

Creating restorative outdoor environments by meeting informational needs: Applying the Supportive Environments for Effectiveness framework to long-term care design

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## Abstract

Supporting health and well-being in long-term care facilities has long been a pressing issue that has only increased in significance due to rising mental health concerns for residents and staff in response to the COVID-19 pandemic. While outdoor environments have been demonstrated to support well-being, these environments in long-term care, if well designed, are typically only designed for the functional needs of residents. These spaces are rarely designed to offer restorative support for staff, as design recommendations are usually in relation to meeting specific needs required as caregivers rather than as individuals. This suggests that outdoor environments in long-term care are unlikely to meet the needs of staff and are, therefore, less likely to be utilized by this user group and less likely to provide any restorative benefit. This study utilized the principles from the environmental psychology framework Supportive Environments for Effectiveness to address this issue (reDirect, 2022). A quantitative study at Meadowlark Hills Retirement Community in Manhattan, Kansas examined the needs and preferences of outdoor environments by both residents and staff in long-term care facilities. Data collection involved photo-surveys of 11 existing outdoor environments inquiring about use patterns, preferences for proposed elements, and satisfaction with existing elements. The surveys also inquired about general outdoor preferences, self-reported well-being, and the impact of the COVID-19 pandemic on well-being and use of outdoor spaces. Survey data from 155 residents and direct care staff revealed significant differences in resident versus staff perceptions and preferences for 10 spaces, indicating a need to create custom outdoor spaces that meet the physical and psychological needs for each user group. This need is further supported by the disparity in well-being between both user groups, with staff reporting a higher frequency of negative affects consistent with mental fatigue and burnout. These findings demonstrate the need to re-evaluate long-term care design to create more supportive outdoor environments for both resident and staff and present the Supportive Environments for Effectiveness framework as a novel application to contextualize psychological needs through contact with nature. The broader outcomes of this study relate to its implications in supporting well-being in residents and staff in long-term care facilities.

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*To my grandparents,  
who first introduced me to the joys of nature,  
and to whom I greatly miss.*

## Chapter 1 - Introduction

As medical advancements and technologies continue to prolong the lifespan of adults, there will be an increasing need for long-term care facilities for the aging population (Hsieh et al., 2022; National Resource Council, 1988). The environmental conditions within these facilities, however, often contribute to increased agitation, aggression, or restlessness in residents and result in lowered quality of life for residents and increased work-related stress in staff – all contributing to reduced well-being (Detweiler & Warf, 2005; Fillit et al., 2021; Schmüdderich et al., 2021). These struggles have been further amplified by the COVID-19 pandemic, which intensified the sense of social isolation for residents and mental fatigue for staff (Booi et al., 2021; Chu et al., 2020). Collectively, these factors contribute to the development or intensification of mental health issues within residents and staff, including depression and cognitive decline (Hwang et al., 2020). Since the mental well-being of staff influences the quality of care they provide to their residents (Eltaybani et al., 2021), it is imperative to examine how to best restore the mental well-being of both populations.

It is well established in the literature that contact with nature is positively connected to health and well-being; studies indicate that exposure to natural environments is linked with improved physical, mental, and social health and associated with improved well-being and overall quality of life (e.g., Berman et al., 2008; Braubach et al., 2017; Chang et al., 2020; Hartig et al., 2011). Within long-term care facilities specifically, nature has the potential to offer opportunities for physiological rehabilitation, development of social networks, reduced agitation and stress, and improved well-being (Detweilder & Warf, 2005; Milligan et al., 2004). These restorative benefits of nature show the importance of well-designed settings in long-term care that encourage contact with nature by residents and staff to improve their well-being.

While exposure to nature has been demonstrated as a potential means of mental restoration, further exploration is needed to identify effective design characteristics of indoor and outdoor spaces in long-term care facilities. There seems to be opportunities to utilize nature to improve the mental well-being of residents and staff at long-term care facilities through the framework titled Supportive Environments for Effectiveness (SEE; formerly known as the Reasonable Person Model; reDirect, 2022). According to SEE, environments that support the basic needs of individuals result in more mentally effective and reasonable individuals (Kaplan & Kaplan, 2003). These environments, termed *supportive*, feature three domains: model

building, being effective, and meaningful action (Basu et al., 2014; Basu & Kaplan, 2015; Kaplan & Kaplan, 2009). In meeting the informational needs within each domain, supportive environments act to support reasonableness, restore mentally fatigued minds, and facilitate the ability to respond effectively to complex situations. In nature, achieving supportive environments requires meeting both needs and preferences of environmental attributes and affordances that provide opportunities for each SEE domain (Figure 1.1). Needs and preferences may suggest differing conditions in indoor and outdoor environments, as needs may refer to the common evolutionary needs as human beings while preferences refer to contextual individualized needs.

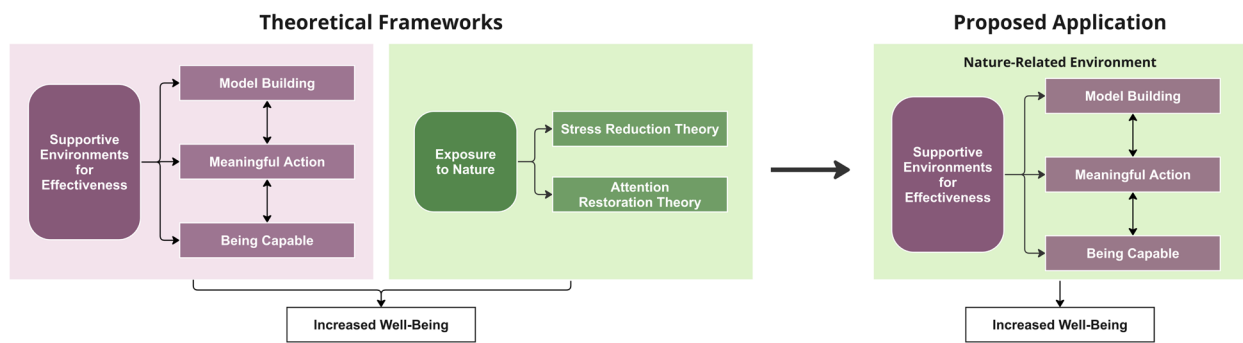


Figure 1.1. Theory to Design Application

Currently, the integration of nature within the design of long-term care facilities is focused on outdoor environments. These spaces are typically designed to address the functional needs of residents but fail to consider the needs of staff. Because of this, there is little literature on whether the outdoor needs and preferences of residents of long-term care facilities align with the needs and preferences of staff. Understanding the needs and preferences of both populations is critical to design effective supportive environments, which can positively impact all users' well-being (Chang et al., 2020). Furthermore, exclusively utilizing nature only in outdoor spaces implicitly limits the restorative benefits of nature to those who are capable of going outdoors. Residents requiring mobility assistance, for instance, are less likely to explore the outdoors and less likely to benefit from the restorative qualities of nature (van den Berg et al., 2020). Similarly, the demands of caring for residents may limit opportunities for staff members to explore outdoor spaces—on their own or with residents (Bengtsson & Carlsson, 2013).

By identifying the necessary and preferred environmental conditions required to create supportive environments for residents and staff, landscape architects can examine the shortcomings of existing environmental attributes and affordances and can provide planning and design solutions to improve the existing conditions according to context-based needs and preferences of the users (see Figure 1.2). Disregarding interior and exterior conditions that comprise supportive characteristics for both user groups may result in decreased well-being in both residents and staff as well as increased burnout and turnover of care staff (Eltaybani et al.,

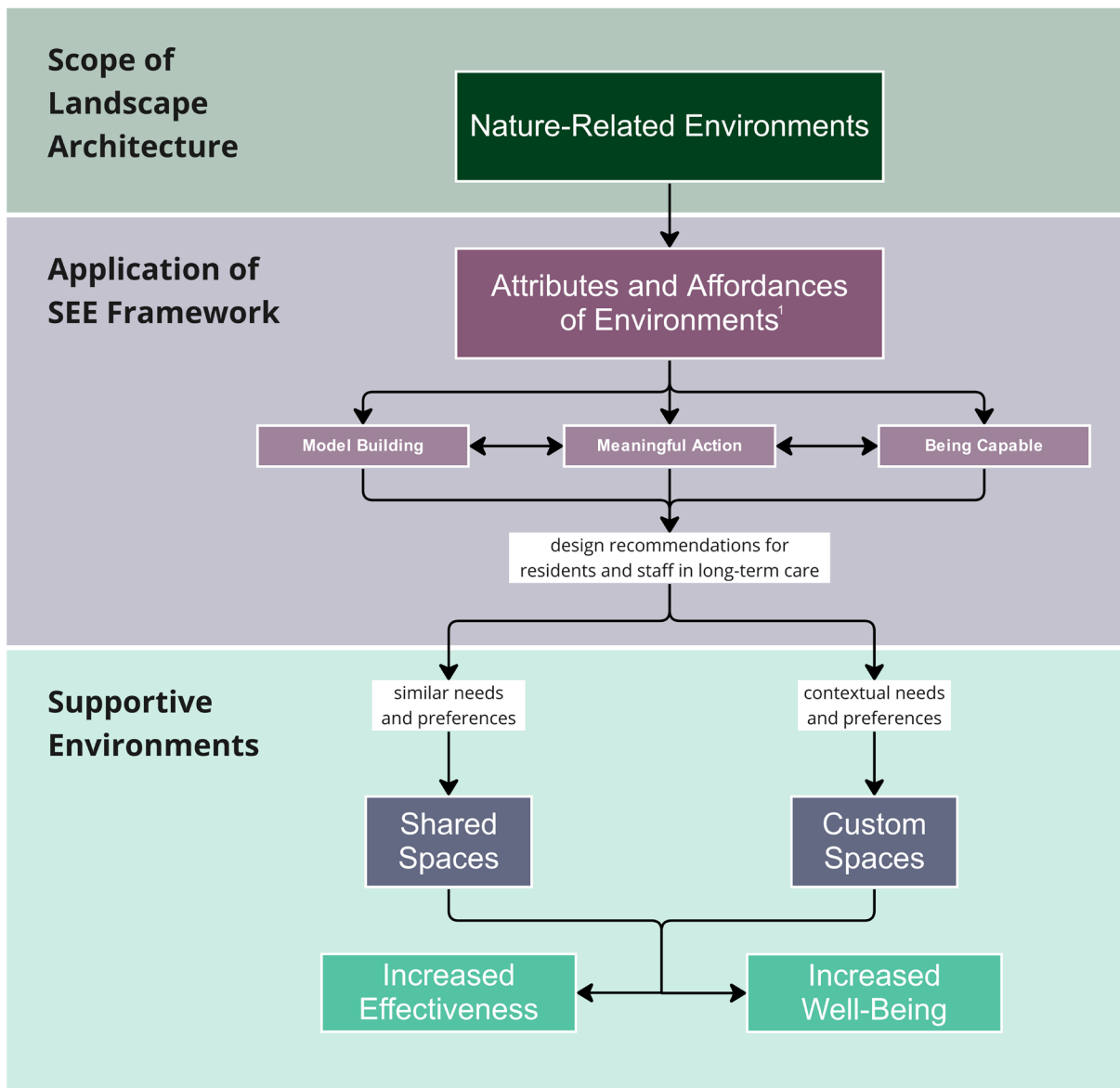


Figure 1.2. Conceptual Framework of Research Design<sup>1</sup>

<sup>1</sup> For details on potential attributes and affordances, refer to Figure 2.3.

2021; Rachel & Francesco, 2018). This creates a cyclic negative environment from unmet needs, as staff burnout is associated with a lowered quality of care for residents (Eltaybani et al., 2021). It is, therefore, important to examine how nature can be utilized in both interior and exterior spaces to support the psychological needs of both residents and staff in long-term care facilities.

This study aimed to address this issue by exploring the following questions:

1. What are the characteristics of a supportive outdoor environment that improve the well-being of residents and staff in long-term care facilities?
2. What are the similarities and differences in environmental attributes and affordances that meet the needs and preferences of residents and staff in long-term care facilities?

## **Chapter 2 - Literature Review**

### **Introduction**

In order to explore how to improve well-being for users in long-term care facilities, this chapter first explores the conceptual frameworks available to define well-being and then examines current trends regarding the well-being of residents and staff in long-term care. The relationship between well-being and supportive environments is highlighted, noting the key environmental psychology theories present throughout the literature. The theoretical framework, Supportive Environments for Effectiveness, is then presented as a novel application to guide design recommendations for long-term care facilities.

### **Defining and Measuring Well-Being**

In order to support well-being, it is imperative to first understand how well-being is defined in the literature to be able to determine how to measure it. There are two conceptual frameworks in which to define well-being: *hedonic* and *eudaimonic* (Cooke et al., 2016; Lent, 2004; Ryan & Deci, 2001). The hedonic approach assesses well-being on the basis of pleasure and happiness, which corresponds to one's satisfaction with life and positive affects (Cook et al., 2016; Ryan & Deci, 2001). The eudaimonic approach centers on achieving one's potential and high functioning (Cook et al., 2016; Lent, 2004). In this study, well-being encompasses both the hedonic and eudaimonic approach and is defined as a state of happiness and contentment with high psychological and social functioning (Ruggeri et al., 2020). It is subjective, with positive mental well-being associated with increased personal satisfaction, effectiveness, and the absence of stress and depression (Cook et al., 2016; Ruggeri et al., 2020).

The subjective nature of well-being typically lends itself to a self-reported measurement. This has resulted in varying well-being scales and measurement tools used in many studies throughout the literature. Cook et al. (2016) identified 42 instruments for measuring well-being. These methods varied in the number of scales and items evaluated, which were based on the specific definition of well-being in a study. For instance, the Flourishing Scale features seven items on one scale and measures the prosperity of one's social-psychological relationships (Cook et al., 2016). In contrast, the Ryff Scales of Psychological Well-Being features six separate scales



and 120 items that measure self-acceptance, autonomy, personal growth, environmental mastery, positive relations with others, and purpose in life (Cook et al., 2016). The measurement of well-being is, therefore, dependent on the exact definition and focus of the research study.

### **Impact of the COVID-19 Pandemic on Well-Being**

The COVID-19 pandemic has become a significant stressor on human health and well-being. As the coronavirus and its variants continue to impact the daily lives of individuals worldwide, the pandemic is found to be associated with increasing amounts of psychological stress and anxiety (Hwang et al., 2020; Khan et al., 2020). As communities imposed lockdowns and mandatory quarantines as preventative public health measures, these and other unfamiliar measures isolated individuals from family, friends, and coworkers. In response to the isolation and uncertainty of the pandemic, individuals experienced increasing levels of stress, anxiety, and depression (Khan et al., 2020). Within long-term care facilities, the negative psychological ramifications of the pandemic on well-being are often amplified. Given the higher risks of infection, hospitalization, and death in older adults, there has been an increased need for stringent quarantining and social distancing to lower the transmission risk of the virus (Hwang et al., 2020). These measures amplify the existing older adult vulnerability to loneliness and social isolation, particularly in long-term care facilities.

The pandemic has also highlighted the need for and importance of outdoor environments (Berdejo-Espinola et al., 2021; Frumkin 2021; Kleinschroth & Kowarik, 2020). With more space for social distancing, the outdoors offers individuals increased opportunity to safely gather with less transmission risk compared to indoor settings (CDC, 2019; Mayo Clinic, 2022). Outdoor spaces became a place for respite for society—a place for recreation and socialization at a safe distance. This allowed nature to alleviate the negative effects of social isolation and quarantine, which improves the health and well-being of individuals (Berdejo-Espinola et al., 2021). With growing recognition and appreciation of the restorative effects of nature, the pandemic has thereby altered the use patterns of outdoor spaces and heightened their demand (Frumkin, 2021). In countries across the globe, people have been spending more time outdoors in response to COVID-19 (Hansen et al., 2022; Ugolini et al., 2020; Volenec et al., 2021). In examining the impact of the pandemic on the use and perceptions of urban [green spaces in Brisbane, a survey of 1,002 individuals found two-thirds of users reported changes in their frequency of use as well as their reasons for using urban green space due to the pandemic (Berdejo-Espinola et al., 2021).

With the need for outdoor spaces to safely socialize, the pandemic has emphasized the necessity of well-designed supportive outdoor environments for individuals of all ages.

### **Examining Well-Being in Long-Term Care Environments**

By the year 2050, the number of older adults worldwide will surpass 2.1 billion—of which, 27 million are expected to require long-term services in the United States alone (Department of Health and Human Services, 2003; World Health Organization, 2022). The increasing demand for these services by older adults highlights the need to examine how the care environments at long-term care facilities impact the well-being of older adults. This need is evident by the prevalence of mental illness within long-term care residents. Recent data indicates almost 30% of long-term care residents suffer from depression, which is accompanied by a form of cognitive impairment in 23.3% of residents (Hsieh et al., 2022). Mental health issues in residents can present at any time of their stay in long-term care—from the initial transition from home to years later. Transitioning from independent living at home to assisted-living at a long-term care facility, for instance, can increase stress and anxiety due to wavering confidence in the decision to move, fearfulness of memory loss, and questions of mortality and time left (Lee et al., 2013). These concerns can be amplified by the sense of loneliness, which affects 22% - 42% of long-term care residents (Simard & Volicer, 2020). Loneliness is proven to impact the well-being of residents as it increases symptoms of depression, reduces perceived quality of life, activates the physiological stress response, and increases the risk of mortality (Hwang et al., 2020; Kobayashi & Steptoe, 2018; Lee et al., 2019; Xia & Li, 2018). The prevalence of loneliness, depression, and other mental disorders have been further amplified by the COVID-19 pandemic, particularly in older adults. Preventative measures to slow the spread of the virus, such as social distancing, quarantine, or self-isolation, contribute to feelings of loneliness, depression, anxiety, irritability, and agitation (Hwang et al., 2020). Although the pandemic will eventually end, improving the care environments for residents in long-term care should remain a priority to improve their well-being.

One frequently overlooked factor impacting the care environments at long-term care facilities is the mental health status of the nursing staff. The nature of caring for others is a high-stress environment that is complicated by demanding situations. The stressfulness of nursing is associated with mental fatigue and high levels of absenteeism and burnout (Harrad & Sulla, 2018). In a cross-sectional study of 95,499 nurses conducted in Pennsylvania, New Jersey,

California, and Florida, 34% of hospital nurses and 37% of long-term care nurses reported experiencing burnout in their current jobs (McHugh et al., 2011). Burnout is described as physical or mental fatigue in response to chronic stressors experienced while working. Symptoms of burnout include emotional exhaustion, depersonalization, reduced performance, and decreased sense of personal accomplishment (De Hert, 2020). It is important to consider the impact of burnout on care environments in long-term care as a decreased sense of personal satisfaction or accomplishment is associated with lower quality of care, which is indicative of decreased effectiveness (Eltaybani et al., 2021). Furthermore, lower job satisfaction of nurses corresponds with decreased patient satisfaction (McHugh et al., 2011). In the same study of 95,499 nurses, McHugh et al. (2011) found long-term care nurses exhibited the highest degree of job dissatisfaction relative to hospital nursing staff—27% compared to 24%, respectively. This is concerning given that burnout is associated with attention deficits, anxiety, asthenia, and depression in care providers—all of which can impact the quality of care given to residents (Eltaybani et al., 2021; Papathanasiou, 2015). Given the correlation between nursing staff burnout and the quality of care for residents, there is a need to explore how the environments at long-term care facilities can support the mental well-being of both residents and staff.

## **Supportive Environments**

It is well-documented in the literature that elements and characteristics of outdoor environments can impact an individual's physical and mental health and overall well-being. Access to quality green space, for instance, has been linked with improved mental health and reduced depression and stress (Braubach et al., 2017; Hartig et al., 2014; White et al., 2013). Viewing pictures of nature is also linked with improved executive attention (Berman et al., 2008; Gamble et al., 2014; Tennessen & Cimprich, 1995). These connections between nature and human health have long been studied, which has given rise to several psychological theories that seek to explain the positive benefits of exposure to natural environments. Early theories, such as habitat-selection and prospect-refuge, suggest individuals have an innate aesthetic preference for landscapes, namely those with savanna-like characteristics, based on ancestral survival instincts (Hadavi & Sullivan, 2018). These theories provided the framework for the concept of environmental affordances. According to Gibson (1979), affordances are the perceived components provided by an environment and how these elements meet the fundamental needs of

a person. Individuals prefer environments with affordances that best meet their needs and purposes.

More recently, the theoretical framework for the impact of landscapes on human health has focused on physiological and psychological responses with the development of the Stress Reduction Theory (SRT; Ulrich 1983; Ulrich et al., 1991) and Attention Restoration Theory (ART; Kaplan & Kaplan 1989), respectively. The Stress Reduction Theory suggests that visual properties of a landscape induce responses in emotional and physiological processes, such as reduced blood pressure from decreased levels of the stress hormone cortisol (Sullivan, 2014). Described by Kaplan and Kaplan (1989), Attention Restoration Theory expands upon the previous theories by focusing on cognitive restoration and information processing. According to this theory, environments that meet the informational needs of an individual offer restorative potential for one's directed attention capacity. More specifically, natural environments with opportunities to reduce directed attention (mental) fatigue are considered restorative (Kaplan, 1995). The emphasis on providing restoration from mental fatigue is important given its potential consequences, which stem from a lowered ability of a person to appropriately respond to the environment. Mental fatigue, therefore, results in increased human error, incompetency, irritability, aggression, and intolerance (Kaplan & Kaplan, 1989; Kaplan et al., 1998). Additionally, a mentally fatigued person exhibits decreased inhibition, lowered effective functioning, and decreased willingness to help those in need (Kaplan & Kaplan, 1989).

Environments that help individuals recover from mental fatigue typically feature four elements that provide opportunities for mental restoration: being away, extent, fascination, and compatibility (Kaplan, 1995). Being away is a conceptual or physical distancing from a fatiguing stressor and becomes restorative with sufficient extent or coherent richness (Kaplan, 1995; Kaplan et al., 1998). Fascination refers to an environment's ability to capture an individual's involuntary attention and can be considered against a soft-hard gradient (Kaplan, 1995). Nature offers soft fascination with opportunities for contemplation, whereas hard fascination fully captures an individual's attention without an opportunity for reflection. The fourth component, compatibility, determines whether a given environment is suitable with an individual's needs and preferences to become restorative (Kaplan, 1995; Kaplan et al., 1998). These factors encourage involuntary attention, which allows the mind to reset a fatigued directed attention state (Kaplan, 1995; Kaplan & Kaplan, 1995; Ohly et al., 2016). Collectively, these theories support the

restorative effects of nature and suggest that humans are psychologically programmed to seek these natural environments.

### Supportive Environments for Effectiveness

Beyond their restorative effects, outdoor environments can meet other needs of individuals and thereby further support health and well-being. One conceptual framework in which to evaluate supportive outdoor environments is the Supportive Environments for Effectiveness (SEE). Developed by Kaplan and Kaplan (2003), this model links human functioning and behavior with environmental contexts that support information processing. According to SEE, supportive environments are those that meet the informational needs of individuals, which in turn fosters reasonableness and effectiveness. These supportive environments manifest the interrelationship of three informational need domains: model building, meaningful action, and being capable (Figure 2.1; Basu & Kaplan, 2015; Kaplan &

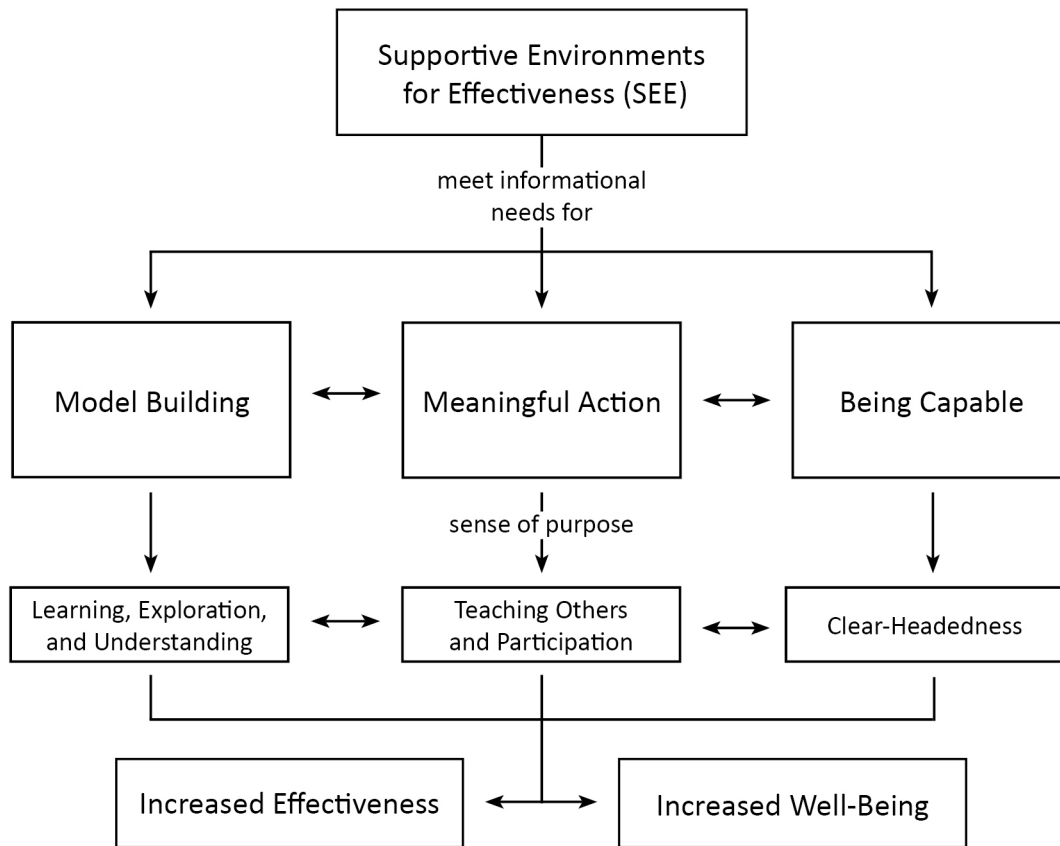


Figure 2.1. Theoretical Framework of the Supportive Environments for Effectiveness (Redrawn from Kaplan & Kaplan, 2009; reDirect, 2022)

Kaplan, 2009; reDirect, 2022). Model building refers to the development of mental models that humans utilize to identify, evaluate, and predict outcomes from an environment. These cognitive maps foster understanding through exploration and experience, which impacts effectiveness and well-being (Kaplan & Kaplan, 2009). The meaningful action domain of the SEE centers on the need of individuals to participate and make a difference with fellow humans. To achieve meaningful action, a supportive environment should allow for participation that is met with respect and appreciation (Kaplan & Kaplan, 2009). Participation can occur at different scales and levels of involvement but requires being heard to satisfy the meaningful action domain (Kaplan & Kaplan, 2009). The third domain of the SEE model centers on capability and effectiveness. Supportive environments satisfy the need to be effective by promoting the ability to process information and to function competently with clear-headedness (Kaplan & Kaplan, 2003, 2009). This domain is associated with the need for directed attention restoration, which increases effectiveness and reasonableness. Together, the three domains of the Supportive Environments for Effectiveness framework illustrate how environmental factors may influence well-being.

### **Application of Supportive Environments for Effectiveness in Long-Term Care**

With the three informational need domains, the SEE framework seems to be particularly suited for application within long-term care facilities. The model's focus on psychological well-being and reasonableness can be applicable to the needs of residents and staff in these facilities. For instance, an individual's transition from full autonomy at home to reduced autonomy at long-term care facilities sparks the need for information in order to understand this new context. Referring back to SEE, this need for information in residents relates to the model building domain. Changes in daily routines, unfamiliarity with the new surroundings, and loss of autonomy often spark confusion and disorientation, which can lead to a strong aversion to the situation. By building a cognitive map, residents can assess and explore environmental contexts and increase their understanding of this new environment. This need for understanding to build cognitive maps is likely to occur in staff as well. With new residents, staff will seek to understand the needs and capabilities of each resident. By acquiring information from the environment, staff can better understand and anticipate the needs of residents. This increased information elicited from the environment increases the effectiveness of care and creates more meaningful health outcomes for residents, which directly connects to the being effective and meaningful action domains of the SEE framework. Environmental deficits in information or

opportunities for meaningful action correlate with mental fatigue, which manifests itself as irritability and declining effectiveness (Kaplan 1995). Given the associations between irritability and dementia in residents as well as decreased effectiveness and burnout in staff, SEE seems to be well-suited for application in long-term care to improve well-being for residents and staff (Schmüdderich et al., 2021).

It is important to note that the Supportive Environments for Effectiveness framework seems easier to be applied as a framework in long-term care facilities that follow care models that are different from traditional models. The traditional “medical” model of care is centered on paternalistic care that requires compliance by patients without direct decision-making (Kumar & Chattu, 2018). Although the psychological need for information implicitly remains, the traditional model does not involve participation of residents in their own care. Long-term care facilities that employ this care model may have more challenges implementing the principles of the SEE framework as opposed to facilities that employ person-centered care. The person-centered care model underlines personal autonomy and respect for an individual’s preferences and needs in medical care (Ekman et al., 2011; Institute of Medicine, 2001). Within long-term care facilities, this care model encourages personal decision making and choice by residents when staff provide assistance with activities of daily living. Rather than relying on routine or habitual care that disempowers the residents and reduces care decisions to a diagnosis, person-centered care offers the opportunity for customized, collaborative care between the resident and staff (Ekman et al., 2011). For residents in long-term care, this care model is associated with improved quality of care, increased satisfaction with health care, and improved health outcomes (Morgan & Yoder, 2011).

With an emphasis on participation and collaboration between residents and staff, the person-centered model seems to be aligned with the principles of Supportive Environments for Effectiveness. By encouraging the participation of residents in their own care, person-centered care supports an environment in which the contributions of residents are valued and respected – echoing the principles of meaningful action. This suggests that residents offer meaningful feedback that care staff seek and respect in order to support the mental models of residents. By seeking to understanding the individual needs and preferences of each resident, person-centered care promotes the building of cognitive maps with increasing interactions between residents and staff. Over time, these interactions are expected to translate into more meaningful resident-staff

relationships and increase the effectiveness of the staff, which can ultimately increase the well-being of residents and staff alike.

The environmental control offered through person-centered care also mirrors principles of job crafting. According to the job crafting model first introduced by Wrzesniewski and Dutton (2001), job crafting refers to the actions employees take to physically, psychologically, and socially shape and redefine their jobs. This is motivated by an employee's desire to take ownership in their work, which results in a job that better fits the individual's needs and preferences (Wrzesniewski & Dutton, 2001). By implementing elements of the SEE framework in long-term care, these environmental interventions can improve the psychosocial work climate as employees participate in crafting their work processes and environment. These targeted interventions increase the person-job fit, leading to work perceived as more meaningful—aligning directly with the informational needs domain of meaningful action (Tims et al., 2016). By creating more meaningful work, the principle of job crafting overlaps with the conceptual framework of SEE to improve employee well-being and to target the high rates of absenteeism, burnout, and turnover present within long-term care. The person-centered model of care, therefore, offers opportunities to implement environmental interventions that meet the informational needs domains of SEE while promoting both contact with nature and job crafting.

### **Environmental Characteristics of Supportive Environments in Long-Term Care**

Although there are two different groups of users of outdoor environments in long-term care, residents and staff are likely to exhibit overlapping needs and preferences based on evolutionary psychology. Regardless of race, gender, or age, humans are intrinsically programmed to prefer natural environments (Kaplan & Kaplan, 1995). As humans have evolved and developed over time, humans developed preferences for certain environments most compatible to their needs and those that enable effective functioning. Studies have indicated that certain landscape themes are consistently preferred across cultures, such as water features over use of quarried rock (Kaplan & Kaplan, 1995; Yang & Brown, 1992). These shared preferences suggest that there may be environmental attributes and affordances preferred by both residents and staff in long-term care.

While there are common attributes of the landscape that are preferred overall, there is likely to be differences in the relative value of preferences given contextualized individual needs due to age differences and differences in function in the facility (care giver versus care recipient).



These differences can arise from variations in familiarity with natural environments, which arise from personal experiences and place of residence (Kaplan & Kaplan, 1995). For instance, a long-term care resident who spent the majority of his life as a rancher in western Kansas might prefer natural settings that are reminiscent of the prairie. This preference might differ from a nurse in the same facility who lacks the same familiarity with the prairie as her patient. The nurse works indoors throughout the day and then returns to her residence in a suburban development, which lacks natural prairie views. While the resident might prefer an outdoor environment that mimics a natural prairie, the nurse might prefer a more manicured lawn. These differences in familiarity are further exemplified by the work-residence distinction, which often reveals consistent variations in preferences (Kaplan & Kaplan, 1995). In this distinction, individuals residing in a particular area exhibit different landscape preferences than individuals who work in the same area but live elsewhere (Kaplan & Kaplan, 1995). Residents have increased experiences and thus greater familiarity with the natural environment than transient workers. This difference in familiarity of outdoor environments can thus influence design preferences for a supportive environment in long-term care.

Each user group is also likely to prefer environments that are most suitable for their needs, which may vary between residents and staff. Residents with decreased physical strength or requiring mobility devices, for instance, may prefer environments with level, paved surfaces with frequent opportunities to rest. While staff may also appreciate an outdoor environment with frequent opportunities to rest, this preference is likely to arise from a different need. Whereas this affordance offers an increased sense of physical safety and comfort for residents, staff may prefer this affordance for rest and meditation during work breaks. In order to effectively design outdoor spaces that function as supportive environments for residents and staff, landscape architects and other designers must, therefore, consider the range of overlapping and differing needs and preferences of both user groups.

### **Existing Design Recommendations in Long-Term Care**

In examining existing design recommendations for long-term care facilities, opportunities to connect with nature are commonly limited to exterior spaces. These outdoor spaces are typically designed with the goal of improving the quality of life of residents, often through nature-based activity or social interactions (Calkins, 2020; Cooper Marcus & Sachs, 2013; Milligan et al., 2004). An accessible, communal gardening, for instance, offers opportunities for

sensory stimulation, exercise, social inclusion and networking, and collaboration amongst residents of all ages, regardless of mental capacity and physical limitations (Calkins, 2020; Cooper Marcus & Sachs, 2013; Loeffler, 2004; Milligan et al., 2004; MMP Architects, 2018). Activities, such as filling bird feeders or raising/lowering the flag each day, offer opportunities for residents to meaningfully participate outdoors in the care community (Calkins, 2020; Loeffler, 2004; MMP Architects, 2018).

Design recommendations are often framed to promote increased accessibility or increased comfort to meet the functional needs of residents, such as the need for ambulatory accommodations or the importance of shade (Calkins, 2020; Cooper Marcus & Sachs, 2013; MMP Architects, 2018; Rodiek & Lee, 2009). In order to promote frequent usage of outdoor spaces by residents, recommendations for design parameters that increase access to the outdoors are frequently mentioned, such as the need for unlocked doors that are either automated or easy to open (Calkins, 2020; MMP Architects, 2018). Due to potentially limited stamina of residents, designers should also include a sitting area close to a primary door (Calkins, 2020; Cooper Marcus & Sachs, 2013; MMP Architects, 2018). Since some individuals will prefer to sit in the sun and others will prefer shade, these seating areas and other spaces throughout the landscape should provide opportunities for both preferences. The need for shade is particularly important as common medications, such as certain antibiotics, antidepressants, and diuretics, increase sensitivity to sunlight and increase the risk for sun damage and sunburns (Cooper Marcus & Sachs, 2013). Shade can be provided through tree canopies, umbrellas, and trellises. In addition to variations in preferences and needs for sun versus shade, there will also be variations in the seating preferences in older adults, with some needing bilateral arm support (Calkins, 2020). Seating elements should be provided at frequent intervals of path systems, such as every 15-feet (Cooper Marcus & Sachs, 2013; Rodiek & Lee, 2009). It is also recommended to use level, tinted concrete paths to reduce glare and increase safety for the elderly (Calkins, 2020; MMP Architects, 2018). Similarly, handrails throughout outdoor spaces increase the safety for users needing physical support for ambulation (Cooper Marcus & Sachs, 2013; MMP Architects, 2018). Handrails also facilitate sensory interactions with environmental features, such as providing stabilization to touch nearby plants or water elements (Rodiek & Lee, 2009).

When selecting planting materials for outdoor environments in long-term care, the literature recommends flowering plants in monotone groupings or with warm hues (Cooper

Marcus & Sachs, 2013; Kwack et al., 2005). These color palettes aid older adults in discerning flowers and plants, with warm hues specifically more easily discernable than cool hues (Cooper Marcus & Sachs, 2013). The design of outdoor spaces should include plants with varying height, sensory properties, and seasonal variation to maintain resident interest. Plants that attract butterflies or provide nesting habitat for wildlife also provide opportunities for passive interactions with the outdoors (Kearney & Winterbottom, 2006). Plant selection should also consider the shade cast by each species as residents with dementia can misinterpret shapes of shadows as threatening (Cooper Marcus & Sachs, 2013).

Since most existing recommendations are grounded in the physical and mental capabilities of residents, there is limited consideration for staff needs. When the needs of staff are considered, they are usually in relation to meeting specific needs required as caregivers rather than individual needs (see Figure 2.2). For instance, a common recommendation is to increase

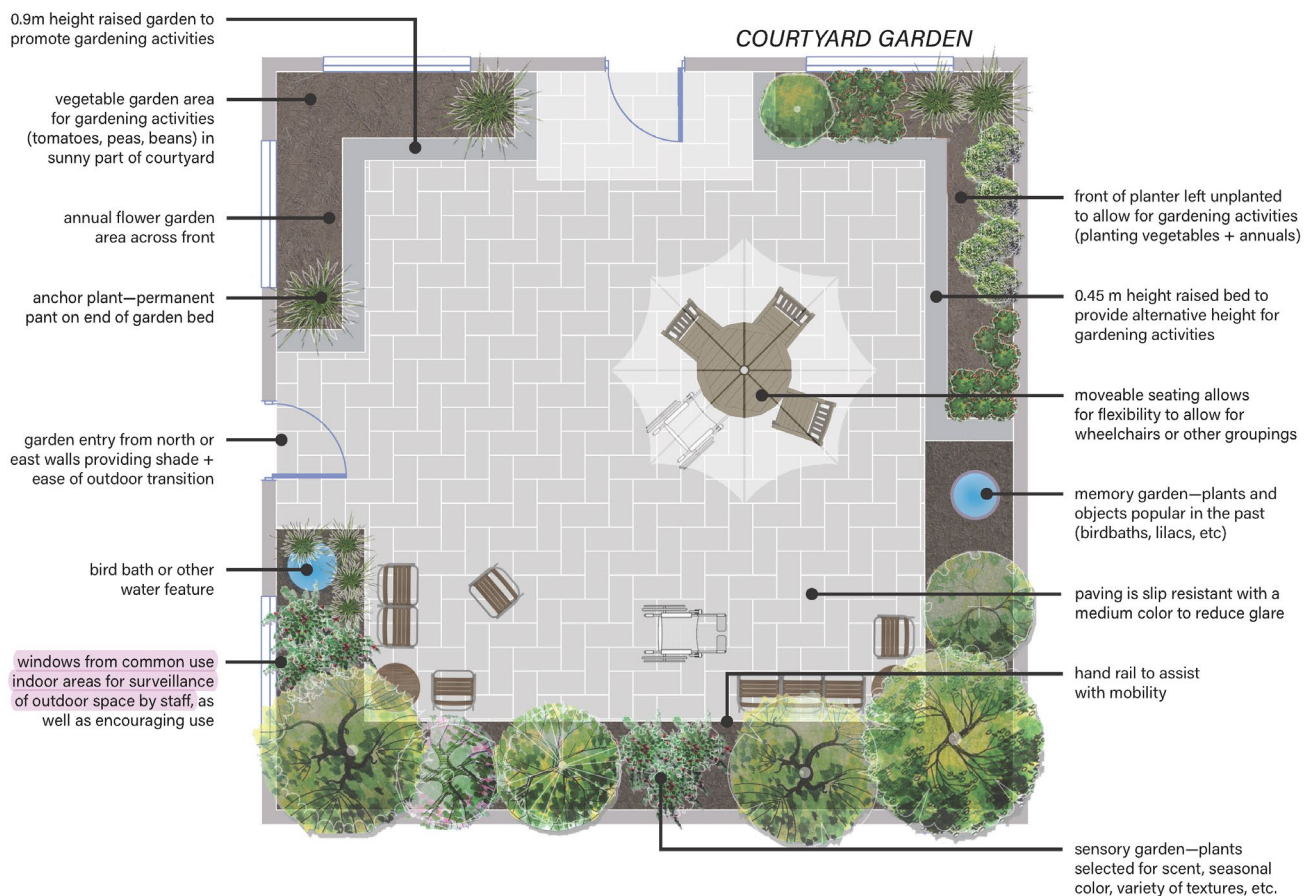


Figure 2.2. Design Recommendations for a Courtyard Garden in Long-Term Care, with Added Emphasis Highlighting Staff Needs (Recreated with Permission from Robert Wrublowsky | MMP Architects, 2018)

the number of windows overlooking an outdoor space in order to maintain visual access of staff indoors to residents outdoors (Calkins, 2020). This recommendation arises from the need to promote resident safety and supports the caregiving role of staff through surveillance of residents (see Figure 2.2); however, it is not intended to promote staff connection with nature, thereby limiting restorative opportunities for this user group.

By limiting connection with nature to the outdoors, existing design recommendations implicitly limit the restorative potential of nature for all users. Even with access to well-designed outdoor spaces, users must have the time, means, and desire to explore these spaces in order to reap their benefits. However, commonly proposed and reported barriers to the use of outdoor spaces in long-term care include residents unable to open locked doors, thresholds too difficult to cross, too few staff members available to accompany a resident, and adverse weather conditions (Bengtsson & Carlsson, 2013; van den Berg et al., 2020). Residents and staff without the ability to explore outdoor environments are consequently limited to achieving the restorative benefits of nature indoors. In the design of long-term care facilities, this indoor connection is often achieved through a window view to the outdoors. This visual connection with nature is a key element in biophilic design, which is a design practice that promotes the connection between individuals and nature in the built environment (Browning et al., 2014; Downton et al., 2017; Peters & Verderber, 2021). Numerous studies have shown that windows with views of nature are preferred in a variety of settings and offer multiple restorative benefits, including improved health status, improved directed attention capacity, and faster recovery times (Tennessen & Cimprich, 1995; Ulrich, 1984; Verderber & Reuman, 1987). Depending on the location within a given long-term care facility, window views can vary in terms of quality and content. While one resident's view might feature a scenic overlook of a waterscape, another resident's view in the same facility might predominantly feature a parking lot or other urban hardscape. Additionally, a resident with a natural view outdoors might prefer to block the view with curtains or blinds due to light sensitivity or privacy concerns. The restorative potential of a window view is, therefore, limited to one's location within a facility and further influenced by personal preferences.

In a systemic review of existing design guidelines of outdoor spaces in long-term care, van den Berg et al. (2020) noted only four studies with design recommendations grounded in the opinions of long-term residents, their family, or staff. Given that existing design recommendations often result in underutilized connections with nature both indoors and

outdoors, it is likely that there is a disconnect between user preferences and design intentions. Understanding the preferences of residents and staff should, therefore, be a priority when proposing new design recommendations in order to increase restorative connections to nature. By incorporating the preferences of both user groups alongside the informational needs domains Supportive Environments for Effectiveness, design recommendations for long-term care facilities can create more meaningful, holistic supportive environments.

### **Applying Supportive Environments for Effectiveness to Long-Term Care Design**

Given the range of existing design recommendations in long-term care and their tailoring specifically to the needs of residents, there is a need to evaluate how, and if, these recommendations also meet the needs of staff. By utilizing the Supportive Environments for Effectiveness framework as a tool to guide design decisions, landscape architects and other designers can create environments that better support the informational needs of all users in long-term care. This study aimed to identify potential attributes and affordances in the landscape that can meet these needs but also align with personal preferences. The key goal of this study was to develop a scoring index in which to evaluate existing outdoor spaces and identify potential informational need domain gaps.

### **Applying Supportive Environments for Effectiveness to Design Recommendations**

Landscape architects and other designers can translate the conceptual framework of Supportive Environments for Effectiveness into specific environmental attributes and affordances for use as design recommendations in long-term care facilities. The overarching concepts of SEE can be explored by domain to recommend activity opportunities and spatial elements for indoor and outdoor supportive environments (Figure 2.3). By utilizing this sequential flow chart, designers can create tangible designed spaces that fulfill one or more of informational need domains (see Figure 2.4). For instance, to fulfill the domain of meaningful action, supportive environments must provide opportunities that satisfy the need for a sense of purpose through participation, helping, or teaching others. If a designer wants to consider how to integrate opportunities for teaching others into a space, then an indoor or outdoor classroom could provide the necessary environmental attributes and affordances to satisfy this need. These spatial elements could include a chalkboard, amphitheater, indoor or outdoor projector, or

demonstration kitchen to facilitate the learning process in the classroom. An indoor or outdoor classroom could also satisfy the need for model building by providing opportunities for exploration or learning. The same spatial elements that provide opportunities for one domain could, therefore, satisfy the informational needs of another domain.

### Conclusion

With the growing demand for long-term care services, there is an increasing emphasis on improving well-being in long-term care facilities. Although much consideration is given to improving resident well-being, it is equally important to consider staff well-being in order to reduce burnout and improve the quality of care. Given the relationships between nature and supportive environments, improving connections with nature is likely to improve the well-being of both populations. However, existing design recommendations that promote connections with nature in long-term care facilities are unlikely to meet the needs and preferences of both residents and staff—resulting in underutilized environments with limited restorative potential. There is an opportunity to apply the concepts of the informational needs domains from the Supportive Environments for Effectiveness framework to natural elements to improve well-being. By applying the domains of model building, meaningful action, and being capable to nature-related environments in conjunction with user-specific needs and preferences, designers can create supportive environments to inform well-being in long-term care.

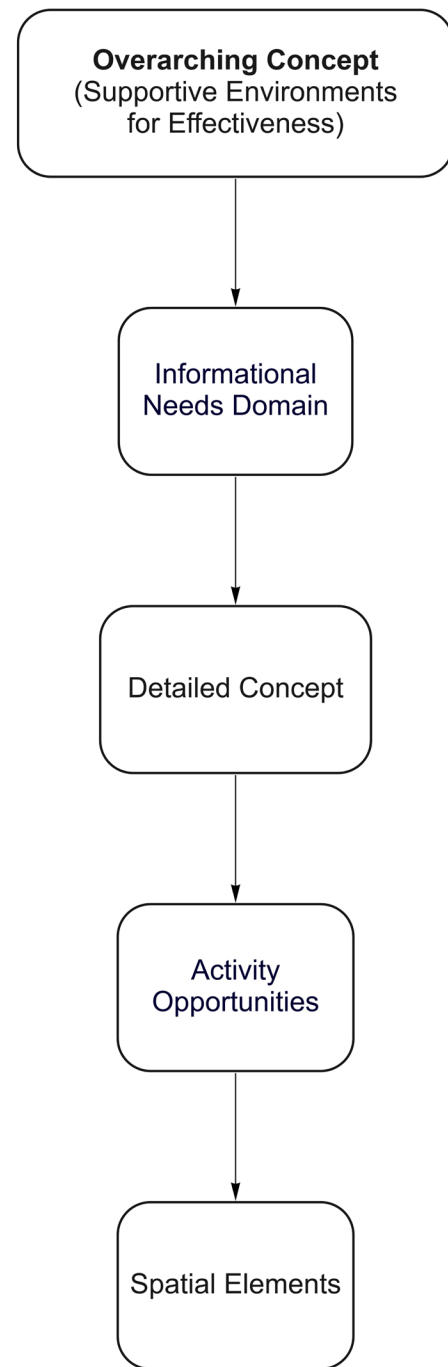


Figure 2.3. Framework for SEE Application in Design

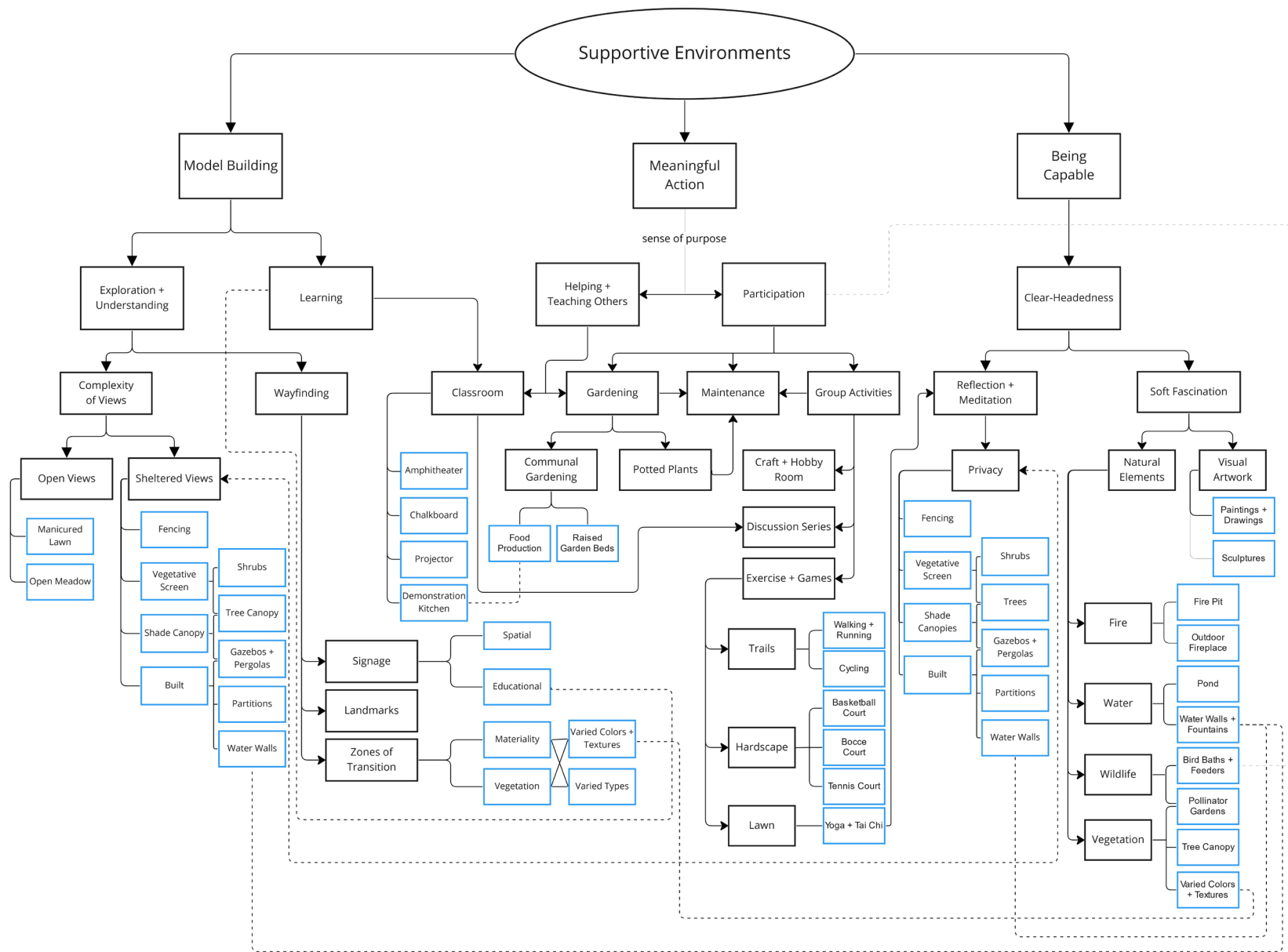


Figure 2.4. Translating the SEE Framework into Spatial Design Elements

--- denotes connection to other informational needs domain

# Chapter 3 - Research Design and Findings

## Introduction

This project utilized a quantitative approach to address the research questions. The study was conducted at a local retirement community in Manhattan, Kansas with person-centered care. This chapter details the principles guiding site selection, including notable social and site data, as well as the importance of the Household Model of Care in applying the Supportive Environments for Effectiveness framework to long-term care design. The research design guiding the methodology for data collection is then explored to detail the chosen constructs and their metrics. The results of the surveys are then detailed and discussed to reveal key findings.

## Site Selection

Located in northeast Manhattan, Kansas (Figure 3.1), Meadowlark Hills was selected as the site to investigate the research questions. With a 55.87-acre campus, Meadowlark Hills offers one of the largest campuses in Manhattan for older adults with three levels of care: independent living, assisted living, and skilled nursing in healthcare households. The healthcare households are designed according to the Household Model of Care, which is recognized for its emphasis on resident-directed, or person-centered, services in home-like environments (Ahmed et al., 2019;

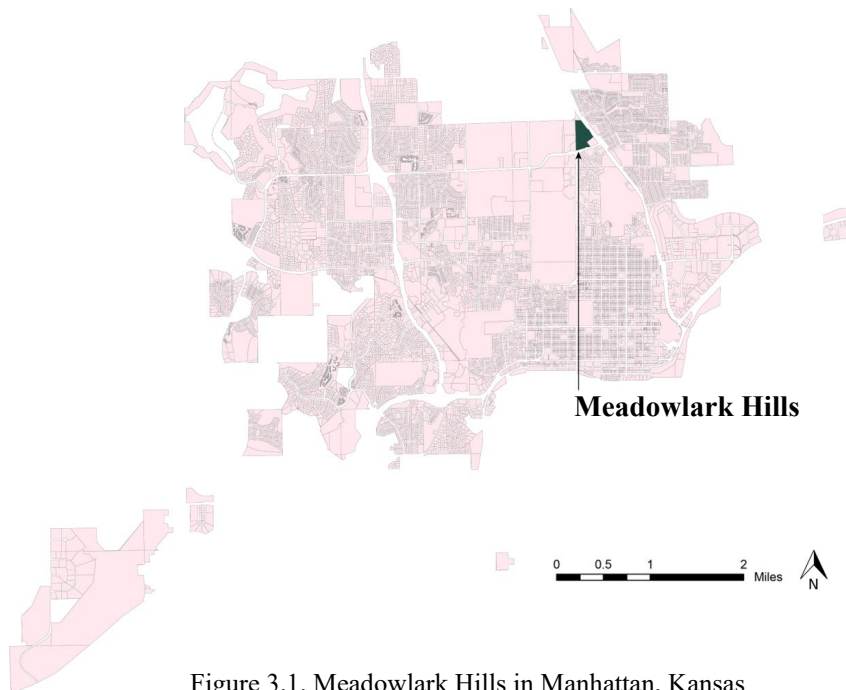


Figure 3.1. Meadowlark Hills in Manhattan, Kansas



Carnemolla et al., 2021). The built environment in these households is intended to promote a culture of social investment with resident identity and autonomy, all of which facilitate positive aging (Ahmed et al., 2019; Carnemolla et al., 2021). Compared to traditional models of care, person-centered care encourages the participation of residents to create more effective care and improve well-being (Ekman et al., 2011). By prioritizing person-centered care within the Household Model, Meadowlark Hills seems to have subscribed to some of the principles of the SEE framework. While there are other person-centered care facilities, such as Loch Lomond Villa in New Brunswick, Canada, Evergreen Retirement Community in Oshkosh, Wisconsin, or Traceway Retirement Community in Tupelo, Mississippi, Meadowlark Hills was chosen due to its proximity to Kansas State University and its existing collaborative relationship with the university's Center of Aging. These factors informed site selection due to the ease of access and stronger potential for collaboration to facilitate data collection. Meadowlark Hills, therefore, offers the unique opportunity to explore how supportive environments in long-term care can better utilize both outdoor and indoor nature-related settings to further foster well-being in both residents and staff.

## **Social Data**

Meadowlark Hills is currently home to over 370 residents in independent living, assisted living, and healthcare households (Meadowlark, 2022). The facility employs approximately 500 staff, including nurses, care aides (e.g., certified nursing aide or certified medication aide), administrative staff, and other auxiliary staff (Meadowlark, 2022). For this study, residents from independent living, assisted living, and healthcare households and all direct care staff were targeted for data collection. Residents were recruited in-person, while staff participants were recruited primarily via flyers sent to work emails and posted in staff-only nursing areas as well as via in-person recruitment.

## **Site Data**

The Meadowlark Hills campus currently features several types of outdoor environments that range from large hardscape gathering spaces to an extensive nature trail (Figure 3.2). These environments are spread throughout the campus, which increases accessibility to outdoor spaces for site users. Each space offers different attributes and affordances as outdoor supportive

environments. For instance, the courtyard and trail system at Meadowlark offer opportunities for socializing and physical activity with other residents, guests, and the general public. The courtyard is located to the north of the community center and offers the largest paved gathering space at Meadowlark Hills. It is largely hardscape and includes numerous seating options as well as a several amenities, including a fire pit, outdoor bar and grill, putting green, and bocce ball court (Figure 3.3). This space is also shaded by a pavilion on the eastern edge and features juvenile tree species with small canopies. This large courtyard space is available to rent for public events that are not associated with Meadowlark, such as business meetings or family gatherings. Although the

courtyard is intended for residents and their guests, its availability to the public indicates that staff could use this outdoor space as well.

Similarly, the walking trail system is available for public use. The partially-paved trail system is accessible on the entire campus and provides access to Bayer's Nature Area, Leon's Glen, Donner's Way, and Stillman Cemetery. The unpaved portions of the trail feature grass, mulch, or soil walking paths, which may limit accessibility for users following precipitation events. The trail includes access to a wooden foot bridge, pavilion, pond, large tree canopies, and

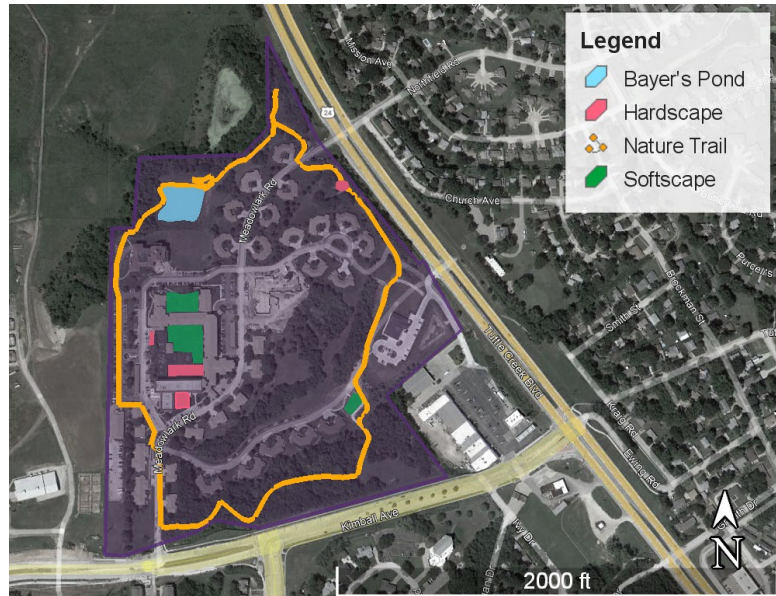


Figure 3.2. Primary Outdoor Spaces at Meadowlark



Figure 3.3. East Side of the Courtyard

native vegetation (Figure 3.4). The trail system is the primary outdoor environment that promotes walking and other physical activity on the Meadowlark campus. It is the connection system to Bayer Pond (Figure 3.5), which features gazebos, fishing docks, and various seating options for socializing, meditation, or nature-related pursuits (e.g., fishing or birdwatching).



Figure 3.4. Perspective from the Walking Trail



Figure 3.5. Perspective Overlooking the Pond from the Trail at Bayer's Nature Area  
(Reproduced with Permission from Meadowlark Hills, n.d.)

In addition to these publicly accessible outdoor spaces, Meadowlark Hills features additional outdoor amenities reserved for residents. There is a large community garden that was recently re-located to the end of Meadowlark Valley Road. Any resident can reserve a plot in the garden, which includes access to gardening tools and water for irrigation. In addition, independent living residents in apartments and cottages often have private patios at a variety of scales with variable attributes and affordances suited to the individual preferences of each resident. Each healthcare household also features a dedicated patio space for use by all residents in the household, which is typically enclosed with fencing or screening for resident safety. Within healthcare households, these spaces are intended to be used for intimate visits with family, life enrichment with staff or other residents, and personal reflection or meditation. These spaces can feature a variety of spatial elements, including, but not limited to, bird feeders, potted plants, fountains, open lawn, and gazebos.

Given the variety of outdoor environmental affordances offered at Meadowlark Hills, this site offered the opportunity to explore the extent to which use of such spaces is associated with the residents' and staff's sense of well-being and satisfaction with outdoor spaces.

## Methodology

To answer the research questions, this quantitative study utilized photo-elicitation surveys of existing outdoor spaces to identify environmental attributes and affordances that would meet the informational needs and preferences of residents and staff at Meadowlark Hills. Photographs were used as they allow the brain to quickly process, inventory, and evaluate landscapes – allowing the viewer to reflect on purpose, personal usage, and preferences (Clark-Ibáñez, 2004). Additional questions explored general preferences for outdoor spaces, familiarity, and perceived well-being. Figure 3.6 illustrates the overarching design of this quantitative study in relation to the research questions and the photo-elicitation surveys.

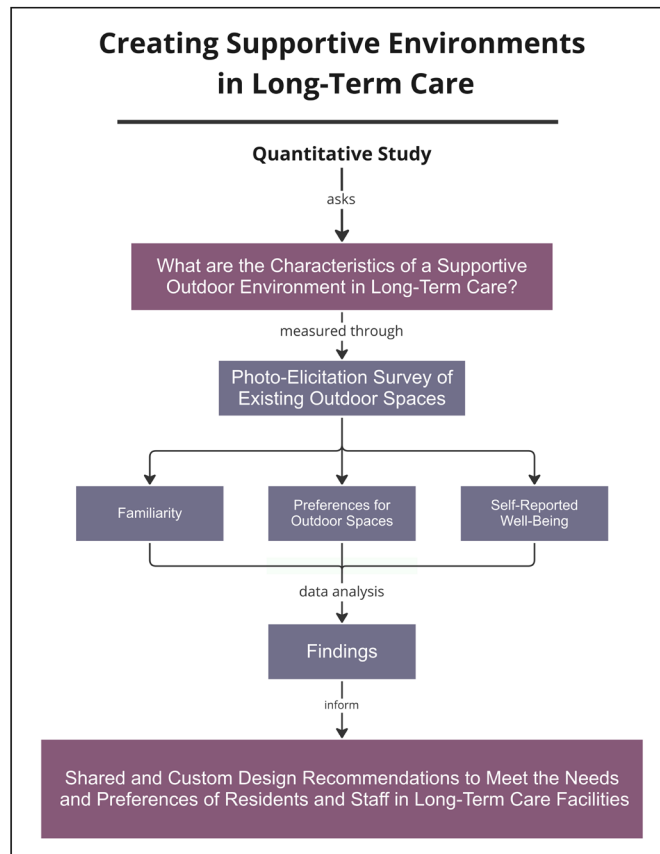


Figure 3.6. Research Design

## Survey Design

The design of the surveys was centered on three overarching variables: well-being, familiarity with outdoor spaces, and preferences for outdoor environments (see Figure 3.7). Additionally, the impact of the COVID-19 pandemic was examined to evaluate the extent to which it altered the other constructs. The 11 outdoor spaces chosen for the photo-elicitation survey reflected the range of outdoor spaces available to residents and staff based on privacy, attributes, and affordances. Attributes refer to physical characteristics present in the given space,

while affordances refer to possibilities for specific use or activities that a space offers. All metrics were measured through 5-point Likert scale questions in which respondents indicated the extent to which they agree or disagree with each statement. Refer to Appendix A and Appendix B for the full resident and staff surveys, respectively.

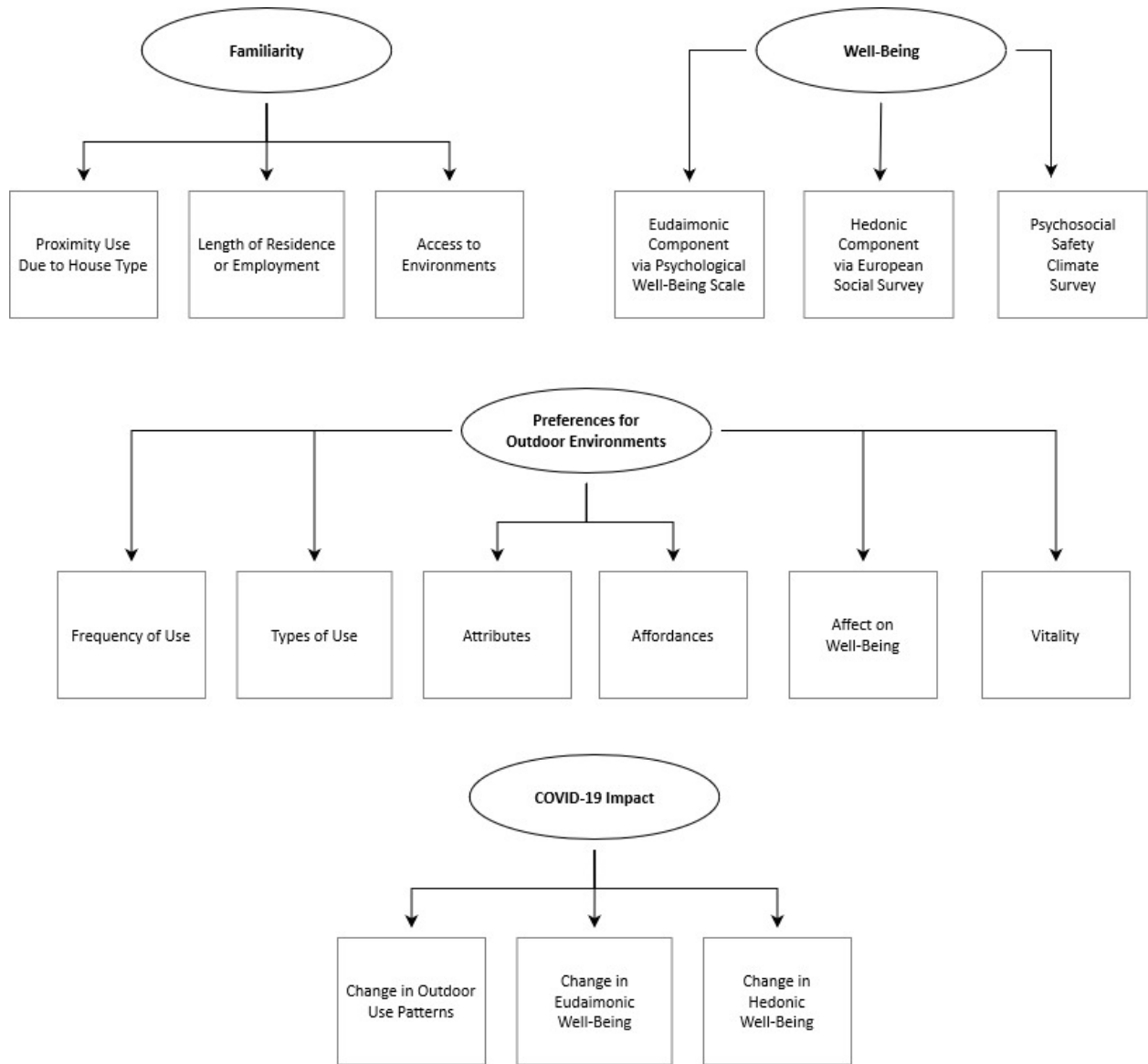


Figure 3.7. Variables and Constructs of Photo-Elicitation Surveys

### **Familiarity**

The Meadowlark Hills campus features a variety of public and private outdoor spaces available for resident and staff use. These spaces are distributed throughout the campus, which

impacts the ease of accessibility for potential users. Familiarity is likely a key factor impacting the use and satisfaction of these spaces, with unfamiliar spaces less likely to be utilized and, therefore, less likely to provide restorative potential. Furthermore, it is likely that residents and staff are more familiar with outdoor spaces in closer proximity to their household compared to other spaces. Close proximity might also influence access to particular outdoor spaces, such as Bayer’s Nature Area or Donner’s Way Trail, which are more difficult to access relative to other spaces on campus. The terrain of the nature trail, for instance, is likely to create a barrier to access for individuals with limited vitality—particularly those not in close proximity to the trail. Additionally, each skilled nursing household features a private patio space that is available for exclusive use by residents and staff within that household.

For the photo-elicitation survey, familiarity was evaluated according to two broad metrics: degree of awareness and accessibility (see Figure 3.8). Degree of awareness was gauged through questions inquiring about frequency of use and about the length and location of residence/employment. Accessibility was also considered as a metric influencing familiarity and was measured by proximity due to household type (i.e., independent living, assisted living, or healthcare household), public versus private spaces, and potential barriers to access (e.g., physical ability, feelings of safety, or unpaved surfaces). These items can impact a user’s ability to access outdoor spaces, which may limit their familiarity with different outdoor spaces.

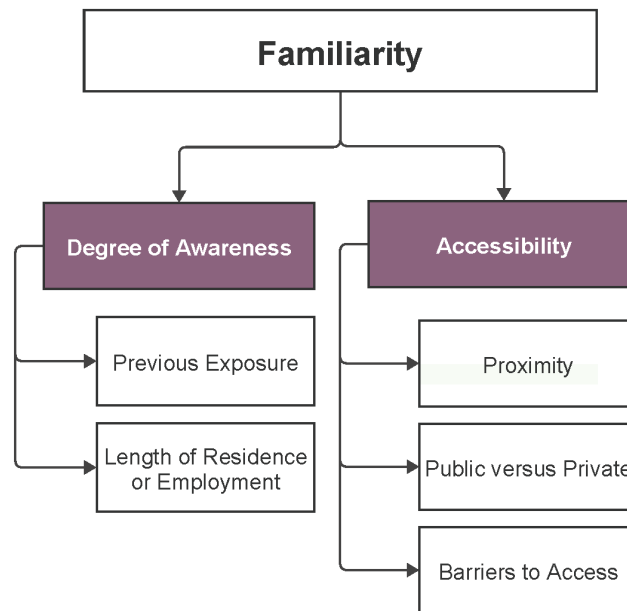


Figure 3.8. Metrics of Familiarity

## Preferences for Outdoor Spaces

The surveys featured 11 photographs of existing conditions of outdoor environments at Meadowlark Hills (Figure 3.9). These photographs document the range of environmental

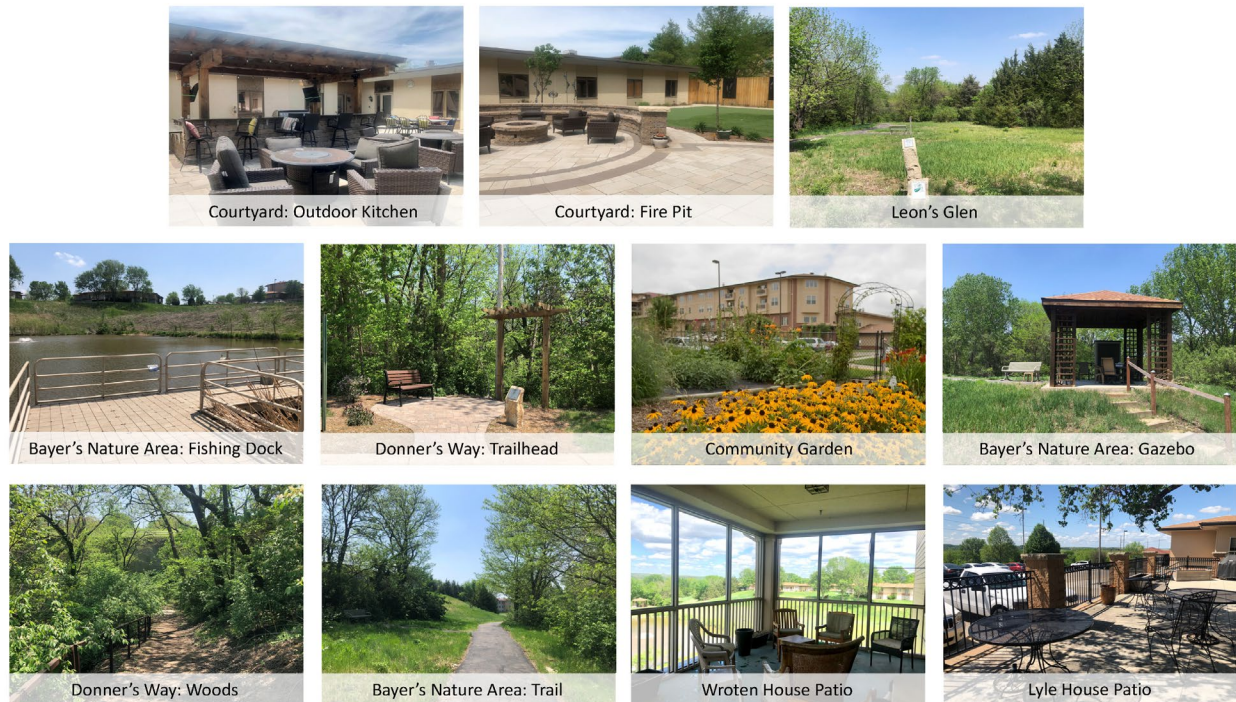


Figure 3.9. Existing Sites Selected for the Photo-Surveys

attributes and affordances currently on-site in May 2022, such as outdoor seating areas, types of outdoor activities, accessibility of walking paths, water elements, amount of green space, tree canopies, and vegetation types (e.g., manicured lawn or native landscapes). All photographs were taken at eye level to mimic the normal experience of the outdoor environment by users. Preferences for outdoor environments were measured through four metrics: attributes, affordances, usage, and effect on well-being (see Figure 3.10). Participants were also asked to indicate preference for potential attributes and affordances that could be introduced to each space or to the larger campus that would fulfill informational needs of the Supportive Environments for Effectiveness framework. Each existing space is also evaluated for usage and effect on well-being, to better gauge preference and degree of supportiveness, respectively. By evaluating usage, environmental attributes and affordances, and impact on well-being, each space can be better evaluated for its potential as a supportive environment for both residents and staff.

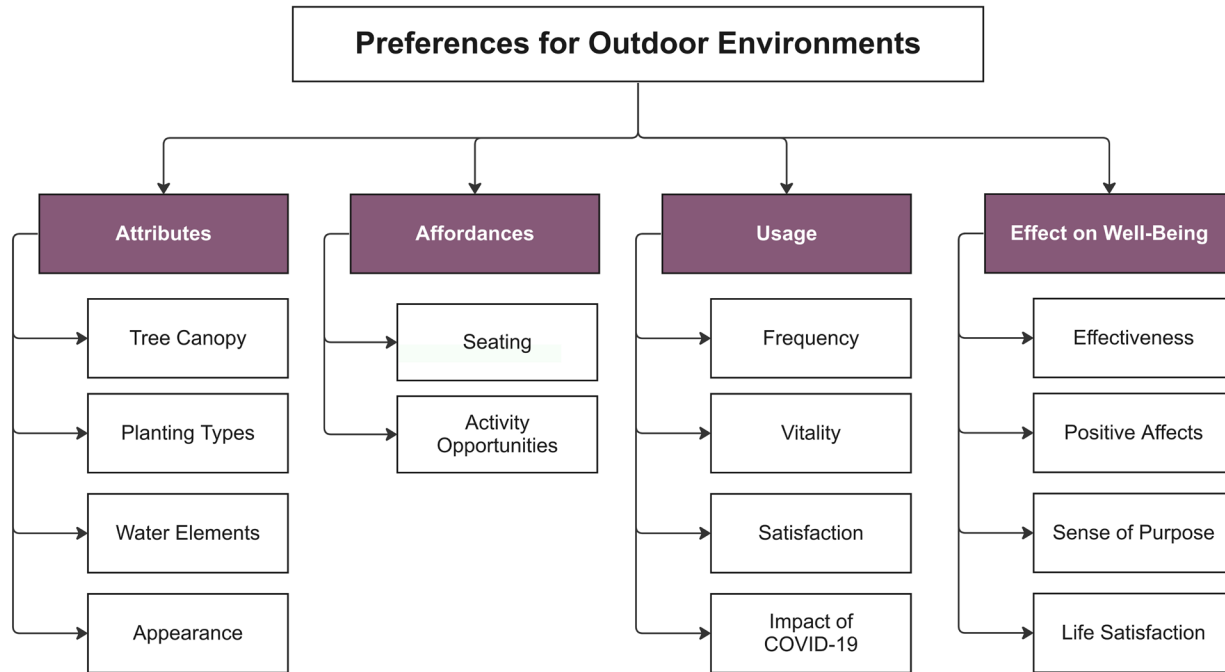


Figure 3.10. Metrics of Preferences for Outdoor Environments

## Well-Being

In this study, well-being was defined as a state of happiness, contentment, and effective functioning in the absence of depression, stress, and mental fatigue. Well-being was measured as a self-reported view of personal satisfaction with life, social connectedness, and attentional functioning. Since both eudaimonic and hedonic components of well-being are studied, the tools to measure well-being encompassed both aspects. Although there are many scales in the literature for well-being, this study utilized the Psychological Well-Being Scale and the European Social Survey to measure eudaimonic and hedonic influences, respectively (OECD, 2013). These scales measured the aspects of well-being considered in this study, such as feelings of happiness, sadness, and loneliness as well as competence, social relationships, and sense of meaning and purpose (see Figure 3.11).

The staff survey also utilized elements of the Psychosocial Safety Climate (PSC) scale to evaluate the impact of the workplace environment on well-being (Berthelsen et al., 2019). The PSC scale measured staff perception of the extent to which Meadowlark Hills promotes stress prevention and the well-being of employees.



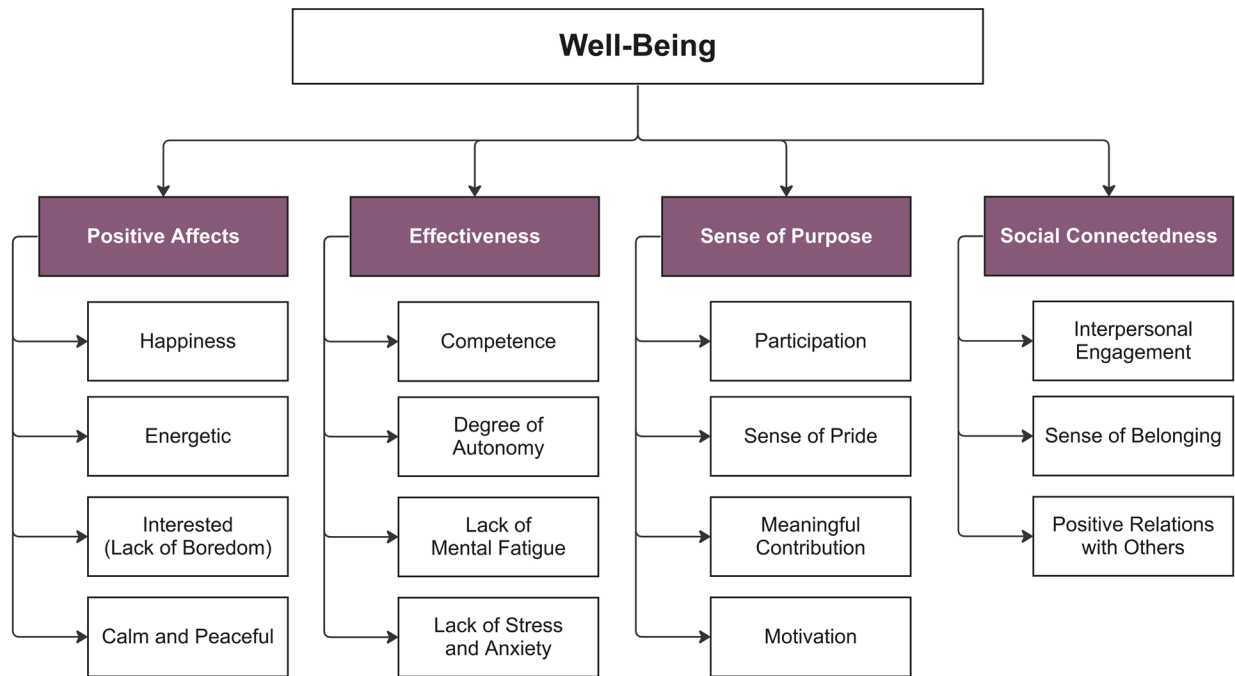


Figure 3.11. Metrics of Well-Being

## COVID-19

Given the impact of the COVID-19 pandemic on mental health and increased awareness of the importance of outdoor environments, the survey asked both user groups how the pandemic influenced their well-being and frequency of use of outdoor spaces. The staff survey also included questions about the impact of coronavirus protocols on the working environment as a potential confounding variable impacting well-being.

## Data Collection

From June to November 2022, the surveys were distributed digitally and on paper for staff and residents based on familiarity with technology and needs of respondents. All direct-care staff were recruited through email communications, flyers with QR codes, and physical copies delivered to households. The researcher closely coordinated with Meadowlark’s Engagement Coordinator to identify staff that were classified as direct-care staff and to email potential participants via their work emails. At the request of the Engagement Coordinator, the researcher held an informational session in May 2022 to introduce herself and the project to the residents at Meadowlark Hills. Residents were then recruited through door-to-door surveying by the

researcher that summer and fall. All independent living apartments and cottages were targeted, although permission was needed to enter assisted living and skilled nursing households.

## Participants

The total number of survey participants was 189, although 34 surveys were not included for data analysis due to incompleteness. This reduced the total sample size to 155, which included 103 resident and 52 staff participants. The demographic information for each user group that was collected through the survey is shown in Table 3-1. Although there was nearly even distribution between males (46%) and females (54%) in resident participants, the staff participants were disproportionately female (96%). Participants in both user groups were predominately white or Caucasian. The majority of resident participants were 75 years of age or older (96%), while 75% of staff participants were between the ages of 18 and 34. Resident participants were most likely to reside in independent living, while staff participants were most likely to work in a skilled nursing household. Almost 75% of residents have lived at Meadowlark between 1–10 years, whereas nearly 70% of staff have been employed for 1–3 years. Most staff participants worked as nurse aides or medication aides, with over 46% employed full-time.

Table 3-1. Survey Participant Demographics

Variable	Residents	Staff
<i>Gender</i>		
Male	45.6	3.8
Female	54.4	96.2
<i>Race/Ethnicity</i>		
White or Caucasian	99.0	99.3
Black or African American	1.0	1.9
Hispanic or Latino	0.0	1.9
Other	0.0	3.8
<i>Age</i>		
18–24		36.5
25–34		38.5
35–44		23.1
45–54		1.9
55–64	1.0	
65–74	2.9	
75–84	50.0	
85+	46.1	
<i>Highest Educational Attainment</i>		
High School Graduate	8.8	5.8
Some College	12.7	42.3
College Degree	44.1	50.0
Professional or Doctorate Degree	34.3	1.9
<i>Length of Residence/Employment</i>		
<6 months	4.9	
6–12 months	5.8	4.3
1–3 years	25.2	69.6
3–5 years	21.4	13.0
5–10 years	28.2	8.7
10+ years	14.6	4.3
<i>Place of Residence/Employment</i>		
Independent Living	92.9	
Assisted Living	3.0	33.3
Skilled Nursing	4.0	66.7
<i>Employment Position</i>		
CNA or CMA		48.1
RN or LPN		34.6
Project or Clinical Coordinator		9.6
Other		7.7
<i>Time Spent on Campus Per Week</i>		
<20 Hours		11.5
20–39 Hours		42.3
40+ Hours		46.2

## **Data Analysis**

SPSS version 29 was used to analyze the data and identify statistically significant findings. Descriptive statistics were used to analyze the existing outdoor spaces and identify general trends in use, satisfaction, and preferences for all users. To identify differences between residents and staff needs and preferences, independent sample T-tests were conducted to compare responses on existing outdoor spaces, preferences for changes, and well-being. To ensure that the differences between the two user groups could be compared, F-tests were also conducted. Principal component analysis was conducted to identify the well-being factors defining latent variables, with reliability tests. Bivariate Pearson correlations was used to explore the relationships between variables, which was followed by simple linear regression analysis and generalized linear modeling to examine predictors of wellbeing, satisfaction, and use of outdoor spaces across two user groups.

## **Data Results**

### **General Frequencies for All Users**

To understand perceptions and preferences for existing spaces to compare to overall preferences for proposed changes to outdoor spaces, frequencies were used to help explore satisfaction across all user groups. Comparing the means of individual spaces for accessibility, use, and satisfaction against general preferences for outdoor elements provided insight into the types of spaces most attractive to all users in long-term care.

### **Use and Satisfaction of Existing Spaces**

In comparing the frequency of use of existing outdoor spaces for all users, all spaces have low utilization (see Table 3-2). Of the 11 spaces documented in the survey, the community garden ( $M = 2.80$ ) is the most frequently utilized, whereas the Wroten House Patio is most underutilized ( $M = 1.99$ ). Post-pandemic use is similarly low across all spaces, with users most likely to use the fire pit space in the courtyard most now compared to time before the pandemic ( $M = 2.71$ ). Users perceive the Wroten House Patio as least accessible ( $M = 2.58$ ), while the fire pit space in the courtyard is the most accessible ( $M = 4.03$ ). When regarding satisfaction with

each space, users enjoy the outdoor kitchen of the courtyard the most ( $M = 3.50$ ) and the Lyle House Patio the least ( $M = 2.91$ ).

Table 3-2. Overall Use, Accessibility, and Satisfaction with Existing Outdoor Spaces

Space	Mean (SD)			
	Accessibility	Frequency of Use	Post-Pandemic Use	Satisfaction with Use
Bayer's Nature Area: Dock	3.30 (1.124)	2.52 (1.124)	2.57 (.935)	3.30 (.934)
Bayer's Nature Area: Gazebo	3.30 (1.224)	2.41 (1.127)	2.50 (.855)	3.19 (.907)
Bayer's Nature Area: Trail	3.37 (1.168)	2.60 (1.132)	2.55 (.914)	3.23 (.933)
Community Garden	3.68 (1.014)	2.80 (1.227)	2.52 (.902)	3.19 (1.036)
Courtyard: Fire Pit	4.03 (.975)	2.48 (1.107)	2.71 (1.037)	3.30 (.975)
Courtyard: Outdoor Kitchen	3.97 (1.179)	2.37 (1.120)	2.66 (1.098)	3.50 (1.018)
Donner's Way: Trailhead	3.42 (1.092)	2.32 (1.168)	2.54 (.829)	3.04 (.949)
Donner's Way: Woods	3.00 (1.294)	2.55 (1.248)	2.61 (.973)	3.25 (.954)
Lyle House Patio	3.64 (1.025)	2.31 (1.054)	2.63 (.853)	2.91 (.993)
Leon's Glen	2.99 (1.239)	2.23 (1.101)	2.53 (.872)	2.99 (.934)
Wroten House Patio	2.58 (1.116)	1.99 (.944)	2.50 (.872)	2.94 (.967)

### Overall Preferences for Change

Regarding the desire to increase the amount of certain elements in the outdoors, participants showed the greatest interest in shade structures ( $M = 3.71$ ), water elements ( $M = 3.70$ ), and diverse vegetation ( $M = 3.69$ ). As shown in Table 3-3, users indicated lower interest in more fire elements ( $M = 3.04$ ), nighttime activity ( $M = 3.07$ ), or nature trails ( $M = 3.18$ ). When asked what they would like to have outdoor spaces for, socializing is the greatest interest for all users ( $M = 3.61$ ). Participants showed the least interest in space for play or recreation ( $M = 3.16$ ). It should be considered that even the lowest interest for change is still quite above average, indicating that all the proposed changes are desired overall.

Table 3-3. Overall Preferences for Attributes and Elements Outdoors

Item	Mean (SD)
<i>Proposed Elements</i>	
Tree Canopy	3.56 (.794)
Diverse Vegetation	3.69 (.732)
Wildlife Connections	3.51 (.762)
Water Elements	3.70 (.779)
Fire Elements	3.04 (.887)
Shade Structures	3.71 (.880)
Visual Artwork	3.24 (.827)
Open Sight Lines	3.23 (.736)
Nighttime Activity	3.07 (.885)
Signage: Educational	3.42 (.731)
Signage: Wayfinding	3.43 (.769)
Nature Trails	3.18 (.884)
Types of Gathering Spaces	3.30 (.679)
Seating Options	3.48 (.734)
<i>Proposed Activities</i>	
Exercising	3.35 (.911)
Socializing	3.61 (.796)
Gardening	3.36 (1.036)
Reflection or Meditation	3.53 (.891)
Play or Recreation	3.16 (.888)
Nature-Related Pursuits	3.57 (.811)
Teaching or Learning	3.26 (.855)
Active Recreation (Staff Only)	3.23 (.831)

## Residents Versus Staff Perceptions and Preferences for Existing Outdoor Spaces and Proposed Changes

Independent samples t-tests were conducted to compare resident and staff perceptions and preferences for the existing outdoor spaces surveyed. To examine the magnitude of the differences between the two user groups, effect size was measured through Cohen’s d test. For each outdoor space, the statistically significant differences are highlighted in the following paragraphs.

### Bayer’s Nature Area: Dock

There were statistically significant differences between resident and staff preferences for proposed elements in this space, as shown in Table 3-4. Staff reported greater preference for more colorful vegetation (residents,  $M = 3.00$ ; staff,  $M = 3.48$ ;  $t = -3.515$ ,  $p = .000$ ). Staff also reported greater preference for additional shade (residents,  $M = 3.04$ ; staff,  $M = 3.35$ ;  $t = -2.121$ ,  $p = .018$ ). To better meet the preferences of staff, this space should include a custom space with more colorful vegetation and more shade.

Table 3-4. Differences in User Group Perceptions of the Dock at Bayer’s Nature Area

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>Residents</i>	<i>Staff</i>			
Preference: More Colorful Vegetation	3.00 (.837)	3.48 (.727)	-3.515	.000	.801
Preference: More Shade	3.04 (.855)	3.35 (.837)	-2.121	.018	.849

### Bayer’s Nature Area: Gazebo

Residents and staff differed in preferences and satisfaction with the Gazebo space in four items: preference for more native plantings ( $t = -2.030$ ,  $p = .034$ ), preference for larger gathering areas ( $t = -2.030$ ,  $p = .022$ ), satisfaction due to views of the pond ( $t = 2.762$ ,  $p = .003$ ), and satisfaction due to the paved accessibility ( $t = 1.651$ ,  $p = .050$ ) (see Table 3-5). Regarding preference for proposed elements, staff reported higher preference for more native plantings (residents,  $M = 3.19$ ; staff,  $M = 3.44$ ) and for larger gathering areas in this space (residents,  $M = 3.01$ ; staff,  $M = 3.29$ ). Regarding satisfaction with the space due to existing elements, residents report greater satisfaction due to the views of pond ( $M = 4.20$ ) compared to staff ( $M = 3.81$ ). Residents also reported more interest in the Gazebo environment due to the paved

accessibility in this space ( $M = 3.86$ ) compared to staff ( $M = 3.65$ ).

Table 3-5. Differences in User Group Perceptions of the Gazebo at Bayer’s Nature Area

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Preference: More Native Plantings	3.19 (.805)	3.44 (.777)	-1.832	.034	.796
Preference: Larger Gathering Areas	3.01 (.822)	3.29 (.776)	-2.030	.022	.807
Satisfaction: Views of Pond	4.20 (.890)	3.81 (.742)	2.762	.003	.843
Satisfaction: Paved Accessibility	3.86 (.797)	3.65 (.623)	1.651	.050	.743

### Bayer’s Nature Area: Trail

As shown in Table 3-6, staff reported greater preference for more colorful vegetation along this path ( $M = 3.60$ ) compared to residents ( $M = 3.09$ ;  $t = -3.816$ ,  $p = .000$ ). Staff also reported greater preference for more shade along the path (residents,  $M = 2.95$ ; staff,  $M = 3.38$ ;  $t = -3.450$ ,  $p = .000$ ).

Table 3-6. Differences in User Group Perceptions of the Trail at Bayer’s Nature Area

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Preference: More Colorful Vegetation	3.09 (.746)	3.60 (.799)	-3.816	.000	.764
Preference: More Shade	2.95 (.723)	3.38 (.745)	-3.45	.000	.730

### Community Garden

There were statistically significant differences between residents and staff for four items: perceived ability to connect with others ( $t = -1.902$ ,  $p = .030$ ), preference for more privacy ( $t = -3.229$ ,  $p = .000$ ), satisfaction with the existing native plantings ( $t = -1.685$ ,  $p = .047$ ), and satisfaction with the unpaved accessibility ( $t = -2.702$ ,  $p = .004$ ). For each factor, Cohen’s *d* test revealed significant effect of the findings (see Table 3-7). Staff reported greater perceived ability to connect with others in this space ( $M = 3.52$ ) compared to residents ( $M = 3.23$ ). Staff also reported greater preference for more privacy from the road (residents,  $M = 2.79$ ; staff,  $M = 3.23$ ). Regarding satisfaction with existing elements, staff reported greater interest in this space due to existing native plants (residents,  $M = 3.38$ ; staff,  $M = 3.63$ ) and due to its unpaved accessibility (residents,  $M = 2.96$ ; staff,  $M = 3.37$ ).

Table 3-7. Differences in User Group Perceptions of the Community Garden

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Ability to Connect with Others	3.23 (.906)	3.52 (.804)	-1.902	.030	.872
Preference: Privacy from Road	2.79 (.776)	3.23 (.807)	-3.229	.000	.787
Satisfaction: Native Plantings	3.38 (.914)	3.63 (.841)	-1.685	.047	.889
Satisfaction: Unpaved Accessibility	2.96 (.816)	3.37 (.908)	-2.702	.004	.848

### Courtyard: Fire Pit

As shown in Table 3-8, there were three survey questions relating to satisfaction with existing elements with statistically significant differences between residents and staff and high effect sizes per Cohen's *d* test results. Residents reported lower interest in the tree canopy of the courtyard ( $M = 2.94$ ) as compared to staff ( $M = 3.27$ ;  $t = -2.051$ ,  $p = .021$ ). Residents also reported lower satisfaction with the recreation lawn (residents,  $M = 3.30$ ; staff,  $M = 3.60$ ;  $t = -2.159$ ,  $p = .016$ ). Similarly, residents reported lower interest with the fire pit (residents,  $M = 3.63$ ; staff,  $M = 3.98$ ;  $t = -2.436$ ,  $p = .008$ ). Therefore, this space will require custom design interventions to better meet the needs and preferences of residents.

Table 3-8. Differences in User Group Perceptions of the Fire Pit at the Courtyard

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Satisfaction: Tree Canopy	2.94 (.963)	3.27 (.888)	-2.051	.021	.938
Satisfaction: Recreation Lawn	3.30 (.963)	3.60 (.693)	-2.159	.016	.881
Satisfaction: Fire Pit	3.63 (.840)	3.98 (.852)	-2.436	.008	.844

### Courtyard: Outdoor Kitchen

Four items were identified as exhibiting statistically significant differences between residents and staff responses: post-pandemic use ( $t = -1.690$ ,  $p = .047$ ), preferences for proposed elements, and satisfaction with the existing spaces (see Table 3-9). For all factors, Cohen's *d* tests showed high effect sizes. For use of the space post-pandemic, staff reported higher usage compared to residents (residents,  $M = 2.55$ ; staff,  $M = 2.87$ ). When examining preferences for proposed elements, staff have greater preference for a projector screen for outdoor movies or learning (residents,  $M = 3.09$ ; staff,  $M = 3.69$ ;  $t = -3.936$ ,  $p = .000$ ) as well as for more natural elements (residents,  $M = 3.47$ ; staff,  $M = 3.73$ ;  $t = -1.937$ ,  $p = .027$ ). When considering satisfaction with existing space, residents reported lower satisfaction with outdoor kitchen compared to staff (residents,  $M = 3.36$ ; staff,  $M = 3.77$ ;  $t = -3.188$ ,  $p = .001$ ). Based on these

findings, this space will require more accommodations to meet the needs and preferences of residents. While staff are more receptive to the proposed elements, which can be introduced to meet their preferences, other design accommodations that align with resident needs and preferences will be necessary to increase resident satisfaction with this space.

Table 3-9. Differences in User Group Perceptions of the Outdoor Kitchen at the Courtyard

Item	Mean (SD)		t	p	Cohen's d
	Residents	Staff			
Post-Pandemic Use	2.55 (1.077)	2.87 (1.121)	-1.690	.047	1.092
Preference for Projector Screen	3.09 (.955)	3.69 (.781)	-3.936	.000	.901
Preference for More Natural Elements	3.47 (.855)	3.73 (.689)	-1.937	.027	.803
Satisfaction: Outdoor Kitchen	3.36 (.895)	3.77 (.675)	-3.188	.000	.828

### Donner's Way: Trailhead

Five items were identified with statistically significant differences between residents and staff (see Table 3-10). Residents reported lower preference for three proposed elements: increased privacy from the road (residents,  $M = 2.97$ ; staff,  $M = 3.42$ ;  $t = -3.696$ ,  $p = .000$ ), more flowering plants (residents,  $M = 3.19$ ; staff,  $M = 3.54$ ;  $t = -2.842$ ,  $p = .003$ ), and more shade (residents,  $M = 2.90$ ; staff,  $M = 3.29$ ;  $t = -3.157$ ,  $p = .000$ ). Residents have higher interest in the space due to the existing tree canopy (residents,  $M = 4.02$ ; staff,  $M = 3.67$ ;  $t = 2.324$ ,  $p = .011$ ) as well the existing native plantings (residents,  $M = 3.72$ ; staff,  $M = 3.46$ ;  $t = 1.721$ ,  $p = .044$ ).

Table 3-10. Differences Between User Group Perceptions of the Trailhead at Donner's Way

Item	Mean (SD)		t	p	Cohen's d
	Residents	Staff			
Preference: Privacy from Road	2.97 (.652)	3.42 (.750)	-3.696	.000	.686
Preference: More Flowering Plants	3.19 (.700)	3.54 (.779)	-2.842	.003	.727
Preference: More Shade	2.90 (.798)	3.29 (.536)	-3.157	.000	.720
Satisfaction: Tree Canopy	4.02 (.929)	3.67 (.760)	2.324	.011	.876
Satisfaction: Native Plantings	3.72 (.912)	3.46 (.803)	1.721	.044	.877

### Donner's Way: Woods

Two survey questions were identified with statistically significant differences between residents and staff: preference for paved accessibility ( $t = 2.545$ ,  $p = .006$ ) and satisfaction with the existing unpaved accessibility ( $t = -2.848$ ,  $p = .003$ ). As shown in Table 3-11, both factors have high effect according to Cohen's d testing. Regarding preference for paved accessibility, residents significantly reported higher preference ( $M = 3.33$ ) compared to staff ( $M = 2.87$ ). This



preference exists in contrast with interest in the space due to the existing unpaved accessibility, with residents reporting lower satisfaction ( $M = 3.09$ ) compared to staff ( $M = 3.61$ ). Given that these items exist in opposition of each other, this indicates the need for customized spaces tailored to both residents and staff.

Table 3-11. Differences Between User Group Perceptions of the Woods at Donner's Way

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Preference: Paved Path	3.33 (1.050)	2.87 (1.085)	2.545	.006	1.062
Satisfaction: Unpaved Accessibility	3.09 (1.074)	3.61 (1.021)	-2.848	.003	1.057

### Leon's Glen (Meadow)

There were no statistically significant differences in survey responses between residents and staff for this space. This suggests that the meadow space does not require any customized interventions to meet the individual needs or preferences of one user group.

### Lyle House Patio

This space exhibited the most statistically significant differences between residents and staff, with eight of the eleven survey questions exhibiting significant effect according to Cohen's *d* tests (see Table 3-12). These items include perceived accessibility ( $t = -3.582, p = .000$ ), frequency of use ( $t = -4.177, p = .000$ ), perceived ability to connect with others ( $t = -2.821, p = .003$ ), post-pandemic use ( $t = -2.491, p = .007$ ), perceived satisfaction when using the space ( $t = -2.380, p = .009$ ), preferences for proposed elements, and satisfaction with existing elements. Staff reported higher perceived accessibility of this space ( $M = 3.98$ ) compared to residents ( $M = 3.46$ ). Staff also perceived higher usage ( $M = 2.81$ ) than residents ( $M = 2.06$ ), with a similarly higher perceived post-pandemic use for staff ( $M = 2.87$ ) compared to residents ( $M = 2.51$ ). Staff also perceive a greater ability to connect with others in this space (residents,  $M = 3.05$ ; staff,  $M = 3.42$ ). When evaluating satisfaction with use, staff perceive greater enjoyment ( $M = 3.17$ ) than residents ( $M = 2.77$ ). Regarding preferences for proposed changes, staff reported greater preferences for two: more privacy from the road (residents,  $M = 3.02$ ; staff,  $M = 3.46$ ;  $t = -3.552, p = .000$ ) and more colorful vegetation (residents,  $M = 3.15$ ; staff,  $M = 3.65$ ;  $t = -3.926, p = .000$ ). When evaluating satisfaction with the space due to existing conditions, staff report greater satisfaction due to the tree canopy ( $M = 3.71$ ) compared to residents ( $M = 3.47$ ;  $t = -1.828, p = .035$ ) as well as due to the paved accessibility (residents,

$M = 3.60$ ; staff,  $M = 3.81$ ;  $t = -1.830$ ,  $p = .035$ ). Given the higher preferences and satisfaction with this space for staff, the findings indicate the need for customized space(s) to meet the needs and preferences of residents. The differences between the two user groups, particularly those in preferences, indicate the need for customized spaces to better meet the needs and preferences of both residents and staff.

Table 3-12. Differences Between User Group Perceptions of the Lyle House Patio

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Accessibility	3.46 (1.141)	3.98 (.641)	-3.582	.000	.998
Frequency of Use	2.06 (.936)	2.81 (1.103)	-4.177	.000	.996
Ability to Connect with Others	3.05 (.791)	3.42 (.723)	-2.821	.003	.769
Post-Pandemic Use	2.51 (.784)	2.87 (.929)	-2.491	.007	.838
Satisfaction and Use	2.77 (.974)	3.17 (.985)	-2.380	.009	.977
Preference: Privacy from the Road	3.02 (.793)	3.46 (.699)	-3.552	.000	.742
Preference: More Colorful Vegetation	3.15 (.768)	3.65 (.683)	-3.926	.000	.740
Satisfaction: Tree Canopy	3.47 (.810)	3.71 (.696)	-1.828	.035	.773

### Wroten House Patio

Three items were identified with statistically significant differences between residents and staff: perceived relaxation and stress relief ( $t = 2.497$ ,  $p = .007$ ), perceived satisfaction when using the space ( $t = 2.059$ ,  $p = .021$ ), and preference for more colorful vegetation ( $t = -2.183$ ,  $p = .015$ ) (see Table 3-13). Residents perceive greater relaxation and stress relief in this space ( $M = 3.13$ ) compared to staff ( $M = 2.76$ ) as well as greater enjoyment of the space (residents,  $M = 3.07$ ; staff,  $M = 2.72$ ). Residents reported lower preference for more colorful vegetation ( $M = 3.13$ ) compared to staff ( $M = 3.46$ ).

Table 3-13. Differences Between User Group Perceptions of the Wroten House Patio

Item	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	Residents	Staff			
Ability to Relax and Lower Stress	3.13 (.813)	2.76 (.870)	2.497	.007	.835
Satisfaction and Use	3.07 (.973)	2.72 (.927)	2.059	.021	.956
Preference: More Colorful Vegetation	3.13 (.872)	3.46 (.762)	-2.183	.015	.832

## Residents Versus Staff General Preferences for Outdoor Spaces

Independent samples t-tests were conducted to compare resident and staff general preferences for attributes and affordances in outdoor spaces and overall satisfaction with the outdoor spaces at Meadowlark Hills. Cohen’s d tests were conducted to examine the effect size of all t-tests. All significant differences are highlighted in Table 3-14.

When considering general preferences to increase certain elements in outdoor spaces, there were significant differences between residents and staff for eight elements: wildlife connections ( $t = -1.919, p = .028$ ), water elements ( $t = -3.526, p = .000$ ), fire elements ( $t = -4.757, p = .000$ ), shade structures ( $t = -2.191, p = .015$ ), visual artwork ( $t = -2.393, p = .009$ ), nighttime activity ( $t = -2.199, p = .015$ ), nature trails ( $t = -2.449, p = .008$ ), and seating options ( $t = 3.529, p = .000$ ). Staff reported greater interest in all but seating options, in which residents reported greater interest ( $M = 3.62$ ) compared to staff ( $M = 3.21$ ).

When considering use of outdoor spaces, two factors significantly differed between residents and staff: socializing ( $t = 2.384, p = .009$ ) and play or recreation ( $t = -2.296, p = .012$ ). Residents reported greater interest in utilizing outdoor spaces for socializing ( $M = 3.72$ ) compared to staff ( $M = 3.40$ ), whereas staff reported greater interest in having outdoor spaces for play or recreation ( $M = 3.38$ ) compared to residents ( $M = 3.04$ ). Further, residents reported greater overall satisfaction with the outdoor environments at Meadowlark Hills ( $M = 3.89$ ) compared to staff ( $M = 3.63$ ).

Table 3-14. Differences Between User Groups in General Preferences and Satisfaction

Item	Mean (SD)		t	p	Cohen's d
	Residents	Staff			
Overall Satisfaction with the Outdoors	3.89 (.795)	3.63 (.742)	1.944	.027	.777
<i>Proposed Elements</i>					
Wildlife Connections	3.43 (.792)	3.67 (.678)	-1.919	.028	.755
Water Elements	3.55 (.757)	4.00 (.741)	-3.526	.000	.752
Fire Elements	2.80 (.841)	3.48 (.804)	-4.757	.000	.829
Shade Structures	3.60 (.939)	3.90 (.721)	-2.191	.015	.871
Visual Artwork	3.13 (.868)	3.46 (.699)	-2.393	.009	.815
Nighttime Activity	2.96 (.963)	3.29 (.667)	-2.199	.015	.874
Nature Trails	3.06 (.870)	3.42 (.871)	-2.449	.008	.870
Seating Options	3.62 (.745)	3.21 (.637)	3.529	.000	.711
<i>Proposed Activities</i>					
Socializing	3.72 (.763)	3.40 (.823)	2.384	.009	.784
Play or Recreation	3.04 (.957)	3.38 (.690)	-2.296	.012	.875

## Residents Versus Staff Well-Being

Independent samples t-tests were also carried out to compare differences in well-being between residents and staff. Cohen's d tests were conducted to examine the effect size on all t-tests. The effect sizes for all tests were high (above .7) except for two items, feeling of living a good life and making a difference in others' lives, which showed medium level effect sizes (between .5 and .7). All significant differences are presented in Table 3-15.

Regarding the well-being metrics, there were significant differences between residents and staff for 15 factors: overall mental health ( $t = 3.235, p = .000$ ), overall satisfaction with place of residence/employment ( $t = 2.863, p = .002$ ), three metrics related to sense of purpose and social connectedness, and ten other metrics related to feelings in the past few weeks. Residents reported greater overall mental health ( $M = 4.05$ ) compared to staff ( $M = 3.62$ ) as well as greater satisfaction with living at Meadowlark ( $M = 4.29$ ) compared to staff working there ( $M = 3.92$ ). When considering their sense of purpose and social connectedness, staff reported greater sense of actively contributing to the happiness and well-being of others (residents,  $M = 3.89$ ; staff,  $M = 4.21$ ) and greater sense of making a difference in the lives of others (residents,  $M = 3.92$ ; staff,  $M = 4.37$ ). However, residents perceive a greater sense that they are a good person and live a good life ( $M = 4.41$ ) compared to staff ( $M = 4.10$ ).

Compared to residents, staff are more likely to perceive feeling depressed (residents,  $M = 1.85$ ; staff,  $M = 4.77$ ;  $t = -13.774, p = .000$ ), lonely (residents,  $M = 2.08$ ; staff,  $M = 3.90$ ;

Table 3-15. Differences Between User Group Perceptions of Well-Being Measures

Item	Mean (SD)		t	p	Cohen's d
	Residents	Staff			
Overall Mental Health	4.05 (.777)	3.62 (.796)	3.235	.000	.784
Active Contribution to Happiness/Well-Being of Others	3.89 (.936)	4.21 (.605)	-2.560	.006	.837
Good Person and Live a Good Life	4.41 (.535)	4.10 (.693)	3.127	.001	.594
Make a Difference in the Lives of Others	3.92 (.699)	4.37 (.486)	-4.113	.000	.634
Satisfied with Place of Residence/Employment	4.29 (.743)	3.92 (.763)	2.863	.002	.750
Depressed	1.85 (1.024)	4.77 (.983)	-13.774	.000	1.010
Lonely	2.08 (1.078)	3.90 (.891)	-10.511	.000	1.019
Sad	1.83 (1.068)	3.69 (.853)	-10.893	.000	1.001
Bored	2.15 (1.062)	3.73 (.931)	-9.091	.000	1.020
Calm and Peaceful	3.77 (.947)	3.38 (.911)	2.429	.008	.935
Anxious or Stressed	2.19 (1.002)	3.13 (.929)	-5.650	.000	.978
Everything Was an Effort	2.18 (1.091)	3.43 (.900)	-7.033	.000	1.031
Disconnected from the World Around Me	1.76 (.927)	4.21 (.825)	-16.043	.000	.893
Don't Really Belong	1.70 (1.114)	4.42 (.776)	-15.684	.000	1.010
Actively Involved in People's Lives	3.36 (1.171)	3.92 (.682)	-3.776	.000	1.032

$t = -10.511, p = .000$ ), sad (residents,  $M = 1.83$ ; staff,  $M = 3.69$ ;  $t = -10.893, p = .000$ ), and bored (residents,  $M = 2.15$ ; staff,  $M = 3.73$ ;  $t = -9.091, p = .000$ ). Additionally, staff reported greater frequency of feeling anxious or stressed (residents,  $M = 2.19$ ; staff,  $M = 3.13$ ;  $t = -5.650, p = .000$ ), disconnected from the world around them (residents,  $M = 1.76$ ; staff,  $M = 4.21$ ;  $t = -16.043, p = .000$ ), and the sense of not really belonging (residents,  $M = 1.70$ ; staff,  $M = 4.42$ ;  $t = -15.684, p = .000$ ). While residents reported more frequently feeling calm and peaceful ( $M = 3.77$ ) compared to staff ( $M = 3.38$ ) in the last few weeks ( $t = 2.429, p = .008$ ), staff reported feeling more actively involved in people's lives (residents,  $M = 3.36$ ; staff,  $M = 3.92$ ;  $t = -3.776, p = .000$ ).

### **Response to COVID-19 Pandemic**

Independent samples t-tests were carried out to compare differences in the impact of the COVID-19 pandemic on well-being between residents and staff. Cohen's  $d$  test results revealed high level effect sizes for all tests (above .7). All significant differences are presented in Table 3-16.

Regarding the well-being metrics, there were significant differences between residents and staff for nine factors: eight factors related to negative affect or mood components and one factor related to active involvement in other's lives ( $t = 2.559, p = .006$ ). For all eight negative well-being factors, staff reported higher frequency than residents for depression (residents,  $M = 2.09$ ; staff,  $M = 3.33$ ;  $t = -8.912, p = .000$ ), loneliness (residents,  $M = 2.36$ ; staff,  $M = 3.02$ ;  $t = -3.983, p = .000$ ), sadness (residents,  $M = 2.33$ ; staff,  $M = 3.42$ ;  $t = -6.527, p = .000$ ), and boredom (residents,  $M = 2.31$ ; staff,  $M = 3.58$ ;  $t = -7.212, p = .000$ ). Because of the pandemic, staff also reported feeling more anxious or stress ( $M = 3.08$ ) compared to residents ( $M = 2.47$ ;  $t = -3.277, p = .000$ ) as well as more disconnected from the world (residents,  $M = 2.07$ ; staff,  $M = 3.50$ ;  $t = -7.430, p = .000$ ). Staff also reported greater frequency of feeling that everything was more of an effort (residents,  $M = 2.27$ ; staff,  $M = 3.75$ ;  $t = -7.983, p = .000$ ) and feeling more that they didn't really belong (residents,  $M = 1.52$ ; staff,  $M = 4.62$ ;  $t = -20.871, p = .000$ )

Table 3-16. Differences Between User Group Perceptions of the Impact of the COVID-19 Pandemic on Well-Being Measures

Item	Mean (SD)		t	p	Cohen's d
	Residents	Staff			
More Depressed	2.09 (.970)	3.33 (.712)	-8.912	.000	.891
More Lonely	2.36 (1.073)	3.02 (.896)	-3.983	.000	1.016
More Sad	2.33 (1.036)	3.42 (.848)	-6.527	.000	.974
More Bored	2.31 (1.075)	3.58 (.915)	-7.212	.000	1.023
More Anxious or Stressed	2.47 (1.025)	3.08 (1.169)	-3.277	.000	1.078
More [that] Everything was an Effort	2.27 (1.106)	3.75 (1.007)	-7.983	.000	1.072
More Disconnected from the World	2.07 (1.070)	3.50 (1.180)	-7.430	.000	1.116
More that I Didn't Really Belong	1.52 (.917)	4.62 (.745)	-20.871	.000	.861
More Actively Involved in People's Lives	2.68 (1.189)	3.13 (.929)	2.559	.006	1.107

### Perceived Psychosocial Climate by Staff

To examine the perception of the psychosocial climate of employment at Meadowlark Hills, frequencies of the three representative survey questions customized to the staff survey were evaluated (see Table 3-17). Regarding management showing genuine interest in employee psychological well-being and management's response to concerns about an employee's psychological status, staff perceived a similar climate of interest ( $M = 3.3$ ). However, staff are more likely to perceive productivity as unequal in importance for management compared to employee psychological health ( $M = 3.19$ ).

Table 3-17. Staff Perception of the Psychosocial Employment Climate

Item	Mean (SD)
Supervisors Show Genuine Interest in Employee Psychological Well-Being	3.33 (1.024)
Decisive Action by Management if Concern about an Employee's Psychological Status is Raised	3.31 (.940)
Management Considers Productivity Equally as Important as Employee Psychological Health	3.19 (.971)

Principal component analysis (PCA) was conducted to examine if the psychosocial climate variables can be viewed together as a latent variable. Using dimension reduction with Varimax rotation and a maximum of 25 iterations for convergence, the cluster of three items showed subsequently high loadings (see Table 3-18). This factor, named Psychosocial Climate Index, exhibited high reliability ( $Cr \alpha = .807$ ) and is considered as a job satisfaction factor that can be an indicator of staff well-being in addition to the well-being factors common across the two user groups that are presented in the following paragraphs.

Table 3-18. Psychosocial Climate Factor Loadings

Item (Mean)	Psychosocial Climate Index
Decisive Action by Management if Concern about an Employee's Psychological Status is Raised (3.31)	.898
Management Considers Productivity Equally as Important as Employee Psychological Health (3.19)	.866
Supervisors Show Genuine Interest in Employee Psychological Well-Being (3.33)	.789
Cronbach's $\alpha$	.807
% of Variance	72.626
Mean	3.276
Standard Deviation	.832

### Latent Variables Defining Well-Being

To represent the various eudaimonic and hedonic components of well-being, 23 well-being items were included in the survey. Given the high correlations between these items, principal component analysis was conducted to examine how the items would cluster together as factors of well-being. PCA was used with the rotational method as Varimax with Kaiser Normalization converged in 25 iterations, with only loadings greater than 0.50 included. Double loaders were removed from final solution for the identified factors, which were then evaluated by reliability tests and calculated Cronbach's alphas. PCA identified three overarching factors for well-being (see Table 3-19).

Factor 1, named Depression Sensitivity ( $Cr \alpha = .928$ ), was comprised of eight items related to negative well-being affects (e.g., feeling depressed, sad, or bored) as well as ineffectiveness, such as anxiety or stress and effort needed to complete tasks. The second factor, named Social Cohesion and Effectiveness ( $Cr \alpha = .813$ ), included nine items related to effectiveness, interpersonal engagement, meaningful contribution, and optimism. Factor 3, named Positive Mood ( $Cr \alpha = .683$ ), included three items: happiness, feeling calm and peaceful, and overall mental health. The relatively high Cronbach's alphas for these well-being factors confirmed the reliability of the correlations between the variables comprising each factor.

Table 3-19. Well-Being Factors and Factor Loadings

Item (Mean)	F1 Depression Sensitivity	F2 Social Cohesion and Effectiveness	F3 Positive Mood
Depression (3.27)	.896		
Disconnection from the World (3.33)	.885		
Sadness (3.52)	.851		
Loneliness (3.27)	.846		
Sense of Not Belonging (3.29)	.846		
Boredom (3.34)	.727		
Anxiety or Stress (3.46)	.708		
Effort in Completing Tasks (3.37)	.677		
Make a Difference in the Lives of Others (4.09)		.811	
Competent and Capable in Activities Important to Me (4.17)		.679	
Respected by Others (4.21)		.667	
Actively Contribute to the Happiness and Well-Being of Others (3.98)		.654	
Actively Involved in People's Lives (3.56)		.585	
Optimistic about Future (4.08)		.580	
Effective in Activities (3.74)		.579	
Good Person and Live a Good Life (4.33)		.568	
Supportive and Rewarding Social Relationships (4.07)		.555	
Happiness (4.03)			.721
Overall Mental Health (3.87)			.702
Calm and Peacefulness (3.67)			.530
Cronbach's $\alpha$	.928	.813	.683
% of Variance	25.332	20.669	11.216
Mean	3.417	3.608	3.864
Standard Deviation	1.113	.443	.653

### Well-Being Factors: Resident Versus Staff

Independent samples t-tests were conducted to identify any statistically significant differences between residents and staff regarding the three well-being factors. As highlighted in Table 3-20, only one well-being factor exhibited a significant difference with moderate effect size: Social Cohesion and Effectiveness ( $t = 5.987, p = .000$ ).

Table 3-20. Differences Between User Groups in Well-Being Factors

Factor	Mean (SD)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>Residents</i>	<i>Staff</i>			
Depression Sensitivity	4.03 (.789)	4.10 (.609)	-.783	.436	.757
Social Cohesion and Effectiveness	4.01 (.780)	3.58 (.489)	5.987	.000	.671
Positive Mood	4.04 (.779)	3.97 (.655)	1.422	.158	.486



## Associations Between Variables

To examine the associations between variables in the survey, bivariate Pearson correlations were used to identify the size and strength of potential relationships of key areas of interest. Only significant correlations greater than 30% are reported.

### Use + Well-Being Items

*Staff.* Significant correlations were found between the use of specific spaces and certain well-being variables (see Table 3-21). While exhibiting burnout (e.g., feelings of low effectiveness or mental fatigue), staff reported higher usage of the fire pit space in the courtyard (N=51,  $r = .325$ ,  $p = .020$ ). When feeling low social connectedness, staff members are more likely to visit the meadow at Leon’s Glen (N=52,  $r = .306$ ,  $p = .028$ ). Use of Leon’s Glen was also correlated with perceived sadness (N=52,  $r = .327$ ,  $p = .018$ ).

Table 3-21. Staff Correlations Between Use of Existing Spaces and Well-Being Items

Well-Being Items	$r, p$	Existing Space
Sadness	$r = .327$ $p = .018$	Leon’s Glen
Everything was an Effort	$r = .325$ $p = .020$	Fire Pit at the Courtyard
Don't Really Belong	$r = .306$ $p = .028$	Leon’s Glen

*Residents.* Significant correlations were found between the residents’ use of specific spaces and two well-being items: leading a purposeful and meaningful life and optimism about the future (see Table 3-22). Residents’ perception that they lead a purposeful and meaningful life is most closely related to use of the Donner’s Way Trailhead (N=99,  $r = .354$ ,  $p = .000$ ), followed by use

Table 3-22. Resident Correlations Between Use of Existing Spaces and Well-Being Items

Well-Being Items	$r, p$	Existing Space
Having a Purposeful and Meaningful Life	$r = .334$ $p = .001$	Community Garden
	$r = .354$ $p = .000$	Trailhead at Donner’s Way
Being Optimistic about my Future	$r = .301$ $p = .003$	Trail at Bayer’s Nature Area
	$r = .304$ $p = .003$	Leon’s Glen
	$r = .322$ $p = .001$	Donner’s Way: Trailhead

of the community garden (N=94,  $r = .334$ ,  $p = .001$ ). Feeling optimistic about the future correlated with use of the Trail at Bayer’s Nature Area (N=98,  $r = .301$ ,  $p = .003$ ), Leon’s Glen (N=95,  $r = .304$ ,  $p = .003$ ), and the Trailhead (N=96,  $r = .332$ ,  $p = .001$ ) at Donner’s Way.

### Use + Familiarity Items

*Staff.* As shown in Table 3-23, two familiarity variables exhibited significant correlations with staff use of existing spaces: frequency of use and household of employment. Greater familiarity from increased usage of outdoor spaces correlated with use of the outdoor kitchen at the courtyard (N=52,  $r = .311$ ,  $p = .025$ ), the Lyle House Patio (N=52,  $r = .322$ ,  $p = .020$ ), as well as the Dock and Trail at Bayer’s Nature Area (N=52,  $r = .422$ ,  $p = .002$ ; N=52,  $r = .462$ ,  $p = .000$ , respectively). The specific household of employment strongly correlated with use of only one space—the Wroten House Patio (N=15,  $r = .736$ ,  $p = .002$ ).

Table 3-23. Staff Correlations Between Use of Existing Spaces and Familiarity Items

Familiarity Items	$r, p$	Use of Existing Space
Frequently Use Outdoor Spaces	$r = .311$ $p = .025$	Outdoor Kitchen at the Courtyard
	$r = .322$ $p = .020$	Lyle House Patio
	$r = .422$ $p = .002$	Dock at Bayer's Nature Area
	$r = .462$ $p = .020$	Trail at Bayer's Nature Area
Household of Employment	$r = .736$ $p = .002$	Wroten House Patio

*Residents.* Significant correlations were found between resident use of five existing spaces and two familiarity variables: the physical ability to walk outdoors without assistance and the household of residence (see Table 3-24). Regarding the physical ability to access spaces independently, a resident without this ability may have less familiarity with the surveyed spaces due to reduced accessibility. This item correlated most strongly with use of the two Donner’s Way spaces: the woods (N=101,  $r = .417$ ,  $p = .000$ ) and the Trailhead (N=100,  $r = .403$ ,  $p = .000$ ). Physical vitality was also closely related to use of Leon’s Glen (N=99,  $r = .336$ ,  $p = .000$ ) as well as the Trail (N=102,  $r = .338$ ,  $p = .000$ ) and Dock (N=102,  $r = .385$ ,  $p = .000$ ) at Bayer’s Nature Area. A resident’s household of residence correlated most strongly with use of the Trail at Bayer’s Nature Area (N=99,  $r = .431$ ,  $p = .000$ ), followed by use of Leon’s Glen

(N=96,  $r = .362, p = .000$ ), the woods at Donner's Way (N=98,  $r = .360, p = .000$ ), and Bayer's Dock (N=99,  $r = .351, p = .000$ ).

Table 3-24. Resident Correlations Between Use of Existing Spaces and Familiarity Items

Familiarity Items	$r, p$	Existing Space
Physical Ability to Walk Outdoors without Help	$r = .336$ $p = .000$	Leon's Glen
	$r = .338$ $p = .000$	Trail at Bayer's Nature Area
	$r = .385$ $p = .000$	Dock at Bayer's Nature Area
	$r = .403$ $p = .000$	Trailhead at Donner's Way
	$r = .417$ $p = .000$	Woods at Donner's Way
Household of Residence	$r = .351$ $p = .000$	Dock at Bayer's Nature Area
	$r = .360$ $p = .000$	Woods at Donner's Way
	$r = .362$ $p = .000$	Leon's Glen
	$r = .431$ $p = .000$	Trail at Bayer's Nature Area

### Use + General Preferences for Natural Elements

*Staff.* Use of specific existing spaces correlated with general preferences for three outdoor attributes and affordances (see Table 3-25). Preference for more tree canopy correlated with use of three spaces: Leon's Glen (N=52,  $r = .315, p = .023$ ), the Bayer's Nature Area Gazebo (N=51,  $r = .323, p = .021$ ), the Lyle House Patio (N=52,  $r = .328, p = .018$ ). A preference for water elements correlated with staff use of the Gazebo (N=51,  $r = .319, p = .023$ ). Regarding more wildlife connections, this preference correlated with staff use of six spaces: Donner's Way woods (N=52,  $r = .354, p = .010$ ) and Trailhead (N=52,  $r = .359, p = .009$ ), community garden (N=52,  $r = .540, p = .000$ ), and Bayer's Nature Area Dock (N=52,  $r = .305, p = .028$ ), Gazebo (N=51,  $r = .375, p = .007$ ), and Trail (N=52,  $r = .410, p = .003$ ).

Table 3-25. Staff Correlations Between Use of Existing Spaces and General Preferences for Natural Elements

General Preferences	<i>r, p</i>	Existing Space
Tree Canopy	<i>r</i> = .315 <i>p</i> = .023	Leon's Glen
	<i>r</i> = .323 <i>p</i> = .021	Gazebo at Bayer's Nature Area
	<i>r</i> = .328 <i>p</i> = .018	Lyle House Patio
Water Elements	<i>r</i> = .319 <i>p</i> = .023	Gazebo at Bayer's Nature Area
Wildlife Connections	<i>r</i> = .305 <i>p</i> = .028	Dock at Bayer's Nature Area
	<i>r</i> = .354 <i>p</i> = .010	Woods at Donner's Way
	<i>r</i> = .359 <i>p</i> = .009	Donner's Way Trailhead
	<i>r</i> = .375 <i>p</i> = .007	Gazebo at Bayer's Nature Area
	<i>r</i> = .410 <i>p</i> = .002	Trail at Bayer's Nature Area
	<i>r</i> = .540 <i>p</i> = .000	Community Garden

*Residents.* Significant correlations were found between the residents' use of specific spaces and certain general preferences for the outdoors. As shown in Table 3-26, there were three general preferences correlating with use: wildlife connections, water elements, and nature trails. Regarding wildlife connections, this preference correlated with use of the Gazebo at Bayer's

Table 3-26. Resident Correlations Between Use of Existing Spaces and General Preferences for Nature Elements

General Preferences	<i>r, p</i>	Existing Space
Wildlife Connections	<i>r</i> = .314 <i>p</i> = .002	Gazebo at Bayer's Nature Area
	<i>r</i> = .392 <i>p</i> = .000	Donner's Way Trailhead
Water Elements	<i>r</i> = .320 <i>p</i> = .004	Wroten House Patio
Nature Trails	<i>r</i> = .344 <i>p</i> = .000	Dock at Bayer's Nature Area
	<i>r</i> = .379 <i>p</i> = .000	Donner's Way Trailhead
	<i>r</i> = .426 <i>p</i> = .000	Trail at Bayer's Nature Area
	<i>r</i> = .450 <i>p</i> = .000	Woods at Donner's Way
	<i>r</i> = .495 <i>p</i> = .000	Gazebo at Bayer's Nature Area

$p = .000$ ). Preferring water elements correlated with use of the Wroten House Patio ( $N=80$ ,  $r = .320$ ,  $p = .004$ ). Resident preference for nature trails most strongly correlated with use of the Gazebo at Bayer’s Nature Area ( $N=98$ ,  $r = .495$ ,  $p = .000$ ) and the woods at Donner’s Way ( $N=100$ ,  $r = .450$ ,  $p = .000$ ).

### Exploring Relationships Between Variables

To further understand the relationships between key variables, standard linear regression modeling was conducted to evaluate the degree to which dependent variables can be explained by independent variables. Only statistically significant findings are reported.

#### Mental Health Explained by Use and Satisfaction with Outdoor Spaces

To explore the relationship between overall well-being and use and satisfaction with outdoor spaces, the dependent variable (overall mental health) was regressed on both independent variables (see Table 3-27). Overall satisfaction with the outdoor spaces is found to be a stronger predictor of overall mental health ( $\beta = .220$ ,  $p = .025$ ), as compared to frequency of use ( $\beta = .135$ ,  $p = .048$ ). These variables account for a small amount of variation in well-being ( $R^2 = .123$ ) but are statistically significant ( $p = .000$ ).

Table 3-27. Regression Analysis Explaining Overall Mental Health by Outdoor Use and Satisfaction

Variables	Dependent		
	Overall Mental Health		
Independent	$\beta$	$t$	$p$
Overall Satisfaction with Outdoor Spaces	.220	2.272	.025
Frequently Use the Outdoor Spaces	.135	1.992	.048
Model Summary	$R^2 = .123$ $F = 10.045$		.000

#### Explaining Outdoor Satisfaction and Use by Familiarity Variables

Satisfaction and use of outdoor spaces (dependent variables) were each regressed on the set of familiarity variables: previous exposure, length of residence, proximity due to residence type, and barriers to access. Regarding satisfaction with outdoor spaces, the analysis revealed significant results for three independent variables: frequent use of outdoor spaces, feeling safe outdoors, and having the physical ability to walk outdoors without help (see Table 3-28). Feeling safe outdoors is the greatest predictor of satisfaction with outdoor spaces ( $\beta = .274$ ,  $p = .024$ ).

The overall regression was statistically significant ( $R^2 = .294$ ,  $F = 19.757$ ). The variables of familiarity only impact outdoor satisfaction in residents, as a similar regression with familiarity variables with staff did not yield significant results.

Three metrics of familiarity positively predict resident use of outdoor spaces: feeling safe outdoors ( $\beta = .514$ ,  $p = .002$ ), having the physical ability to walk outdoors without help ( $\beta = .284$ ,  $p = .002$ ), and the household of residence ( $\beta = .355$ ,  $p = .003$ ). Length of residence negatively predicts frequency of use ( $\beta = -.176$ ,  $p = .012$ ). The overall regression was statistically significant ( $R^2 = .443$ ,  $F = 18.290$ ,  $p = .000$ ).

Table 3-28. Regression Analysis Explaining Resident Satisfaction and Use of Outdoor Spaces by Familiarity and Safety

Variables	Dependent					
	Overall Satisfaction with Outdoor Spaces			Frequently Use the Outdoor Spaces		
Independent	$\beta$	$t$	$p$	$\beta$	$t$	$p$
Feeling Safe Outdoors	.274	2.291	.024	.514	3.150	.002
Frequent Use of the Outdoor Spaces	.217	2.985	.004			
Physical Ability to Walk Outdoors Without Help	.154	2.357	.021	.284	3.192	.002
Household of Residence			ns*	.355	3.062	.003
Length of Residence			ns	-.176	-2.572	.012
Model Summary	$R^2 = .380$ $F = 10.045$			$R^2 = .443$ $F = 18.290$		

\*not statistically significant

When exploring the relationship between staff use of the outdoor spaces and familiarity variables, linear regression identified three independent variables of significance: feeling safe outdoors ( $\beta = .929$ ,  $p = .006$ ), the amount of time spent on campus each week ( $\beta = .1.962$ ,  $p = .000$ ), and length of employment ( $\beta = .420$ ,  $p = .004$ ). Although household of residence predicted frequency of use in residents, this variable does not statistically impact use in staff. As shown in Table 3-29, the overall regression was statistically significant ( $R^2 = .876$ ,  $F = 17.706$ ).

Table 3-29. Regression Analysis Explaining Staff Use of Outdoor Spaces by Familiarity and Safety

Variables	Dependent		
	Frequently Use the Outdoor Spaces		
Independent	$\beta$	$t$	$p$
Feeling Safe Outdoors	.929	3.488	.006
Amount of Time Spent on Campus Each Week	1.962	7.468	.000
Length of Employment	.420	3.712	.004
Household of Employment			ns*
Model Summary	$R^2 = .876$ $F = 17.706$		.000

\* not statistically significant

## Explaining Outdoor Satisfaction and Use by General Preferences

Given the number of variables associated with general preferences for attributes and affordances in outdoor spaces, a series of linear regression models were conducted to evaluate the impact of these variables on satisfaction and use (see Tables 3-30 and 3-31, respectively). All components of attributes and affordances were included in the initial regression, and then independent variables without significant associations were dropped from further analysis.

Regarding overall satisfaction, linear regression models identified three independent variables of attributes of significance: diverse vegetation, wildlife connections, and open sight lines. Preferring wildlife connections is the greatest predictor of overall satisfaction ( $\beta = .929$ ,  $p = .006$ ) followed by a preference for open sight lines ( $\beta = .235$ ,  $p = .008$ ), while preferring diverse vegetation negatively predicts satisfaction ( $\beta = -.241$ ,  $p = .020$ ). Although these variables account for a small portion of the variance associated with user satisfaction with outdoor spaces ( $R^2 = .107$ ), the overall regression was statistically significant ( $p = .001$ ). When evaluating the impact of the types of activities available with outdoor satisfaction, only one affordance was statistically significant: spaces for teaching or learning ( $\beta = .331$ ,  $p = .001$ ).

Table 3-30. Regression Analysis Explaining Satisfaction with Outdoor Spaces by General Preferences

Variables		Dependent		
		Overall Satisfaction with Outdoor Spaces		
Independent		$\beta$	$t$	$p$
<i>Attributes</i>	General Preference: Diverse Vegetation	-.241	-2.350	.020
	General Preference: Wildlife Connections	.279	2.726	.007
	General Preference: Open Sight Lines	.235	2.701	.008
	Model Summary	$R^2 = .107$ $F = 5.698$		.001
<i>Affordances</i>	General Preference: Spaces for Teaching or Learning	.331	4.668	.000
	Model Summary	$R^2 = .129$ $F = 21.789$		.000

When the impact of preferred attributes and affordances was explored in relation to frequency of use of outdoor spaces, linear regression models identified only two independent variables of significance. Preferring spaces for teaching or learning is the greatest predictor of use ( $\beta = .674$ ,  $p = .000$ ), while preferring spaces for play or recreation negatively predicts frequency of use ( $\beta = -.229$ ,  $p = .043$ ).

Table 3-31. Regression Analysis Explaining Use of Outdoor Spaces by General Preferences

Variables		Dependent		
		Frequently Use the Outdoor Spaces		
Independent		<i>B</i>	<i>t</i>	<i>p</i>
<i>Affordances</i>	Spaces for Teaching or Learning	.674	5.885	.000
	Spaces for Play or Recreation	-.229	-2.041	.043
	Model Summary	R <sup>2</sup> = .202 F = 18.097		.000

### Explaining Staff Satisfaction with Place of Employment

To explore predicting factors of staff satisfaction with place of employment, linear regression modeling was conducted to evaluate the degree to which each of the perceived work environment, length of employment, or household of employment play a role in satisfaction with place of employment. As shown in Table 3-32, the analysis revealed significant results for the Psychosocial Climate Index ( $\beta = .296, p = .020$ ). Although this variable accounts for only a small degree of variance in staff satisfaction with working at Meadowlark Hills ( $R^2 = .876$ ), the findings are statistically significant ( $p = .020$ ). The overall regression was statistically significant ( $R^2 = .104, F = 5.803$ ).

Table 3-32. Regression Analysis Explaining Staff Satisfaction with Place of Employment

Variables		Dependent		
		Satisfaction with Place of Employment		
Independent		<i>B</i>	<i>t</i>	<i>p</i>
Psychosocial Climate Index		.296	2.409	.020
Model Summary		R <sup>2</sup> = .104 F = 5.803		.020

### Explaining the Impact of Social Cohesion and Effectiveness of User Group Satisfaction with Outdoor Spaces

Given the statistically significant differences between resident and staff well-being and overall satisfaction with outdoor environments, generalized linear modeling was utilized to explore if the well-being factors are predicted by satisfaction and moderated by user group. Of the three well-being factors, only Social Cohesion and Effectiveness was statistically significant. As shown in Table 3-33, satisfaction with the outdoor spaces is more likely to impact this well-being factor in residents ( $\beta = .307, p = .000$ ), while staff satisfaction with the outdoor environments does not statistically predict Social Cohesion and Effectiveness ( $\beta = .095, p = .199$ ).



Table 3-33. Linear Regression Model Explaining Social Cohesion and Effectiveness of User Groups by Satisfaction with Outdoor Spaces

	Dependent Variable	
	Social Cohesion and Effectiveness	
Parameter	$\beta$	$p$
Resident Satisfaction with Outdoor Spaces	.307	.000
Staff Satisfaction with Outdoor Spaces	.095	.199

## Discussion

### Interpretation of Key Findings

#### Perceptions and Preferences of Outdoor Environments

This study revealed both similarities and differences in the extent to which outdoor environments support the needs and preferences of residents and staff in long-term care facilities according to the Supportive Environments for Effectiveness framework. Based on the principles of evolutionary psychology, there were similar environmental attributes that both populations preferred. With greater interest in increasing tree canopy, diverse vegetation, water elements, and fire elements, users of the outdoor spaces at Meadowlark Hills desire incorporation of more natural elements. This preference for natural attributes of landscapes supports well-established literature findings, such as prospect-refuge theory and Gibson’s environmental affordances.

This study also revealed the shortcomings of the existing outdoor environments in meeting the specific needs and preferences of all potential users. Although both user groups reported moderate satisfaction with most existing spaces and high perceived safety outdoors, both residents and staff reported low usage overall for all spaces. This suggests that there are unmet needs, either hindering accessibility or due to incompatibility. Regarding accessibility, residents and staff only agreed that one existing outdoor space was easily accessible—the Fire Pit space in the Courtyard. In contrast, two outdoor spaces were perceived as low in accessibility (Leon’s Glen and the Wroten House Patio). For these two spaces, the perceived low accessibility is logical. The Wroten House Patio is a dedicated outdoor space for the residents in this skilled nursing household, and therefore, it is likely to be perceived as harder to access for those without friends, family, or employment in this residence. While the meadow space at Leon’s Glen is not intended for a specific population on campus, it is the northern-most outdoor space that was

surveyed. Accessing this space requires walking to the northeast entrance to Meadowlark Hills, as there is no public parking available to encourage use. For users without the time or vitality to access this space, these individuals are hindered from easily accessing Leon's Glen. For the remaining outdoor spaces, users perceived these areas as moderately accessible. However, since users report low usage across all spaces, this suggests that incompatibility is a key moderating factor impacting both use and satisfaction.

Incompatibility with user needs and preferences was demonstrated in comparing the differences in user group perceptions of existing outdoor spaces. For most spaces, staff reported greater preference for more natural elements across the surveyed spaces: more flowering plants (Donner's Way Trailhead), more colorful vegetation (Bayer's Nature Area Dock, Wroten House Patio, and Lyle House Patio), and more native plants (Bayer's Nature Area Gazebo). Regarding satisfaction with existing natural attributes, residents and staff differed in which spaces were more preferred. Residents reported greater satisfaction with existing natural elements at the Donner's Way Trailhead and the Bayer's Nature Area Gazebo. In contrast, staff satisfaction with existing elements was higher at the Courtyard's Fire Pit, the Community Garden, and the Lyle House Patio. With the exception of the Community Garden, these spaces can be differentiated on their degree of hardscape and relative locations on campus. The Lyle House Patio and the Fire Pit at the Courtyard are predominantly hardscape environments closely surrounded by urban elements, such as buildings and/or parking lots. In contrast, the Donner's Way Trailhead and Bayer's Nature Area Gazebo are starkly natural, with lush tree canopies and views of natural elements. This difference in hardscape versus softscape is likely to reflect ease of accessibility, which impacts frequency of use. The predominantly hardscape spaces are centrally located relative to the main building, while the more natural spaces are located on the periphery of campus. Since the Courtyard and Lyle House Patio are more likely to host events within the Meadowlark community given their centralized locations, it is likely that staff utilize these spaces more—especially when accompanying residents to events.

The differences between the user groups' general preferences for outdoor environments further highlight the different needs and preferences between residents and staff. While residents would prefer more seating options, this element is least favored by staff. It is likely that this disparity reflects differing mobility needs between the two user groups. Residents are more likely to experience mobility-related physical losses due to aging or disease, thereby reducing their

ability to walk or stand for extended time periods. Across all levels of care (fully autonomous to full care required), these physical losses reduce the functional mobility capacity of residents. With more available seating options, this design accommodation acknowledges the physical needs of residents and will allow greater accessibility and use of outdoor spaces for this user group. In contrast, direct-care staff are less likely to experience prolonged decreased physical mobility due to the inherent physical demands (e.g., strength, mobility, and endurance) needed to care for residents. Instead of a physical need, staff preferences predominantly reflect elements of fascination: water and fire elements, visual artwork, wildlife connections, and nature trails. Since the concept of fascination connects to an environment's ability to offer mental restoration, this suggests staff prefer accommodations that offer greater restorative potential in acknowledgement of the mental demands of their work.

### **Well-Being Considerations**

Many of the significant differences between resident and staff well-being likely reflect the role of each user in the Meadowlark Hills community. Considering the care directly given by staff to residents to improve their quality of life, the higher staff perceptions of actively contributing to the happiness and well-being of others, making a difference in the lives of others, and active involvement in people's lives likely reflects their purposes as care givers. Due to the demanding nature of caring for others, the higher frequency of reported depression, boredom, anxiety and stress, social disconnection, and perceived effort to complete tasks is consistent with the high levels of mental fatigue and burnout reported in the literature.

### **COVID-19 Impact**

While Meadowlark Hills was closed to visitors for a longer time period than mandatory state lockdowns, the COVID-19 pandemic negatively impacted the well-being of staff more than residents. It is likely that this difference reflects the unique experiences each user group faced with the pandemic. Each group has distinct experiences of the pandemic (e.g., frontline worker versus care recipient, degree of personal impact from individual quarantine needs, etc.) that could explain different perceptions of the impact of the pandemic. For instance, staff may perceive a greater negative impact due to continued workplace restrictions (i.e., face masks in skilled nursing households). However, residents may perceive a less noticeable difference as they

may not experience the continued hardship of the pandemic, especially those in independent living without the constant visual reminder from face masks of the continued impact of the pandemic. Although the pandemic will soon no longer be classified as a public health emergency in the United States, the ramifications of the COVID-19 pandemic are likely to remain for years to come. The extent and influence of these ramifications is likely to influence the well-being of residents and staff in long-term care, although the exact mediating mechanisms remain unclear.

### **Understanding Use of Existing Spaces in Relationship with Well-Being**

By evaluating the correlations between well-being affects, each space can be evaluated for which physical elements support mental restoration or social cohesion in residents and staff. For depressive affects, spaces that correlated with these well-being items are likely to feature attributes or affordances that counter these effects. For instance, staff feeling sad or as if they don't really belong are more likely to utilize the highly naturalized areas of Leon's Glen. This space features native plant species, mature tree canopies, educational signage, and seating elements. The remoteness of this location also offers a sense of *being away* and opportunities for reflection and meditation as one connects with nature. Examining other outdoor environments, the fire elements and visual artwork at the Fire Pit, for instance, offer soft fascination as a means for mental restoration—reducing the mental fatigue of staff when they feel as if everything was an effort.

Given that certain spaces correlate with positive well-being affects more strongly than others, evaluating the attributes and affordances within these spaces could help to identify elements that promote well-being in users. This can be evaluated for each well-being variable individually but also across all the variables with significant correlations. Examining the spaces that correlate with residents feeling optimistic about their futures, these spaces predominantly feature native species and mature tree canopies. In contrast, the common elements of the outdoor environments correlated with perceptions of leading a purposeful and meaningful life include paved accessibility and seating availability—elements that increase accessibility for this user group and promote participation and socialization with others. When evaluating all significant well-being factors that correlate with resident use of existing spaces, these elements are amongst the common attributes shared across nearly all spaces: paved accessibility, diverse vegetation, and mature tree canopies. To promote well-being in residents, designers could incorporate a

combination of these elements in the other spaces to further encourage use of other outdoor environments.

### **The Role of Familiarity and Accessibility**

As predicted, familiarity with the outdoor spaces correlated with use for both residents and staff. For staff, the strongest correlation existed between the household of employment and use of the Wroten House Patio. Since this is a private household located north of the main building on campus, it is much less accessible, and therefore, less familiar to staff in other households. Lacking familiarity with this space is likely to deter use of this space for staff members outside of this household. In contrast, frequent use of the outdoor spaces at Meadowlark Hills correlates with staff use of four spaces: the Outdoor Kitchen at the Courtyard, Lyle House Patio, and the Dock and Trail at Bayer's Nature Area. The central locations of the Courtyard and Lyle Patio, as previously mentioned, are more likely to host campus events—drawing staff accompanying residents. This is in contrast to Bayer's Nature Area, which is located on the northwestern edge of campus. Its less centralized location means it is utilized less frequently for specific events, so it is likely that staff are visiting these spaces on their own more frequently than when accompanied by residents.

Regarding residents, having the physical ability to walk outdoors without assistance correlates with outdoor spaces on the periphery of the main campus building. Each of the spaces, especially the spaces associated with Bayer's Nature Area, Leon's Glen, and Donner's Way, require crossing at least one street and traversing elevation changes. These spaces are, therefore, harder to access independently for residents requiring mobility assistance, due to vitality and safety concerns. When examining the impact of the household of residence, it is not surprising that correlations exist with the Woods at Donner's Way, Leon's Glen, and two of the Bayer's Nature Area spaces. These spaces are located on the southeastern and northwestern edges of campus and feature outdoor spaces easily accessible from the backyards of many independent living cottages. Although these spaces are publicly available to any resident within the community, residents in skilled nursing households, assisted living, or independent living apartments must travel further to access these spaces. Their access is complicated by elevation changes from the main building to these areas due to steep hills. For the independent living residents with almost direct access to these spaces from their homes, use of these spaces is less

complicated. With easier access depending on one's location on campus, use of these specific spaces is influenced by place of residence. Since Bayer's Nature Area, Donner's Way, and Leon's Glen are the highly naturalized outdoor spaces at Meadowlark Hills, this suggests a need to introduce softscape, natural spaces to more centralized areas on campus to increase access to these landscape typologies in acknowledgement of the impact of accessibility on use and familiarity.

### **The Role of General Preferences**

Of the correlations between staff and resident general preferences for outdoor elements and their usage of existing spaces, the comparison between the spaces and tree canopy offers interesting insight into user preferences for contact with nature. Comparing a preference for more tree canopy, this preference correlated with staff use of Leon's Glen, the Bayer's Nature Area Gazebo, and the Lyle House Patio but resident use of the Woods at Donner's Way. Each of these spaces has a mature tree canopy, but the Donner's Way Woods canopy is more immersive as the trail weaves directly below the overstory. In contrast, the tree canopies at Leon's Glen and the Gazebo are experienced from a distance. This reveals a subtle difference in the preferred type of experience afforded by tree canopies.

### **Resident versus Staff Satisfaction with Outdoor Spaces and Well-Being Factors**

Referring to the generalized linear modeling results, there is a greater potential for satisfaction with outdoor spaces to impact Social Cohesion and Effectiveness for residents than staff. While staff are likely to have easier access to other green spaces near their own residences in addition to these green spaces near their place of employment, residents, particularly those without the means to leave campus on their own, have more limited accessibility to additional green spaces. Since it is well-established in the literature that use is connected with satisfaction with outdoor spaces as well as personal well-being, there is a greater potential for satisfaction with the outdoor spaces to explain the well-being factor Social Cohesion and Effectiveness in residents.

## **Translational Design: Evaluations, Recommendations, and Considerations**

Based on the findings from this quantitative study, there is a clear opportunity to increase the well-being of residents and staff through thoughtful design interventions for the outdoor spaces in long-term care. By evaluating the attributes and affordances of each space from the Supportive Environments for Effectiveness framework, landscape architects can identify gaps in meeting the three informational needs domains. In merging the environmental psychology framework of SEE with the restorative potential of nature, landscape architects can develop novel design recommendations for each space that consider the needs and preferences of all users to improve their well-being.

### **Shared Versus Custom Design Spaces**

The documented differences between resident and staff preferences for outdoor spaces, including attributes and affordances, indicates the need for dedicated spaces customized to better support individual user group needs and, therefore, their well-being. As shown in Figure 3.12, each existing space has different opportunities to better meet the needs and preferences of residents and staff. Similarities in preferences could yield similar design interventions, which could be implemented in common spaces accessible to both residents and staff. Designers must, therefore, evaluate how design recommendations can impact satisfaction for both residents and staff. For instance, if there is a lack of satisfaction with tree canopy in a given space, then increasing tree canopy is one step towards ultimately increasing user satisfaction with an outdoor space. Given the different needs of each user group, there will also be instances in which recommendations are in conflict with each other. Examining the Woods at Donner's Way, for instance, residents would prefer adding paved accessibility to increase ease of mobility, while staff would prefer keeping the existing path unpaved because mobility limitations are less likely to impact their choices. Designers must reconcile these preferences to address the needs and preferences of both groups. In this instance, introducing a parallel paved path to the unpaved path would meet the residents' need and the staff preference.

### **Evaluating Existing Spaces According to User Preferences and SEE**

In order to maximize the ability of an outdoor space to increase well-being, designers can utilize the SEE framework to identify opportunities for a range of activities and contact with

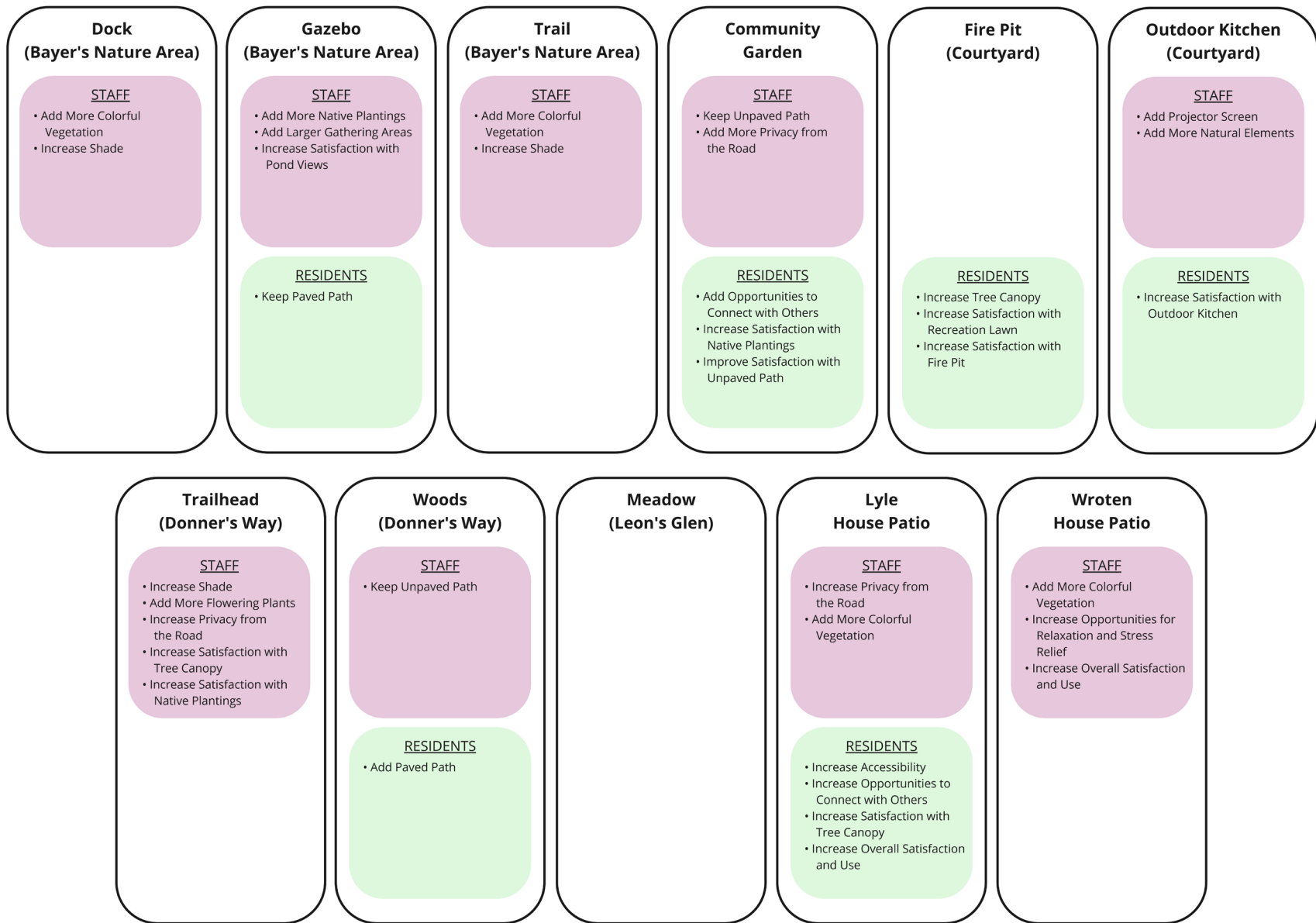


Figure 3.12. Summary of Customized Needs and Preferences of Residents and Staff for Surveyed Outdoor Spaces



nature to better meet the informational needs of residents and staff in long-term care. Each space can be evaluated for existing design attributes and affordances that connect to each informational needs domain, by using Figure 2.4 as a guide. As shown in Figure 3.13, elements of the three spaces are listed according to its application to an informational needs domain. If a given attribute applies to multiple domains, such as the role of vegetative screens at Leon’s Glen, it is listed for all domains. Visually grouping the attributes and affordances of landscapes according to the three informational needs domain allows designers to identify gaps in meeting informational needs. For instance, while the Fire Pit at the Courtyard has five elements that contribute to the being capable domain, this space only offers one element to support meaningful action. To better balance the offerings of this space, a designer could suggest introducing communal gardening beds or potted plants. It is important to note, however, that quantity does

	Fire Pit (Courtyard)	Meadow (Leon's Glen)	Community Garden
Model Building	<i>Wayfinding</i> Materiality	<i>Wayfinding</i> Educational Signage	<i>Learning</i> Communal Gardening
	<i>Complexity of Views</i> Activity Lawn Fencing	<i>Complexity of Views</i> Open Meadow Vegetative Screens	<i>Complexity of Views</i> Fencing Vegetative Screens
Meaningful Action	<i>Group Activities</i> Activity Lawn (Putting Green) Seating Elements	<i>Group Activities</i> Open Lawn (Yoga, Tai Chi, etc)	<i>Participation</i> Communal Gardening
	<i>Participation</i> Potted Plants		
Being Capable	<i>Soft Fascination</i> Fire Pit Diverse Vegetation Tree Canopy Visual Artwork	<i>Soft Fascination</i> Diverse Vegetation Pollinator Gardens Tree Canopy	<i>Soft Fascination</i> Diverse Vegetation Pollinator Gardens Tree Canopy
	<i>Reflection + Meditation</i> Fencing	<i>Reflection + Meditation</i> Vegetative Screens	<i>Reflection + Meditation</i> Fencing Vegetative Screens

Figure 3.13. Evaluation of Three Existing Spaces with SEE

not equate to quality, nor does it reflect individual needs and preferences. Designers should introduce spatial elements that best suit the context of each site and offer the most suitable opportunities for a given site. This is of particular importance when evaluating the spectrum of spaces available to users in long-term care. For instance, in a larger outdoor space such as the meadow at Leon's Glen, a designer might incorporate elements that would introduce novel opportunities that capitalize on the size of this site. Instead of introducing numerous smaller elements, landscape architects might choose to introduce a pavilion for covered seating, which could facilitate group activities such as discussion series on the pollinator plants in the meadow or personal meditation sessions. Although a community garden could also be implemented here due to the available resources, it is already implemented elsewhere on the campus. Instead, designers should evaluate which spatial elements could be introduced that meet an existing unmet need or a more universal need.

Another example demonstrating the importance of prioritizing user needs and preferences and quality over quantity is the implementation of a bocce court in the Courtyard, which was not included in the photo-surveys but is available to users year-round. Bocce courts are a trending amenity to provide to users in residential projects, and this court was introduced to Meadowlark when the courtyard was implemented in 2015. During conversations with residents after completion of their surveys, this court was a frequent topic brought up by residents due to lack of understanding what it was and/or how to play the game. Residents frequently commented that this element did not meet their needs, as they would much rather prefer a second pavilion for shaded seating instead of the court. The inclusion of the bocce court demonstrates how quantity of spatial elements in the landscape does not equate to a more supportive environment overall.

Elements should instead be recommended based on user needs and preferences and how they function to better support well-being in users. This is where the Supportive Environments for Effectiveness framework can be used to guide landscape architects in making informed design decisions. By targeting and fulfilling human informational needs, SEE contextualizes these needs within the restorative power of nature. In understanding the needs and preferences of user groups and applying these concepts to SEE, designers can identify novel opportunities to improve well-being through a range of environmental attributes and affordances. To demonstrate the application of this potential, the findings on the differences in needs and preferences of residents and staff at Meadowlark Hills were examined through the lens of the SEE framework.

Each space was evaluated for existing elements that meet the informational needs of all users and then custom recommendations were suggested to meet individual needs of specific user groups. As shown with the Gazebo space in Figure 3.14, design elements can fulfill the needs of multiple domains. For instance, the staff preference for larger gathering areas can satisfy the informational need for model building by providing space for learning, but it can also satisfy the need for meaningful action through participation and helping or teaching others. Often, spatial elements can contribute to multiple needs within one domain for both user groups. By adding native riparian vegetation, the plant material can satisfy the staff’s preference for more native vegetation and contribute to clear-headedness. There is also potential for the riparian vegetation to increase resident satisfaction with the views of the pond—contributing, again, to clear-headedness through the being capable domain. For a detailed evaluation and application of the findings and the SEE framework of each space, please refer to Appendix C.

Model Building		Meaningful Action		Being Capable		
EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	
Complexity of Views • Gazebo • Tree Canopy (Vegetative Screen + Shade Canopy)  Wayfinding • Materiality • Diverse Vegetation	<b>RESIDENT</b> Exploration & Understanding • Keep Paved Accessibility	Group Activities • Trail (Exercise + Games) • Gathering Space  Participation • Seating Elements	<b>RESIDENT</b>  No Custom Interventions Needed	Reflection & Meditation • Gazebo • Tree Canopy  Soft Fascination • Tree Canopy • Views of Pond • Wildlife Connections	<b>RESIDENT</b> Clear-headedness • Better Pond Views	
	<b>STAFF</b> Exploration & Understanding • Increase Shade Canopy • Add More Native Plants		<b>STAFF</b> Participation • Larger Gathering Areas		<b>STAFF</b> Helping & Teaching Others • Larger Gathering Areas	<b>STAFF</b> Clear-headedness • Add More Native Plants • Increase Shade Canopy
	Learning • Larger Gathering Areas					

Figure 3.14. Translating Survey Findings into SEE Design Recommendations for the Gazebo at Bayer’s Nature Area

To further clarify how an outdoor environment could be evaluated and improved by the SEE principles, three of the 11 photo surveyed spaces were chosen to illustrate these findings visually through before and after comparisons. The three spaces were chosen to represent the range of opportunities available at Meadowlark Hills: the urban woodland at Donner’s Way, the community gathering space at the Courtyard, and the skilled nursing household patio at Lyle House.

Looking at the Woods at Donner’s Way, the existing space features elements that satisfy all three informational need domains (see Figure 3.15). The diverse vegetation and tree canopy influence the complexity of views impacting model building and also contribute to being capable via soft fascination. As the habitat for numerous birds, squirrels, and other wildlife species, there

are additional opportunities for soft fascination that extend beyond plant material. The existing handrail provides a means for users to easily explore the space and to participate in walking expeditions, satisfying model building and meaningful action, respectively. Although each domain of SEE is satisfied with the existing conditions, there are additional spatial opportunities that could be introduced to meet user preferences or address universal needs. For instance, the resident preference for a paved path in this space can be accommodated by paving half of the existing pathway. By leaving half of the path unpaved, this acknowledges the preferences of staff. There is also an opportunity to integrate educational signage into this space, which could be used to educate users on the importance of urban woodlands. In addition to fulfilling model building, this spatial element also offers opportunities for meaningful action through participation in the process of designing, developing, and installing each sign. Additionally, the addition of lighting along the path will increase the ability of users to explore this outdoor space more easily throughout the year.

The existing conditions at the Fire Pit space at the Courtyard include numerous elements that contribute to soft fascination, including the sculptures, metal artwork, and various plant species—fulfilling the domain of being capable (see Figure 3.16). The fencing also contributes to this domain by creating a sense of enclosure that contributes to reflection or meditation and creates a sheltered view that connects with the model building domain in SEE. Similarly, the artificial lawn of the putting green offers an open view that impacts the complexity of views within this space. There are also attributes and affordances that offer opportunities for meaningful action. The seating elements invite participation in activities held in this space,



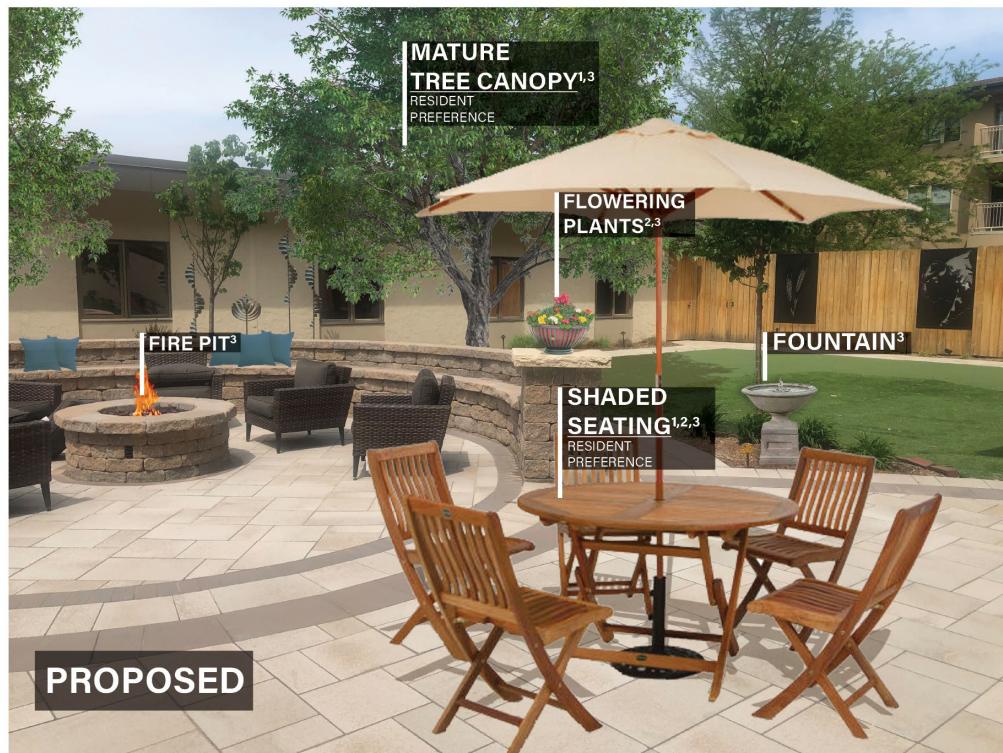
1 = MODEL BUILDING | 2 = MEANINGFUL ACTION | 3 = BEING CAPABLE

Figure 3.15. Visualizing SEE and Survey Findings at the Woods at Donner's Way particularly when the fire pit is in use. The existing potted plants also offer users the ability to participate in a communal activity, such as maintaining these plants through watering. Based on

the survey findings, there are several opportunities to increase user compatibility with this space. Introducing mature tree species would satisfy the resident preference for more tree canopy. By introducing mature plant materials rather than juvenile ones, this will also more meaningfully impact the microclimate in this space to create a more enjoyable experience for users. Users, particularly residents, will appreciate the shaded seating options that better utilize the open space in the courtyard. The extra seating options encourage use and participation in this space, which facilitates meeting needs from all three informational need domains. Furthermore, the inclusion of more flowering plants and a fountain introduce additional elements of soft fascination in the space.

Since the Lyle House Patio is one of the most underutilized spaces at Meadowlark Hills, the proposed changes to the space aim to create a new aesthetic experience for users (see Figure 3.17). While the existing space features dappled shade from a mature tree canopy and numerous patio tables and chairs, the space directly overlooks a parking lot. The proposed changes introduce privacy into the space through colorful vegetation to satisfy staff preferences for both elements. In utilizing plant material as a screen, the vegetation contributes to both soft fascination in the being capable domain and complexity of views in model building. By planting climbing roses and lavender, the plant material will also attract pollinators to the patio—increasing wildlife connections in the domain of being capable. There is also an opportunity to add visual artwork to the space by utilizing the building wall in the background.

As the spaces at Donner's Way, the Courtyard, and the Lyle House Patio illustrate, there is a clear opportunity for landscape architects to utilize the Supportive Environments for Effectiveness framework to evaluate and recommend design interventions for outdoor spaces in long-term care design. Because the informational need domains are shared amongst both residents and staff in these environments, the framework can be used as a guide to introduce spatial elements that meet common needs and preferences and provide opportunities to connect with nature. When these needs and preferences differ between user groups, the framework can again be used as a starting point to evaluate how to integrate a variety of elements into a space.



1 = MODEL BUILDING | 2 = MEANINGFUL ACTION | 3 = BEING CAPABLE

Figure 3.16. Visualizing SEE and Survey Findings at the Fire Pit at the Courtyard



1 = MODEL BUILDING | 2 = MEANINGFUL ACTION | 3 = BEING CAPABLE

Figure 3.17. Visualizing SEE and Survey Findings at the Lyle House Patio



## Chapter 4 - Conclusion

By examining the needs and preferences of residents and staff in long-term care, this study offers insight into how the Supportive Environments for Effectiveness framework can be used to inform design recommendations in order to create supportive outdoor environments. This research contributes to this awareness of the impact of outdoor environment in supporting mental well-being and to the larger discussion of how to create supportive environments at long-term care facilities by presenting the Supportive Environments for Effectiveness framework as a novel approach to design recommendations. By focusing on outdoor environments for both residents and staff, the findings of this quantitative study demonstrate how the needs and preferences of these two populations overlap and differ. With a better understanding of the similarities and differences between residents and staff, this study highlights the need for landscape architects and other designers to re-evaluate existing design recommendations for long-term care facilities. The current approach, emphasizing resident functional needs, limits opportunities to improve the well-being of staff due to unmet needs and preferences. This research, however, demonstrates how existing and proposed outdoor spaces can be designed with the needs and preferences of both users in mind. By grounding design recommendations in the SEE framework, this allows for more tailored design recommendations that can create spatial opportunities that meet the informational needs of users. By considering the psychological needs of residents and staff according to SEE and contextualizing these needs through contact with nature, landscape architects can better support the well-being of both populations in long-term care.

It is important to note that opportunities to integrate the principles of SEE into landscape architecture are beyond what was suggested in the surveys and discussion. While the spatial elements described in this study were tailored specifically for Meadowlark Hills by the researcher, interactions with residents and staff provided additional ideas that could be incorporated into outdoor spaces in long-term care. For instance, a common request in response to an open-ended survey question was to build a fabrication space for residents. This space could be used for a variety of personal interests of residents, such as woodworking, jewelry making, painting, or quilting. As residents transition from independent living to skilled nursing, each subsequent move to a higher level of care is traditionally accompanied by a downsizing in personal space. With each move to smaller accommodations, a resident must downsize—often at the expense of materials for hobbies (e.g., sewing machines, woodworking tools, canvases,

pottery wheels, etc.). Providing a fabrication space for residents would provide opportunities for all three informational needs domains: model building, by providing opportunities to learn from others; meaningful action, by donating unused equipment and/or providing opportunities to teach others a craft; and being capable, by providing opportunities for reflection or meditation while engaged in a task. This space would allow residents a connection to their identity before entering long-term care, maintaining a sense of purpose and autonomy in an environment with otherwise limited control. By providing a fabrication space with a folding glass wall, this maintains a visual connection to nature. In opening the wall during nice weather, the gentle breezes and sounds of nature can offer additional restorative potential for those actively or passively utilizing the space. Furthermore, by providing space for a variety of activities that could be used for individual or group activities, a fabrication space would introduce new opportunities for mental stimulation for both residents and staff. By giving users a space to craft the environment at Meadowlark Hills, users can shape this space to fit their physical, psychological, and social needs—further supporting the idea of job crafting. Furthermore, since a lack of mental stimulation currently available was noted by many residents from all levels of autonomy at Meadowlark Hills, finding creative opportunities to address this need should be a priority. By seeking to understand the needs and preferences of both residents and staff according to the SEE framework, there is an opportunity to impart meaningful change in the care environments in long-term care.

## **Limitations**

Limitations for this study center on the generalizability of the data given that only one long-term care facility was examined. The case study of Meadowlark Hills creates a smaller population from which to draw sample sizes of residents and staff, which implicitly limits the external validity of the study. A lower external validity lowers the applicability of the research to the broader population of residents and staff at long-term care facilities. Other limitations include low survey rates given the limited time frame for the study. During the survey process, an unexpected limitation was the number of residents who opted out of the survey due to minimal or no familiarity with the outdoor spaces available to them. Time of day also impacted the availability of residents to participate in the survey. For residents in healthcare households, mid-mornings were often occupied with bathing, dressing, or other activities of daily living. Afternoons were spent napping for many residents, who were not disturbed.

Regarding resident data, the majority of residents who participated resided in independent living. There were significantly fewer residents who participated from assisted living or healthcare households, largely due to lowered decision-making capacity and unfamiliarity. First, residents in healthcare households were more likely to be excluded from the study due to reduced mental capacity as a result of dementia, which limited their ability to give informed consent and to adequately reflect on prior use patterns. In recognition of this limiting factor, the researcher approached only mentally cognizant residents about participating in the survey. Residents deemed mentally cognizant were identified in collaboration with the Household and/or Clinical Coordinator(s) in each skilled nursing household. This limitation excluded all residents from three specialized dementia-care households: Collins House, Stolzer House, and Tinklin Pointe. The need to pre-screen residents in healthcare households for reduced mental capacity also impacted the ability to survey residents in two households. Although the researcher was working directly with the Engagement Specialist at Meadowlark Hills to schedule survey times with specific households, not all Household Coordinators would respond to repeated email communications. Without the ability to pre-screen and identify potential participants, this further limited the pool of residents available to survey. Of the residents that were identified as mentally fit enough to provide informed consent, many residents declined to participate due to unfamiliarity with outdoor spaces due to reported lack of use.

### **Future Considerations for SEE in Long-Term Care Design**

Despite the limitations of this study, this study offers valuable findings that highlight the necessity of considering the needs and preferences of both user groups in long-term care facilities. Given the underutilization of existing outdoor spaces but the incidence of mental health issues in both residents and staff, designers must be willing to re-evaluate existing design recommendations from a new perspective to improve the well-being of both user groups. By contextualizing the informational need domains of SEE within nature, there is significant potential for this study to meaningfully impact well-being in long-term care now and in the future. To maximize this impact, designers should evaluate the impact of accessibility in harnessing the restorative potential of nature within the SEE framework. Indeed, the findings demonstrated the significant impact of limited accessibility on use of outdoor spaces. Residents with declining physical ability reported little familiarity with the outdoor environments at

Meadowlark Hills. Within Wroten House, for instance, the residents who participated in the survey reported no familiarity with any of the locations photographed. This was a surprising finding given that one of the photographs was the household's back patio space, which is located directly off of Wroten's dining room. Similarly, in other healthcare households, assisted living, or independent living, residents without the physical ability to walk outdoors without assistance were less likely to utilize the outdoor spaces than their neighbors. Although staff are physically able to go outdoors independently, this user group also underutilized the outdoor spaces available to them. Although residents and staff report that many of the outdoor spaces were visually appealing, they are unlikely to benefit from applying the Supportive Environments for Effectiveness framework outdoors. This exclusive focus on the outdoors will implicitly limit the ability of residents and staff to receive restorative benefits from outdoor supportive spaces. Achieving the benefits of natural spaces in long-term care must, therefore, also consider how to integrate elements of nature into the spaces all users can access—the interior of facilities. There is an opportunity for future research to build upon this research by exploring how to bridge the connection with nature indoors and outdoors. In focusing on the indoor-outdoor connection, future research can aid in removing a key barrier of access to nature and create supportive environments accessible by all users in long-term care.

## References

- Ahmed, A. Ormandy, P., & Seekles, M.L. (2019). An examination of how the ‘household model’ of care can contribute to positive ageing for residents in the ‘fourth age.’ *OBM Geriatrics*, 3(1). doi: 10.21926/obm.geriater.1901030
- Basu, A., & Kaplan, R. (2015). The reasonable person model: Introducing the framework and the chapters. In *Fostering reasonableness: supportive environments for bringing out our best*. doi: 10.3998/maize.13545970.0001.001
- Basu, A., Kaplan, R., & Kaplan, S. (2014). Creating supportive environments to foster reasonableness and achieve sustainable well-being. In T.J. Hämäläinen & J. Michaelson (Eds.), *Well-being and beyond* (pp. 182–218). doi: 10.4337/9781783472901.00015
- Bengtsson, A., & Carlsson, G. (2013). Outdoor environments at three nursing homes-qualitative interviews with residents and next of kin. *Urban Forestry & Urban Greening*, 12(3), 393–400. doi: 10.1016/j.ufug.2013.03.008
- Berdejo-Espinola, V., Suárez-Castro, A., Amano, T., Fielding, K.S., Oh, R.R.Y., & Fuller, R.A. (2021). Urban green space use during a time of stress: A case study during the COVID-19 pandemic in Brisbane, Australia. *People and Nature*, 3(3), 597–609. doi: 10.1002/pan3.10218
- Berman, M.G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science*, 19(12), 1207–1212. doi: 10.1111/j.1467-9280.2008.02225.x
- Berthelsen, H., Ertel, M., Geisler, M., & Muhonen, T. (2019). Validating the psychosocial safety climate questionnaire – integration of findings from interviews in Germany and Sweden. *Scandinavian Journal of Work and Organizational Psychology*, 4(1), 9. doi: 10.16993/sjwop.85
- Booi, L., Sixsmith, J., Chaudhury, H., O’Connor, D., Young, M., & Sixsmith, A. (2021). ‘I wouldn’t choose this work again’: Perspectives and experiences of care aides in long-term residential care. *Journal of Advanced Nursing*, 77, 3842–3852. doi: 10.1111/jan.14948
- Braubach, M., Egorov, A., Mudu, P., Wolf, T., Ward Thompson, C., & Martuzzi, M. (2017). Effects of urban green space on environmental health, equity and resilience. In *Nature-based solutions to climate change adaptation in urban areas*. doi: 10.1007/978-3-319-56091-5\_11
- Browning, W.D., Ryan, C.O., & Clancy, J.O. (2014). *14 patterns of biophilic design*. New York: Terrapin Bright Green.

- Calkins, M. (2020). *Designing gardens to attract activity*. Innovative Designs in Environment for an Aging Society Institute. <https://www.ipfcc.org/resources/Designing-Gardens-to-Attract-Activity.pdf>
- Carnemolla, P., Debono, D., Hourihan, F., Hor, S., Roberston, H., & Travaglia, J. (2021). The influence of the built environment in enacting a household model of residential aged care for people living with a mental health condition: A qualitative post-occupancy evaluation. *Health & Place*, *71*, 102624. doi: 10.1016/j.healthplace.2021.102624
- Chang, K.K.P., Wong, F.K.Y., Chan, K.L., Wong, F., Ho, H.C., Wong, M.S., Ho, Y.S., Yuen, J.W.M., Siu, J.Y-M., Yang, L. (2020). The impact of the environment on the quality of life and the mediating effects of sleep and stress. *International Journal of Environmental Research and Public Health* *17*(20), 8529. doi: 10.3390/ijerph17228529
- Chu, C.H., Donato-Woodger, S., & Dainton, C.J. (2020). Competing crises: COVID-19 countermeasures and social isolation among older adults in long-term care. *Journal of Advanced Nursing*, *76*, 2456–2459. doi: 10.1111/jan.14467
- Clark-Ibáñez, M. (2004). Framing the social world with photo-elicitation interviews. *The American Behavioral Scientist*, *47*(12), 1507–1527. doi: 10.1177/0002764204266236
- Cook, P.J., Melchert, T.P., & Connor, K. (2016). Measuring well-being: A review of instruments. *The Counseling Psychologist*, *44*(5), 730–757. doi: 10.1177/0011000016633507
- Cooper Marcus, C., & Sachs, N.A. (2013). *Therapeutic landscapes: An evidence-based approach to designing healing gardens and restorative outdoor spaces*. New Jersey: John Wiley & Sons.
- De Hert, S. (2020). Burnout in healthcare workers: Prevalence, impact and preventative strategies. *Local and Regional Anesthesia*, *13*, 171–183. doi: 10.2147/LRA.S240564
- Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. (2003). “The future supply of long-term care workers in relation to the aging baby boom generation: Report to Congress.” Washington, DC. <http://aspe.hhs.gov/daltcp/reports/ltcwork.pdf>
- Detweiler, M.B., & Warf, C. (2005). Dementia wander garden aids post cerebrovascular stroke restorative therapy: A case study. *Alternative Therapies in Health and Medicine*, *11*(4), 54–58. <https://pubmed.ncbi.nlm.nih.gov/16053122/>
- Downton, P., Jones, D., Zeunert, J., & Roös, P. (2017). Biophilic design applications: Putting theory and patterns into built environment practice. In P.K. Collins & I. Gibson (Eds.), *The International Conference on Design and Technology* (pp. 59–65). doi: 10.18502/keg.v2i2.596

- Ekman, I., Swedberg, K., Taft, C., Lindseth, A., Norberg, A., Brink, E., Carlsson, J., Dahlin-Ivanoff, S., Johansson, I.-L., Kjellgren, K., Lidén, E., Öhlén, J., Olsson, L.-E., Rosén, H., Rydmark, M., & Sunnerhagen, K.S. (2011). Person-centered care – ready for prime time. *European Journal of Cardiovascular Nursing*, *10*(4), 248–251. doi: 10.1016/j.ejcnurse.2011.06.008
- Eltaybani, S., Yamamoto-Mitani, N., Ninomiya, A., & Igarashi, A. (2021). The association between nurses' burnout and objective quality care indicators: A cross-sectional survey in long-term care wards. *BMC Nursing*, *20*, 34. doi: 10.1186/s12912-021-00552-z
- Fillit, H., Aigbogun, M.S., Gagnon-Sanschagrin, P., Cloutier, M., Davidson, M., Serra, E., Guérin, A., Baker, R.A., Houle, C.R., & Grossberg, G. (2021). Impact of agitation in long-term care residents with dementia in the United States. *International Journal of Geriatric Psychiatry*, *36*, 1959–1969. doi: 10.1001/gps.5604
- Frumkin, H. (2021). COVID-19, the built environment, and health. *Environmental Health Perspectives*, *129*(7), 075001. doi: 10.1289/EHP8888
- Gamble, K.R., Howard, J.H., & Howard, D.V. (2014). Not just scenery: Viewing nature pictures improves executive attention in older adults. *Experimental Aging Research*, *40*(5), 513–530. doi: 10.1080/0361073X.2014.956618
- Gibson, J.J. (1979). *The ecological approach to visual perception*. Boston, MA: Houghton Mifflin.
- Hadavi, S., & Sullivan, W.C. (2018). Environmental aesthetics. In D.R. Montello (Ed.), *Handbook of behavioral and cognitive georgraphy* (pp. 307–321). EE Edward Elgar Publishing.
- Hansen, A.S., Beery, T., Fredman, P., & Wolf-Watz, D. (2022). Outdoor recreation in Sweden during and after the Covid-19 pandemic – management and policy implications. *Journal of Environmental Planning and Management*, 1–22. doi: 10.1080/09640568.2022.2029736
- Harrad, R., & Sulla, F. (2018). Factors associated with and impact of burnout in nursing and residential home care workers for the elderly. *Acta Biomed*, *89*(7), 60–69. doi: 10.23750/abm.v89i7-S.7830
- Hartig, T., Berg, A.E., Hagerhall, C.M., Tomalak, M., Bauer, N., Hansmann, R., Ojala, A., Syngollitou, E., Carrus, G., van Herzele, A., Bell, S., Podesta, M.T.C., & Waaseth, G. (2011). Health benefits of nature experience: Psychological, social and cultural processes. In *Forests, Trees and Human Health*. doi: 10.1007/978-90-481-9806-1\_5

- Hsieh, C.-H., Chen, C.-M., Yang, J.-Y., Lin, Y.-J., Liao, M.-L., & Chueh, K.-H. (2022). The effects of immersive garden experience on the health care to elderly residents with mild-to-moderate cognitive impairment living in nursing homes after the COVID-19 pandemic. *Landscape and Ecological Engineering*, *18*, 45–56. doi: 10.1007/s11355-021-00480-9
- Hwang, T.J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020). Loneliness and social isolation during the COVID-19 pandemic. *International Psychogeriatrics*, *32*(10), 1217–1220. doi: 10.1017/S1041610220000988
- Institute of Medicine. 2001. *Crossing the quality chasm*. Washington, DC: National Academies Press.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, *15*(3), 169–182. doi: 10.1016/0272-4944(95)90001-2
- Kaplan, S., & Kaplan, R. (1989). The visual environment: Public participation in design and planning. *Journal of Social Issues*, *45*(1), 59–86. doi: 10.1111/j.1540-4560.1989.tb01533.x
- Kaplan, R., & Kaplan, S. (1995). *The experience of nature: A psychological perspective*. Cambridge University Press.
- Kaplan, S., & Kaplan, R. (2003). Health, supportive environments, and the reasonable person model. *American Journal of Public Health*, *93*(9), 1484–1489. doi: 10.2105/ajph.93.9.1484
- Kaplan, S., & Kaplan, R. (2009). Creating a larger role for environmental psychology: The reasonable person model as an integrative framework. *Journal of Environmental Psychology*, *29*(3), 329–339. doi: 10.1016/j.jenvp.2008.10.005
- Kaplan, R., Kaplan, S., & Ryan, R.L. (1998). *With people in mind: Design and management of everyday nature*. Washington, DC: Island Press.
- Kearney, A.R., & Winterbottom, D. (2006). Accommodating culturally meaningful activities in outdoor settings for older adults. In S. Rodiek & B. Schwarz (Eds.), *The role of the outdoors in residential environments for aging* (pp. 7–28). New York: The Haworth Press.
- Khan, A.H., Sultana, M.S., Hossain, S., Hasan, M.T., Ahmed, H.U., & Sikder, M.T. (2020). The impact of COVID-19 pandemic on mental health & wellbeing among home-quarantined Bangladeshi students: A cross-sectional pilot study. *Journal of Affective Disorders*, *277*, 121–128. doi: 10.1016/j.jad.2020.07.135



- Kleinschroth, F., & Kowarik, I. (2020). COVID-19 crisis demonstrates the urgent need for urban greenspaces. *Frontiers in Ecology and the Environment*, 18(6), 318–319. doi: 10.1002/fee2230
- Kobayashi, L.C., & Steptoe, A. (2018). Social isolation, loneliness, and health behaviors at older ages: Longitudinal cohort study. *Annals of Behavioral Medicine*, 52, 582–593. doi: 10.1093/abm/kax033
- Kumar, R., & Chattu, V.K. (2018). What is in the name? Understanding terminologies of patient-centered, person-centered, and patient-directed care! *Journal of Family Medicine and Primary Care*, 7(3), 487–488. doi: 10.4103/jfmpe.jfmpe\_61\_18
- Kurlowicz, L. (1999). The mini mental state examination (MMSE). *The Hartford Institute for Geriatric Nursing*, 3. <https://cgatoolkit.ca/Uploads/ContentDocuments/MMSE.pdf>
- Kwack, H., Relf, P.D., & Rudolph, J. (2005). Adapting garden activities for overcoming difficulties of individuals with dementia and physical limitations. *Activities, Adaptation & Aging*, 29(1), 1–13. doi: 10.1300/j016v29n01\_01
- Lee, V.S.P., Simpson, J., & Froggart, K. (2013). A narrative exploration of older people's transitions into residential care. *Aging & Mental Health*, 17(1), 48–56. doi: 10.1080/13607863.2012.715139
- Lent, R.W. (2004). Toward a unifying theoretical and practical perspective on well-being and psychosocial adjustment. *Journal of Counseling Psychology*, 51(4), 482–509. doi: 10.1037/0022-0167.51.4.482
- Loeffler, T.A. (2004) A photo elicitation study of the meanings of outdoor adventure experiences. *Journal of Leisure Research*, 36(4), 536–556. doi: 10.1080/00222216.2004.11950035
- McHugh, M.D., Kutney-Lee, A., Cimiotti, J.P., Sloane, D.M, & Aiken, L.H. (2011). Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. *Health Affairs*, 30(2), 202–210. doi: 10.1377/hlthaff.2010.0100
- Meadowlark Hills. (2022). *Senior living*. <https://www.meadowlark.org/senior-living-0>
- Milligan, C., Gatrell, A., & Bingley, A. (2004). 'Cultivating health': Therapeutic landscapes and older people in northern England. *Social Science & Medicine*, 58, 1781-1793. doi: 10.1016/S0277-9536(03)00397-6
- MMP Architects. (2018). *Design guide for long term care homes*. [https://www.fgiguilines.org/wp-content/uploads/2018/03/MMP\\_DesignGuideLongTermCareHomes\\_2018.01.pdf](https://www.fgiguilines.org/wp-content/uploads/2018/03/MMP_DesignGuideLongTermCareHomes_2018.01.pdf)
- Morgan, S., & Yoder, L. H. (2011). A concept analysis of person-centered care. *Journal of Holistic Nursing*, 30(1): 6–15. doi: 10.1177/0898010111412189

- National Resource Council (US) Panel on Statistics for an Aging Population. (1988). The aging population in the twenty-first century. (G. DM, Ed.) Washington, DC. doi: 10.17226/737
- OECD. (2013). *OECD Guidelines on Measuring Subjective Well-being*. OECD Publishing. doi: 10.1787/97892641191655-en
- Ohly, H., White, M.P., Wheeler, B.W., Bethel, A., Ukoumunne, O.C., Nikolaou, V., & Garside, R. (2016). Attention restoration theory: A systematic review of the attention restoration potential of exposure to natural environments. *Journal of Toxicology and Environmental Health, 19*(7), 305–343. doi: 10.1080/10937404.2016.1196155
- Papathanasiou, I.V. (2015). Work-related mental consequences: Implications of burnout on mental health status among health care providers. *Acta Informatica Medica, 23*(1): 22–28. doi: 10.5455/aim.2015.23.22-28
- Peters, T., & Verderber, S. (2021). Biophilic design strategies in long-term residential care environments for persons with dementia. *Journal of Aging and Environment, 36*(3): 227–255. doi: 10.1080/26892618.2021.1918815
- Rachel, H., & Francesco, S. (2018). Factors associated with and impact of burnout in nursing and residential home care workers for the elderly. *Acta Biomedica Atenei Parmensis, 89*(7), 60–69. doi: 10.23750/abm.v89i7-S.7830
- reDirect. (2022). *Supportive Environments for Effectiveness (SEE)*. <https://redirect.org/our-framework>
- Rodiek, S., & Lee, C. (2009). Elderly care: Increasing outdoor usage in residential facilities. *World Health Design, 2*(4), 49–55. <https://www.researchgate.net/publication/260797391>
- Ruggeri, K., Garcia-Garzon, E., Maguire, A., Matz, S., & Huppert, F.A. (2020). Well-being is more than happiness and life satisfaction: A multidimensional analysis of 21 countries. *Health and Quality of Life Outcomes, 18*, 192. doi: 10.1186/s12955-020-01423-y
- Ryan, R.M., & Deci, E.L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*(1), 141–166.
- Schmüdderich, K., Holle, D., Ströbel, A., Holle, B., & Palm, R. (2021). Relationship between the severity of agitation and quality of life in residents with dementia living in German nursing homes – a secondary data analysis. *BMC Psychiatry, 21*, 191. doi: 10.1186/s12888-021-03167-5
- Simard, J., & Volicer, L. (2020). Loneliness and isolation in long-term care and the COVID-19 pandemic. *Journal of the American Medical Directors Association, 21*(7), 966–967. doi: 10.1016/j.jamda.2020.05.006

- Sullivan, W.C. (2014). Attention restoration and stress reduction: Two mechanisms underlying the health benefits of exposure to green spaces [Paper presentation]. A Community on Ecosystem Services (ACES) Conference 2014, Washington, D.C.  
<https://www.researchgate.net/publication/269988848>
- Tennessen, C.M., & Cimprich, B. (1995). View to nature: Effects on attention. *Journal of Environmental Psychology, 15*(1), 77–85. doi: 10.1016/0272-4944(95)90016-0
- Tims, M., Derks, D., & Bakker, A. (2016). Job crafting and its relationship with person-job fit and meaningfulness: A three-wave study. *Journal of Vocational Behavior, 92*, 44–53. doi: 10.1016/j.jvb.2015.11.007
- Ugolini, F., Massetti, L., Calaza-Martínez, P., Cariñanos, P., Dobbs, C., Ostoić, S.K., Marin, A.M., Pearlmutter, D., Saaroni, H., Šaulienė, I., Simoneti, M., Verlič, A., Vuletić, D., & Sanesi, G. (2020). Effects of the COVID-19 pandemic on the use and perceptions of urban green space: An international exploratory study. *Urban Forestry & Urban Greening, 56*, 126888. doi: 10.1016/j.ufug.2020.126888
- Ulrich, R.S. (1983). Aesthetic and affective response to natural environment. In I. Altman & J.F. Wohlwill (Eds.), *Behavior and the natural environment: Human behavior and environment* (pp. 85–125). Springer. doi: 10.1007/978-1-4613-3539-9\_4
- Ulrich, R.S. (1984). View through a window may influence recovery from surgery. *Science, 224*(4647), 420–1. doi: 10.1126/science.6143402
- Ulrich, R.S., Simons, R.F., Losito, B.D., Fiorito, E., Miles, M.A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology, 11*(3), 201–230. doi: 10.1016/S0272-4944(05)80184-7
- van den Berg, M.E.L., Winsall, M., Dyer, S.M., Breen, F., Gresham, M., & Crotty, M. (2020). Understanding the barriers and enablers to using outdoor space in nursing homes: A systematic review. *The Gerontologist, 60*(4), 254–269. doi: 10.1093/geront/gnz055
- Verderber, S., & Reuman, D. (1987). Windows, views, and health status in hospital therapeutic environments. *Journal of Architectural and Planning Research, 4*(2), 120–133.  
<http://www.jstor.org/stable/43029487>
- Volenc, Z.M., Abraham, J.O., Becker, A.D., & Dobson, A.P. (2021). Public parks and the pandemic: How park usage has been affected by COVID-10 policies. *PLOS ONE, 16*(5), 0251799. doi: 10.1371/journal.pone.0251799
- White, M.P., Alcock, I., Wheeler, B.W., & Depledge, M.H. (2013). Would you be happier living in a greener urban area? A fixed-effects analysis of panel data. *Psychological Science, 24*(6), 920–928. doi: 10.1177/09567976124659

- World Health Organization. (2022, October 1). *Ageing and health*. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
- Wrzesniewski, A., & Dutton, J.E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *The Academy of Management Review*, 26(2), 179–201. doi: 10.2307/259118
- Xia, N., & Li, H. (2018). Loneliness, social isolation, and cardiovascular health. *Antioxidants & Redox Signaling*, 28(9), 837–851. doi: 10.1089/ars.2017.7312
- Yang, B., & Brown, T.J. (1992). A cross-cultural comparison of preferences for landscape styles and landscape elements. *Environment and Behavior*, 24(4), 471–507. doi: 10.1177/0013916592244003

## Appendix A - Resident Survey



*Informing Well-Being through Outdoor Supportive Environments:  
Applying the Supportive Environments for Effectiveness Framework  
to Long-Term Care Design*

Dear Participant:

Thank you for participating in this survey, which is part of research for “Informing Well-Being through Outdoor Supportive Environments: Applying the Supportive Environments for Effectiveness Framework to Long-Term Care Design.” The purpose of this survey is to identify characteristics of outdoor environments that meet the needs and preferences of residents and staff. Your anonymous feedback will help inform design recommendations to create for supportive outdoor environments for residents in long-term care facilities. All answers will remain confidential and will be used for research purposes only.

Your participation in this survey is voluntary and completely anonymous. No personal information or identifiers, including your name or contact information, will be collected in this survey. All answers are confidential and will be used for research purposes only by the principal investigator and researcher. You may skip any questions you do not feel comfortable answering and can withdraw from the survey at any time. There are no anticipated risks to participating. The total survey should take approximately 10-15 minutes to complete. The anonymous data collected may be used for future research studies but will not be distributed to any other entity. This study is approved by Kansas State University’s Institutional Review Board.

If you have any questions regarding this survey or the research project, please contact the principal investigator, Dr. Sara Hadavi, at [sarahadavi@k-state.edu](mailto:sarahadavi@k-state.edu) or the graduate student researcher, Victoria Brenneis, at [victoriab@k-state.edu](mailto:victoriab@k-state.edu). If you have any questions regarding your role as a participant in this study, please contact K-State’s University Research Compliance Office at [comply@k-state.edu](mailto:comply@k-state.edu).

Thank you for your time and participation!

Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

- 1 2 3 4 5 This space is easily accessible to me.
- 1 2 3 4 5 I often use this space.
- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 This space allows me to meaningfully contribute to my surroundings.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have a projector screen for outdoor learning or movies in this space.
- 1 2 3 4 5 I would like to have more natural elements in this space.
- 1 2 3 4 5 I would like to have more privacy in this space for smaller group activities.

I like this space because of its:

- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 amount of covered structures.
- 1 2 3 4 5 paved accessibility.
- 1 2 3 4 5 outdoor kitchen.

Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

- 1 2 3 4 5 This space is easily accessible to me.
- 1 2 3 4 5 I often use this space.
- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 This space allows me to meaningfully contribute to my surroundings.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more shade in this space.
- 1 2 3 4 5 I would like to have more natural elements in this space.
- 1 2 3 4 5 I would like to have more privacy in this space for smaller group activities.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 recreation lawn.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 visual artwork.
- 1 2 3 4 5 paved accessibility.
- 1 2 3 4 5 fire pit.

Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

- 1 2 3 4 5 This space is easily accessible to me.
- 1 2 3 4 5 I often use this space.
- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have some privacy in this space to meditate or reflect.
- 1 2 3 4 5 I would like to have moveable seating options here to watch wildlife.
- 1 2 3 4 5 I would like to have a courtyard space to gather here with others.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 open space without structures.
- 1 2 3 4 5 educational signage.
- 1 2 3 4 5 paved accessibility.



Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

- 1 2 3 4 5 This space is easily accessible to me.
- 1 2 3 4 5 I often use this space.
- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 This space allows me to meaningfully contribute to my surroundings.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more colorful vegetation in this space.
- 1 2 3 4 5 I would like to have more moveable seating options in this space.
- 1 2 3 4 5 I would like to have more shade in this space.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 water elements.
- 1 2 3 4 5 open space without overhead structures.
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more privacy from the road in this space.
- 1 2 3 4 5 I would like more flowering plants in this space.
- 1 2 3 4 5 I would like to have more shade in this space.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 built structures (i.e., pergola).
- 1 2 3 4 5 signage for wayfinding.
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
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- 1 2 3 4 5 I used to have access to this space when it was here.
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- 1 2 3 4 5 This space was relaxing and lowered my stress.
- 1 2 3 4 5 This space allowed me to connect with others.
- 1 2 3 4 5 This space allowed me to meaningfully contribute to my surroundings.
- 1 2 3 4 5 I spent more time in this space recently compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I liked to use this space.
- 1 2 3 4 5 I would have liked more accessible garden beds in this space.
- 1 2 3 4 5 I would have liked more privacy in this space from the road.
- 1 2 3 4 5 I would have liked movable seating in this space.

I like this space because of its:

- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 fruit and vegetable production.
- 1 2 3 4 5 climbing plants on fences and trellises.
- 1 2 3 4 5 open space without structures.
- 1 2 3 4 5 unpaved accessibility (e.g., gravel).

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more native plantings in this space.
- 1 2 3 4 5 I would like to have larger gathering areas in this space.
- 1 2 3 4 5 I would like to have visual artwork in this space.

I like this space because of its:

- 1 2 3 4 5 views of the pond.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 built structures (i.e., Gazebo).
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



1 = strongly disagree  
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- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have this path paved.
- 1 2 3 4 5 I would like to have more benches along this path.
- 1 2 3 4 5 I would like to have educational signage on the plants along this path.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 interactions with wildlife.
- 1 2 3 4 5 unpaved accessibility.

Indicate your level of agreement with the following statements regarding this image:



- 1 = strongly disagree**
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- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more colorful vegetation along this path.
- 1 2 3 4 5 I would like to have more seating options along this path.
- 1 2 3 4 5 I would like to have more shade along this path.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 open space without structures.
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I would like to use this space.
- 1 2 3 4 5 I would like to have an outdoor classroom in this space.
- 1 2 3 4 5 I would like to have visual artwork or be able to create art in this space.
- 1 2 3 4 5 I would like to have more colorful vegetation in this space.

I like this space because of its:

- 1 2 3 4 5 screens.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 views of natural elements.

Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

- 1 2 3 4 5 This space is easily accessible to me.
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- 1 2 3 4 5 I would like to have visual artwork or be able to create art in this space.
- 1 2 3 4 5 I would like to have more colorful vegetation in this space.

I like this space because of its:

- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 tree canopies.
- 1 2 3 4 5 paved accessibility.



At Meadowlark Hills, I would like to have more:

- 1 2 3 4 5 tree canopy
- 1 2 3 4 5 diverse vegetation
- 1 2 3 4 5 wildlife connections
- 1 2 3 4 5 water elements
- 1 2 3 4 5 fire elements
- 1 2 3 4 5 shade structures
- 1 2 3 4 5 visual artwork
- 1 2 3 4 5 open sight lines
- 1 2 3 4 5 nighttime activity
- 1 2 3 4 5 educational signage
- 1 2 3 4 5 wayfinding signage
- 1 2 3 4 5 nature trails
- 1 2 3 4 5 types of gathering spaces
- 1 2 3 4 5 seating options

<p><b>1 = strongly disagree</b> <b>2 = disagree</b> <b>3 = neither agree nor disagree</b> <b>4 = agree</b> <b>5 = strongly agree</b></p>
--

At Meadowlark Hills, I would like to have outdoor spaces for:

- 1 2 3 4 5 exercising
- 1 2 3 4 5 socializing
- 1 2 3 4 5 gardening
- 1 2 3 4 5 reflection or meditation
- 1 2 3 4 5 play or recreation
- 1 2 3 4 5 nature-related pursuits (e.g., fishing or bird-watching)
- 1 2 3 4 5 teaching or learning
- 1 2 3 4 5 other (please explain)

Indicate your level of agreement with the following statements:

- 1 2 3 4 5 I frequently use the outdoor spaces at Meadowlark Hills.
- 1 2 3 4 5 I feel safe going outside.
- 1 2 3 4 5 I have the physical ability to walk outdoors without help.
- 1 2 3 4 5 Overall, I am satisfied with the outdoor environments at Meadowlark Hills.

1 2 3 4 5 Overall, I would rate my mental health as:

**1 = poor**  
**2 = somewhat poor**  
**3 = average**  
**4 = good**  
**5 = excellent**

Indicate your level of agreement with the following statements:

**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

1 2 3 4 5 I lead a purposeful and meaningful life.

1 2 3 4 5 My social relationships are supportive and rewarding.

1 2 3 4 5 I am engaged and interested in my daily activities.

1 2 3 4 5 I actively contribute to the happiness and well-being of others.

1 2 3 4 5 I am competent and capable in the activities that are important to me.

1 2 3 4 5 I am a good person and live a good life.

1 2 3 4 5 I am optimistic about my future.

1 2 3 4 5 People respect me.

1 2 3 4 5 I make a difference in the lives of others.

1 2 3 4 5 Overall, I am satisfied with where I live.

In the last few weeks, I have felt:

1 2 3 4 5 depressed.

1 2 3 4 5 happy.

1 2 3 4 5 lonely.

1 2 3 4 5 sad.

1 2 3 4 5 bored.

1 2 3 4 5 calm and peaceful.

1 2 3 4 5 anxious or stressed.

1 2 3 4 5 that I was effective in what I was doing.

1 2 3 4 5 everything I did was an effort.

1 2 3 4 5 disconnected from the world around me.

1 2 3 4 5 that I don't really belong.

1 2 3 4 5 actively involved in people's lives.

**1 = rarely or never**  
**2 = a little**  
**3 = occasionally**  
**4 = often**  
**5 = almost all the time**

Indicate your level of agreement with the following statements:

- 1 2 3 4 5 The COVID-19 pandemic has negatively impacted my mental health.
- 1 2 3 4 5 I spend more time outdoors now than I did before the pandemic.

**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

Because of the pandemic, I have felt more:

- 1 2 3 4 5 depressed.
- 1 2 3 4 5 happy.
- 1 2 3 4 5 lonely.
- 1 2 3 4 5 sad.
- 1 2 3 4 5 bored.
- 1 2 3 4 5 calm and peaceful.
- 1 2 3 4 5 anxious or stressed.
- 1 2 3 4 5 that I was effective in what I was doing.
- 1 2 3 4 5 everything I did was an effort.
- 1 2 3 4 5 disconnected from the world around me.
- 1 2 3 4 5 that I don't really belong.
- 1 2 3 4 5 actively involved in people's lives.

**1 = rarely or never**  
**2 = a little**  
**3 = occasionally**  
**4 = often**  
**5 = almost all the time**

How long have you lived at Meadowlark Hills?

- Less than six months
- 6 – 12 months
- 1 – 3 years
- 3 – 5 years
- 5 – 10 years
- More than 10 years

Which household do you live in?

- Honstead House
- Lyle House
- Sloan House
- Wroten house
- Miller Place (Assisted Living)
- Independent Living Apartment
- Independent Living Cottage

What is your age?

- Under 54
- 55 – 64
- 65 – 74
- 75 – 84
- 85+

What is your gender?

- Male
- Female
- Non-binary / third gender
- Prefer not to answer

What is your race/ethnicity?

- White or Caucasian
- Black or African American
- Hispanic or Latino
- Asian or Asian American
- Other:

What is the highest level of education you have completed?

- Some high school but no diploma
- High school graduate
- Some college but no degree
- College degree
- Professional or doctorate degree

## Appendix B - Staff Survey



*Informing Well-Being through Outdoor Supportive Environments:  
Applying the Supportive Environments for Effectiveness Framework  
to Long-Term Care Design*

Dear Participant:

Thank you for participating in this survey, which is part of research for “Informing Well-Being through Outdoor Supportive Environments: Applying the Supportive Environments for Effectiveness Framework to Long-Term Care Design.” The purpose of this survey is to identify characteristics of outdoor environments that meet the needs and preferences of residents and staff. Your anonymous feedback will help inform design recommendations to create for supportive outdoor environments for staff in long-term care facilities. All answers will remain confidential and will be used for research purposes only.

Your participation in this survey is voluntary and completely anonymous. No personal information or identifiers, including your name or contact information, will be collected in this survey. All answers are confidential and will be used for research purposes only by the principal investigator and researcher. You may skip any questions you do not feel comfortable answering and can withdraw from the survey at any time. There are no anticipated risks to participating. The total survey should take approximately 10-15 minutes to complete. The anonymous data collected may be used for future research studies but will not be distributed to any other entity. This study is approved by Kansas State University’s Institutional Review Board.

If you have any questions regarding this survey or the research project, please contact the principal investigator, Dr. Sara Hadavi, at [sarahadavi@k-state.edu](mailto:sarahadavi@k-state.edu) or the graduate student researcher, Victoria Brenneis, at [victoriab@k-state.edu](mailto:victoriab@k-state.edu). If you have any questions regarding your role as a participant in this study, please contact K-State’s University Research Compliance Office at [comply@k-state.edu](mailto:comply@k-state.edu).

Thank you for your time and participation!

Indicate your level of agreement with the following statements regarding this image:



**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

- 1 2 3 4 5 This space is easily accessible to me.
- 1 2 3 4 5 I often use this space.
- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 This space allows me to connect with others.
- 1 2 3 4 5 This space allows me to meaningfully contribute to my surroundings.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have a projector screen for outdoor learning or movies in this space.
- 1 2 3 4 5 I would like to have more natural elements in this space.
- 1 2 3 4 5 I would like to have more privacy in this space for smaller group activities.

I like this space because of its:

- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 amount of covered structures.
- 1 2 3 4 5 paved accessibility.
- 1 2 3 4 5 outdoor kitchen.

Indicate your level of agreement with the following statements regarding this image:



- |  |
|--|
| <p><b>1 = strongly disagree</b><br/><b>2 = disagree</b><br/><b>3 = neither agree nor disagree</b><br/><b>4 = agree</b><br/><b>5 = strongly agree</b></p> |
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- 1 2 3 4 5 This space allows me to meaningfully contribute to my surroundings.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more shade in this space.
- 1 2 3 4 5 I would like to have more natural elements in this space to connect with nature.
- 1 2 3 4 5 I would like to have more privacy in this space for smaller group activities.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 recreation lawn.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 visual artwork.
- 1 2 3 4 5 paved accessibility.
- 1 2 3 4 5 fire pit.

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 This space is relaxing and lowers my stress.
- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have some privacy in this space to meditate.
- 1 2 3 4 5 I would like to have moveable seating options here to watch wildlife.
- 1 2 3 4 5 I would like to have a courtyard space to gather here with others.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 open space without structures.
- 1 2 3 4 5 educational signage.
- 1 2 3 4 5 paved accessibility.



Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more colorful vegetation in this space.
- 1 2 3 4 5 I would like to have more moveable seating options in this space.
- 1 2 3 4 5 I would like to have more shade in this space.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 water elements.
- 1 2 3 4 5 open space without overhead structures.
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more privacy from the road in this space.
- 1 2 3 4 5 I would like more flowering plants in this space.
- 1 2 3 4 5 I would like to have more shade in this space.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 built structures (i.e., pergola).
- 1 2 3 4 5 signage for wayfinding.
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



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- 2 = disagree**
- 3 = neither agree nor disagree**
- 4 = agree**
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- 1 2 3 4 5 I used to have access to this space when it was here.
- 1 2 3 4 5 I often used this space when it was there.
- 1 2 3 4 5 This space was relaxing and lowered my stress.
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- 1 2 3 4 5 I spent more time in this space recently compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I liked to use this space.
- 1 2 3 4 5 I would have liked more accessible garden beds in this space.
- 1 2 3 4 5 I would have liked more privacy in this space from the road.
- 1 2 3 4 5 I would have liked movable seating in this space.

I like this space because of its:

- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 fruit and vegetable production.
- 1 2 3 4 5 climbing plants on fences and trellises.
- 1 2 3 4 5 open space without structures.
- 1 2 3 4 5 unpaved accessibility (e.g., gravel).

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more native plantings in this space.
- 1 2 3 4 5 I would like to have larger gathering spaces in this space.
- 1 2 3 4 5 I would like to have visual artwork in this space.

I like this space because of its:

- 1 2 3 4 5 views of the pond.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 built structures (i.e., Gazebo).
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



- |  |
|--|
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- 1 2 3 4 5 I spend more time in this space now compared to time before the COVID-19 pandemic.
- 1 2 3 4 5 I like to use this space.
- 1 2 3 4 5 I would like to have more paved accessibility along this path.
- 1 2 3 4 5 I would like to have more benches along this path.
- 1 2 3 4 5 I would like to have more educational signage on the plants along this path.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 interactions with wildlife.
- 1 2 3 4 5 unpaved accessibility.

Indicate your level of agreement with the following statements regarding this image:



- 1 = strongly disagree**
- 2 = disagree**
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- 1 2 3 4 5 I would like to have more colorful vegetation along this path.
- 1 2 3 4 5 I would like to have more benches along this path.
- 1 2 3 4 5 I would like to have more shade along this path.

I like this space because of its:

- 1 2 3 4 5 tree canopy.
- 1 2 3 4 5 native plantings.
- 1 2 3 4 5 open space without structures.
- 1 2 3 4 5 paved accessibility.

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 I would like to use this space.
- 1 2 3 4 5 I would like to have an outdoor classroom in this space.
- 1 2 3 4 5 I would like to have visual artwork or be able to create art in this space.
- 1 2 3 4 5 I would like to have more colorful vegetation in this space.

I like this space because of its:

- 1 2 3 4 5 screens.
- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 views of natural elements.

Indicate your level of agreement with the following statements regarding this image:



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- 1 2 3 4 5 I would like to have visual artwork or be able to create art in this space.
- 1 2 3 4 5 I would like to have more colorful vegetation in this space.

I like this space because of its:

- 1 2 3 4 5 amount of seating options.
- 1 2 3 4 5 tree canopies.
- 1 2 3 4 5 paved accessibility.



At Meadowlark Hills, I would like to have more:

- 1 2 3 4 5 tree canopy
- 1 2 3 4 5 diverse vegetation
- 1 2 3 4 5 wildlife connections
- 1 2 3 4 5 water elements
- 1 2 3 4 5 fire elements
- 1 2 3 4 5 shade structures
- 1 2 3 4 5 visual artwork
- 1 2 3 4 5 open sight lines
- 1 2 3 4 5 nighttime activity
- 1 2 3 4 5 educational signage
- 1 2 3 4 5 wayfinding signage
- 1 2 3 4 5 nature trails
- 1 2 3 4 5 types of gathering spaces
- 1 2 3 4 5 seating options

<p><b>1 = strongly disagree</b> <b>2 = disagree</b> <b>3 = neither agree nor disagree</b> <b>4 = agree</b> <b>5 = strongly agree</b></p>
--

At Meadowlark Hills, I would like to have outdoor spaces for:

- 1 2 3 4 5 exercising
- 1 2 3 4 5 socializing
- 1 2 3 4 5 gardening
- 1 2 3 4 5 reflection or meditation
- 1 2 3 4 5 play or recreation
- 1 2 3 4 5 nature-related pursuits (e.g., fishing or bird-watching)
- 1 2 3 4 5 teaching or learning
- 1 2 3 4 5 active recreation (e.g., basketball)
- 1 2 3 4 5 other: (please explain)

Indicate your level of agreement with the following statements:

- 1 2 3 4 5 I frequently use the outdoor spaces at Meadowlark Hills.
- 1 2 3 4 5 When I spend time outdoors, it is to participate in pre-planned activities with other staff or residents.
- 1 2 3 4 5 I feel safe going outside.
- 1 2 3 4 5 Overall, I am satisfied with the outdoor environments at Meadowlark Hills.

1 2 3 4 5 Overall, I would rate my mental health as:

**1 = poor**  
**2 = somewhat poor**  
**3 = average**  
**4 = good**  
**5 = excellent**

Indicate your level of agreement with the following statements:

**1 = strongly disagree**  
**2 = disagree**  
**3 = neither agree nor disagree**  
**4 = agree**  
**5 = strongly agree**

1 2 3 4 5 I lead a purposeful and meaningful life.

1 2 3 4 5 My social relationships are supportive and rewarding.

1 2 3 4 5 I am engaged and interested in my daily activities.

1 2 3 4 5 I actively contribute to the happiness and well-being of others.

1 2 3 4 5 I am competent and capable in the activities that are important to me.

1 2 3 4 5 I am a good person and live a good life.

1 2 3 4 5 I am optimistic about my future.

1 2 3 4 5 People respect me.

1 2 3 4 5 I make a difference in the lives of those I care for beyond meeting their basic needs.

1 2 3 4 5 Overall, I am satisfied with where I work.

In the last few weeks, I have felt:

- 1 2 3 4 5 depressed.
- 1 2 3 4 5 happy.
- 1 2 3 4 5 lonely.
- 1 2 3 4 5 sad.
- 1 2 3 4 5 bored.
- 1 2 3 4 5 calm and peaceful.
- 1 2 3 4 5 anxious or stressed.
- 1 2 3 4 5 that I was effective in what I was doing.
- 1 2 3 4 5 everything I did was an effort.
- 1 2 3 4 5 disconnected from the world around me.
- 1 2 3 4 5 that I don't really belong.
- 1 2 3 4 5 actively involved in people's lives.
- 1 2 3 4 5 that I was making mistakes.

<p><b>1 = rarely or never</b> <b>2 = a little</b> <b>3 = occasionally</b> <b>4 = often</b> <b>5 = almost all the time</b></p>
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Indicate your level of agreement with the following statements:

- 1 2 3 4 5 At Meadowlark Hills, supervisors show a genuine interest in my psychological well-being.
- 1 2 3 4 5 Management acts decisively when a concern of an employee's psychological status is raised.
- 1 2 3 4 5 Management clearly considers employee psychological health to be equally as important as productivity.

<p><b>1 = strongly disagree</b> <b>2 = disagree</b> <b>3 = neither agree nor disagree</b> <b>4 = agree</b> <b>5 = strongly agree</b></p>
--

Indicate your level of agreement with the following statements:

- 1 2 3 4 5 The COVID-19 pandemic has negatively impacted my mental health.
- 1 2 3 4 5 The pandemic has increased my stress while giving care to residents.
- 1 2 3 4 5 I spend more time outdoors due to the COVID-19 pandemic than I did before the pandemic.

Because of the pandemic, I have felt more:

- 1 2 3 4 5 depressed.
- 1 2 3 4 5 happy.
- 1 2 3 4 5 lonely.
- 1 2 3 4 5 sad.
- 1 2 3 4 5 bored.
- 1 2 3 4 5 calm and peaceful.
- 1 2 3 4 5 anxious or stressed.
- 1 2 3 4 5 that I was effective in what I was doing.
- 1 2 3 4 5 everything I did was an effort.
- 1 2 3 4 5 disconnected from the world around me.
- 1 2 3 4 5 that I don't really belong.
- 1 2 3 4 5 actively involved in people's lives.
- 1 2 3 4 5 that I was making mistakes.

<p><b>1 = rarely or never</b></p> <p><b>2 = a little</b></p> <p><b>3 = occasionally</b></p> <p><b>4 = often</b></p> <p><b>5 = almost all the time</b></p>
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How long have you worked at Meadowlark Hills?

- Less than six months
- 6 – 12 months
- 1 – 3 years
- 3 – 5 years
- 5 – 10 years
- More than 10 years

Which household do you work in?

- Collins House
- Honstead House
- Lyle House
- Sloan House
- Stolzer House
- Wroten House
- Miller Place (Assisted Living)

What is your position at Meadowlark Hills?

- CNA or CMA
- RN or LPN
- Project Coordinator
- Other:

How much time do you spend on the Meadowlark Hills campus during the week?

- Less than 20 hours       20 – 39 hours       More than 40 hours

What is your age?

- Under 18       18 – 24       25 – 34  
 35 – 44       45 – 54       55+

What is your gender?

- Male     Female     Non-binary/third gender     Prefer not to answer

What is your race/ethnicity?

- White or Caucasian  
 Black or African American  
 Hispanic or Latino  
 Asian or Asian American  
 Other:

What is the highest level of education you have completed?

- Some high school but no diploma  
 High school graduate  
 Some college but no degree  
 College degree  
 Professional or doctorate degree

# Appendix C - Design Recommendations for Existing Outdoor Spaces at Meadowlark Hills

	Model Building		Meaningful Action		Being Capable		
	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	
Dock (Bayer's Nature Area)	<ul style="list-style-type: none"> <li>Complexity of Views                             <ul style="list-style-type: none"> <li>Tree Canopy (Vegetative Screen + Shade Canopy)</li> </ul> </li> <li>Wayfinding                             <ul style="list-style-type: none"> <li>Diverse Vegetation</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Group Activities                             <ul style="list-style-type: none"> <li>Fishing</li> <li>Gathering Space</li> </ul> </li> <li>Participation                             <ul style="list-style-type: none"> <li>Feeding Wildlife</li> <li>Seating Elements</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Reflection + Meditation                             <ul style="list-style-type: none"> <li>Tree Canopy</li> </ul> </li> <li>Soft Fascination                             <ul style="list-style-type: none"> <li>Riparian Vegetation</li> <li>Sound of Waves</li> <li>Tree Canopy</li> <li>Views of Pond</li> <li>Wildlife Connections</li> </ul> </li> </ul>	RESIDENT	
		No Custom Interventions Needed		No Custom Interventions Needed		No Custom Interventions Needed	
		STAFF		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Increase Shade Canopy</li> <li>Add More Colorful Plants</li> </ul> </li> </ul>		No Custom Interventions Needed	<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>More Colorful Vegetation</li> <li>Increase Shade Canopy</li> </ul> </li> </ul>
Gazebo (Bayer's Nature Area)	<ul style="list-style-type: none"> <li>Complexity of Views                             <ul style="list-style-type: none"> <li>Gazebo</li> <li>Tree Canopy (Vegetative Screen + Shade Canopy)</li> <li>Diverse Vegetation</li> </ul> </li> <li>Wayfinding                             <ul style="list-style-type: none"> <li>Materiality</li> <li>Diverse Vegetation</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Group Activities                             <ul style="list-style-type: none"> <li>Trail (Exercise + Games)</li> <li>Gathering Space</li> </ul> </li> <li>Participation                             <ul style="list-style-type: none"> <li>Seating Elements</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Reflection + Meditation                             <ul style="list-style-type: none"> <li>Gazebo</li> <li>Tree Canopy</li> </ul> </li> <li>Soft Fascination                             <ul style="list-style-type: none"> <li>Tree Canopy</li> <li>Views of Pond</li> <li>Wildlife Connections</li> </ul> </li> </ul>	RESIDENT	
		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Keep Paved Accessibility</li> </ul> </li> </ul>		No Custom Interventions Needed		No Custom Interventions Needed	<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Better Pond Views</li> </ul> </li> </ul>
		STAFF		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Increase Shade Canopy</li> <li>Add More Native Plants</li> </ul> </li> <li>Learning                             <ul style="list-style-type: none"> <li>Larger Gathering Areas</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Participation                             <ul style="list-style-type: none"> <li>Larger Gathering Areas</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Add More Native Plants</li> <li>Increase Shade Canopy</li> </ul> </li> </ul>
Trail (Bayer's Nature Area)	<ul style="list-style-type: none"> <li>Complexity of Views                             <ul style="list-style-type: none"> <li>Manicured Lawn</li> <li>Tree Canopy (Vegetative Screen + Shade Canopy)</li> <li>Diverse Vegetation (Vegetative Screen)</li> </ul> </li> <li>Wayfinding                             <ul style="list-style-type: none"> <li>Materiality</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Group Activities                             <ul style="list-style-type: none"> <li>Trail (Exercise + Games)</li> </ul> </li> <li>Participation                             <ul style="list-style-type: none"> <li>Seating Elements</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Reflection + Meditation                             <ul style="list-style-type: none"> <li>Fencing</li> <li>Vegetative Screens</li> </ul> </li> <li>Soft Fascination                             <ul style="list-style-type: none"> <li>Diverse Vegetation</li> <li>Tree Canopy</li> <li>Wildlife Connections</li> </ul> </li> </ul>	RESIDENT	
		No Custom Interventions Needed		No Custom Interventions Needed		No Custom Interventions Needed	
		STAFF		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Increase Shade Canopy</li> <li>Add More Colorful Plants</li> </ul> </li> </ul>		No Custom Interventions Needed	<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Add More Colorful Plants</li> <li>Increase Shade Canopy</li> </ul> </li> </ul>
Community Garden	<ul style="list-style-type: none"> <li>Complexity of Views                             <ul style="list-style-type: none"> <li>Diverse Vegetation (Vegetative Screen)</li> <li>Fencing</li> </ul> </li> <li>Learning                             <ul style="list-style-type: none"> <li>Communal Garden</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Helping + Teaching Others                             <ul style="list-style-type: none"> <li>Food Production</li> <li>Gathering Space</li> </ul> </li> <li>Participation                             <ul style="list-style-type: none"> <li>Communal Gardening</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Reflection + Meditation                             <ul style="list-style-type: none"> <li>Fencing</li> <li>Vegetative Screens</li> </ul> </li> <li>Soft Fascination                             <ul style="list-style-type: none"> <li>Diverse Vegetation</li> <li>Pollinator Garden</li> <li>Wildlife Connections</li> </ul> </li> </ul>	RESIDENT	
		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Increase Satisfaction with Unpaved Path</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Participation &amp; Helping + Teaching Others                             <ul style="list-style-type: none"> <li>Add Opportunities to Connect with Others</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Increase Satisfaction with Native Plantings</li> </ul> </li> </ul>	
		STAFF		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Keep Unpaved Path</li> <li>Add Privacy from the Road</li> </ul> </li> </ul>		No Custom Interventions Needed	<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Add Privacy from the Road</li> </ul> </li> </ul>
Fire Pit (Courtyard)	<ul style="list-style-type: none"> <li>Complexity of Views                             <ul style="list-style-type: none"> <li>Fencing</li> <li>Activity Lawn</li> <li>Seating Wall</li> </ul> </li> <li>Wayfinding                             <ul style="list-style-type: none"> <li>Materiality</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Group Activities                             <ul style="list-style-type: none"> <li>Activity Lawn (Putting Green)</li> <li>Gathering Space</li> </ul> </li> <li>Participation                             <ul style="list-style-type: none"> <li>Potted Plants</li> <li>Activity Lawn</li> <li>Seating Elements</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Reflection + Meditation                             <ul style="list-style-type: none"> <li>Fencing</li> </ul> </li> <li>Soft Fascination                             <ul style="list-style-type: none"> <li>Fire Pit</li> <li>Tree Canopy</li> <li>Visual Artwork</li> </ul> </li> </ul>	RESIDENT	
		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Increase Satisfaction with Activity Lawn</li> <li>Increase Tree Canopy</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Participation &amp; Helping + Teaching Others                             <ul style="list-style-type: none"> <li>Increase Satisfaction with Activity Lawn</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Increase Tree Canopy</li> <li>Increase Satisfaction with Fire Pit</li> </ul> </li> </ul>	
		STAFF		No Custom Interventions Needed		No Custom Interventions Needed	No Custom Interventions Needed
Outdoor Kitchen (Courtyard)	<ul style="list-style-type: none"> <li>Complexity of Views                             <ul style="list-style-type: none"> <li>Pergola (Shade Canopy + Built Structure)</li> </ul> </li> <li>Wayfinding                             <ul style="list-style-type: none"> <li>Materiality</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Group Activities                             <ul style="list-style-type: none"> <li>Food Production</li> <li>Gathering Space</li> </ul> </li> <li>Participation                             <ul style="list-style-type: none"> <li>Outdoor Kitchen</li> <li>Seating Elements</li> </ul> </li> </ul>	RESIDENT	<ul style="list-style-type: none"> <li>Reflection + Meditation                             <ul style="list-style-type: none"> <li>Pergola</li> </ul> </li> </ul>	RESIDENT	
		No Custom Interventions Needed		<ul style="list-style-type: none"> <li>Participation                             <ul style="list-style-type: none"> <li>Increase Satisfaction with Outdoor Kitchen</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Clear-headedness                             <ul style="list-style-type: none"> <li>Add More Natural Elements</li> </ul> </li> </ul>	
		STAFF		<ul style="list-style-type: none"> <li>Exploration + Understanding                             <ul style="list-style-type: none"> <li>Add More Natural Elements</li> </ul> </li> <li>Learning                             <ul style="list-style-type: none"> <li>Add Projector Screen</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Helping + Teaching Others                             <ul style="list-style-type: none"> <li>Add Projector Screen</li> </ul> </li> </ul>	No Custom Interventions Needed

	Model Building		Meaningful Action		Being Capable	
	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS	EXISTING ELEMENTS	CUSTOM RECOMMENDATIONS
Trailhead (Donner's Way)	Complexity of Views • Tree Canopy (Vegetative Screen + Shade Canopy)  Wayfinding • Spatial Signage • Materiality	RESIDENT	Group Activities • Gathering Space  Participation • Seating Elements	RESIDENT	Reflection + Meditation • Tree Canopy  Soft Fascination • Vegetation • Tree Canopy • Wildlife Connections	RESIDENT
		No Custom Interventions Needed		No Custom Interventions Needed		No Custom Interventions Needed
		STAFF		STAFF		STAFF
		Exploration + Understanding • Increase Shade Canopy • Add More Native and Flowering Plants • Add Privacy from the Road		No Custom Interventions Needed		Clear-headedness • More Flowering Vegetation • Increase Shade Canopy • Add Privacy from the Road
Woods (Donner's Way)	Complexity of Views • Tree Canopy (Vegetative Screen + Shade Canopy) • Diverse Vegetation  Wayfinding • Handrail	RESIDENT	Group Activities • Trail (Exercise + Games)  Participation • Trail Maintenance	RESIDENT	Reflection + Meditation • Tree Canopy  Soft Fascination • Tree Canopy • Wildlife Connections	RESIDENT
		Exploration + Understanding • Add Paved Accessibility		No Custom Interventions Needed		No Custom Interventions Needed
		STAFF		STAFF		STAFF
		Exploration + Understanding • Keep Unpaved Path		No Custom Interventions Needed		No Custom Interventions Needed
Meadow (Leon's Glen)	Complexity of Views • Open Lawn • Tree Canopy (Vegetative Screen + Shade Canopy) • Diverse Vegetation (Vegetative Screen)  Wayfinding • Educational Signage	RESIDENT	Group Activities • Open Lawn (Yoga, Tai Chi, etc)  Participation • Seating Elements	RESIDENT	Reflection + Meditation • Tree Canopy • Vegetative Screens  Soft Fascination • Diverse Vegetation • Pollinator Gardens • Tree Canopy • Wildlife Connections	RESIDENT
		No Custom Interventions Needed		No Custom Interventions Needed		No Custom Interventions Needed
		STAFF		STAFF		STAFF
		No Custom Interventions Needed		No Custom Interventions Needed		No Custom Interventions Needed
Lyle House Patio	Complexity of Views • Tree Canopy (Shade Canopy) • Fencing	RESIDENT	Group Activities • Gathering Space  Participation • Potted Plants • Seating Elements	RESIDENT	Reflection + Meditation • Tree Canopy  Soft Fascination • Diverse Vegetation • Tree Canopy	RESIDENT
		Exploration + Understanding • Increase Tree Canopy		Participation & Helping + Teaching Others • Add Opportunities to Connect with Others		Clear-headedness • Increase Tree Canopy
		STAFF		STAFF		STAFF
		Exploration + Understanding • Add More Colorful Vegetation • Add Privacy from the Road		No Custom Interventions Needed		Clear-headedness • Add Privacy from the Road • Add More Colorful Vegetation • Add Visual Artwork
Wroten House Pato	Complexity of Views • Built Structure • Tree Canopy (Vegetative Screen)  Wayfinding • Bayer Pond (Landmark)	RESIDENT	Helping + Teaching Others • Gathering Space  Participation • Potted Plants • Seating Elements	RESIDENT	Reflection + Meditation • Built Structure  Soft Fascination • Diverse Vegetation • Pond Views • Tree Canopy • Wildlife Connections	RESIDENT
		No Custom Interventions Needed		No Custom Interventions Needed		No Custom Interventions Needed
		STAFF		STAFF		STAFF
		Exploration + Understanding • Add More Colorful Vegetation		No Custom Interventions Needed		Clear-headedness • Add More Colorful Vegetation

## Appendix D – Quantitative Study IRB Approval



TO: Sara Hadavi  
Landscape Archit & Comm Plan

Proposal Number: IRB-11237

FROM: Sara Rosenkranz, PhD, Chair  
Committee on Research Involving Human Subjects

DATE: 06/30/2022

RE: Proposal Entitled, "Informing well-being through outdoor supportive environments: Applying the Supportive Environments for Effectiveness framework to long-term care design."

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, 45 CFR §104(d), category:Exempt Category 2 Subsection ii.

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

Electronically signed by Sara Rosenkranz, PhD on 06/30/2022 1:51 PM ET