

Assessing Professional and Client Interest in Utilizing Healing Gardens at Skyland Trail for Talk Therapy Sessions

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Abstract

Despite the well-known benefits of nature for human health and wellbeing, outdoor spaces have not been used to their full potential as places for talk therapy sessions. The literature regarding the effects of observing or interacting with nature has led to a surge of gardens in and around health facilities across the globe. Whether they are referred to as healing gardens, therapy gardens, or therapeutic landscapes, outdoor spaces where mentally or physically ill individuals can find relief are proof of the growing demand for evidence-based designs and a rising social awareness of mental health. Skyland Trails, a nationally recognized mental health facility in Atlanta, GA, has their own installation of healing gardens across their five campuses. This research proposal aims to gather evidence to drive future designs of therapy spaces within healing gardens by 1) examining how the existing gardens at Skyland Trail’s Charles B. West Campus are used and 2) gauging staff and client interest in using an outdoor space for one-on-one talk therapy sessions. Two surveys will be distributed, one to professional staff members and one to adult clients, to provide qualitative and quantitative data on their experience with and opinions on the healing gardens as they are and their potential. We expect that staff and client data will produce differing perspectives on perceived benefits and risks and that clients will be more enthusiastic about outdoor therapy sessions than the staff members. Regardless of the opinions gathered at Skyland Trail, this presents a new avenue of study where the fields of psychology and landscape architecture overlap.

Keywords: healing gardens, mental health, environmental psychology, evidence-based design

Introduction

Mental health is the foundation for human success. Thinking, communicating, learning, resilience, and self-esteem are all directly influenced by an individual’s mental health. A healthy mental prognosis is necessary in order for any individual to efficiently complete productive tasks, maintain healthy relationships, or master and maintain the ability to adapt and cope with adversity (American Psychiatric Association 2021). On the flip side, mental illness can negatively impact or completely prohibit all of the above. Mental illness is classified as any health condition involving changes in emotion, thinking or behavior, and distress and/or problems functioning in social, work, or family activities (American Psychiatric Association 2021). It is a medical condition that can affect anyone, regardless of race, gender, or ethnicity. It strikes with impunity and as of 2021, one in five adults living in the United States will experience mental illness at some point in their lives; one in twenty-four will suffer from mental illness severe enough to inhibit one or more major life activities.

Psychotherapy, also known as talk therapy, is one of many ways to treat mental illness. The concept of talk therapy has permeated American culture, usually in the form of a client laying on a couch and monologuing to an impartial psychiatrist. In reality, talk therapy is a method of active listening, discussion, and counseling conducted by psychologists, counselors, and psychiatrists in a way to treat or manage any variety of mood, personality, or anxiety disorders (National Cancer Institute 2021). Talk therapy may be conducted with an individual or a group and can help both children and adults. There is no session limit – talk therapy can continue as long as the patient desires. However, talk therapy is rarely a standalone treatment plan; talk therapy is often paired with one or more other strategies, such as Cognitive Behavioral Therapy and medication, for better results.

In this way, talk therapy is part of a holistic treatment plan. Holistic therapy is not using crystals or another pseudoscience to replace institutionalized medical treatment. Rather, holistic therapy is putting the understanding that a person’s consciousness is a collection of the mind, body and spirit into practice so that the whole self can be led to greater self-awareness, self-esteem, and self-acceptance. Not only is the person’s consciousness a collection, but the external influences on a person’s wellbeing is also multifaceted. Nature is a well-documented source of influence to the human trifecta of mind, body, and spirit.

Improving wellness by exposure to nature gained a scientific foothold following Ulrich’s seminal 1984 paper, “View through a window may influence recovery from surgery,” offering evidence that the passive viewing of nature can speed physical healing, reduce patient painkiller intake, and decrease irritability. Since then, the collection of evidence and the subsequent evidence-based designs have been the standard for contemporary healing gardens (American Horticulture Therapy Association 2021). Healing gardens and the similarly spirited therapy gardens and therapeutic landscapes have emerged throughout the public and private health care domains. However existing literature does not show psychiatric professionals using these healing gardens to engage in talk therapy.

It is the purpose of this research proposal to examine the potential benefits of using existing healing gardens as spaces for talk therapy sessions, while addressing the potential limitations and

liabilities. Covid-19, the novel coronavirus that evolved in 2019 before spreading across the globe in 2020, showed us the necessity of having a safe and manageable outdoor space for talk therapy for the health of both the client and the professional. If the restorative and calming effects of nature can be combined with the safe practice of meeting outdoors, talk therapy greenspaces could be a significant development in the field of mental health and landscape architecture.

Skyland Trails in Atlanta, Georgia is a non-profit mental health facility. They have multiple healing and meditative gardens that are already part of their programmed therapeutic activities, with the exception of talk therapy. This research proposes that the adult program clients and staff members at Skyland Trails be surveyed to gauge interest in setting aside some of the existing garden space for talk therapy, along with gathering information on any concerns they may have.

While there have been attempts to hold talking therapy outdoors, there exists several outstanding logistical issues (Cooley 2020). What if the weather is unsuited for light walks? How does the licensed and therefore liable professional counselor ensure confidentiality in public spaces? Would interest in using outdoor spaces for individual therapy sessions increase if the spaces used were designed with clients and professionals in mind? If a portion of the variables and risks, currently uncontrolled in public and unregulated areas, associated without outdoor therapy sessions were mitigated, would clients' mental health and journey of recovery benefit from a designed 'safe space'?

environments and built environments (Korpela 2003; Ivarsson & Hagerhall 2008). Environmental neuroscientists have mapped this attention restoration effect to specific pathways in the brain; 90-minute walks in urban settings had no measurable effect on negative self-rumination or associated neural activity whereas 90-minute walks in natural settings decreased negative self-rumination and associated neural activity in the subgenual prefrontal cortex (Bratman, Hamilton, Hahn, Daily & Gross 2015).

As a caveat to these studies, researchers do not have a single method for measuring attention. There have been studies measuring systolic and diastolic blood pressure, self-reported mood, and performance in pattern and memory tests, to name a few (Hartig, Book, Garvill, Olsson & Garling 1996; Korpela 2003; Tennessen & Cimprich 1995). This coupled with the vague standards for 'soft fascination' forces designers to straddle the line between 'educated' guess work and evidence-based design.

A competing theory to the effects of exposure to nature is Ulrich's Psycho-evolutionary Theory (PET). PET provides a cognitive and physiological framework based on the assumption that human physiology is biased towards natural environments due to evolution (Ulrich et al. 1991). Rather than Kaplan's ART where fatigue is cured by replenishing directed attention through indulging in soft fascination, PET is based on a proposed adaptive response that allows faster cognitive and sensory processing of natural objects and scenes.

Because PET is based on evolutionary adaptation, there is a survival component. Ulrich et al. 1991 proposed that evolution favored those who had the following two adaptations to nature:

1. Restoration response follows periods of stress or danger; and
2. Without stress, individuals prefer safe settings or those most geared towards survival.

Safety and threat play a large role in Ulrich's theory; therefore, it is assumed that natural stimuli that provoke feelings of safety are the most restorative and stimuli that incite a danger response are the least restorative. Coupled with the consistent preference to natural over built environments when experiencing cognitive or physiological distress, this seems to indicate that built environments are more likely to incite a survival-threat response. In present times, the average North American citizen would survive better in a city, with access to clean running water and shelter, rather than the middle of a natural forest – no matter how beautiful or fertile it may have appeared to their ancient ancestors. Researchers then have to establish a reason why conscious thought does not override subconscious instinct.

The last theory to be discussed shares the same evolutionary defense as PET with similar shortcomings. Biophilia was first coined by Erich Fromm in *The Anatomy of Human Destructiveness* in 1973 as "the passionate love of life and of all that is alive." In 1984 the term biophilia was adopted by biologist Edward O. Wilson to describe the human impulse to focus on and bond with nature and other life-forms (Rogers 2021). Like Ulrich, Wilson drew upon the evolutionary drive to survive and consequently found that the place preferences of humans with free choice met the same three criteria:

- 1) Preferred place is situated at a height looking down,
- 2) Preferred place is in an open savannah-like terrain with scattered trees, and

Literature Review

Theories Regarding the Effects of Exposure to Nature

Stephen Kaplan's Attention Restoration Theory (ART) has become a widely recognized and frequently cited theory in the environmental psychology literature of the past three decades (Reeve, Niebler-Walker & Desha 2017). ART builds upon Kaplan and Kaplan's 1989 work, which focuses on the recovery process of the mind after periods of focus; this study classified attention as *directed* and *involuntary*. Directed attention, or 'hard fascination', refers to attention that requires effort and as such, is susceptible to fatiguing the individual (Kaplan and Kaplan 1989). Kaplan argues that directed attention is crucial for problem solving, perception, and the effectiveness of thought but as a top down process is subject to depletion over time; urban environments are argued to consist of 'hard fascination' that requires direct attention to navigate and perceive in a way that maintains personal safety (listening for sirens or honking) (Kaplan 1995).

In contrast, involuntary attention or 'soft fascination' is more loosely identified as requiring no effort – like sleeping – and that zero effort stimuli is Kaplan's basis for restoration. He identifies natural environments as more restorative compared to built environments so long as the following conditions are met:

1. The environment is extant. It possesses the scope for the viewer to feel immersed in the environment.
2. The environment provides a sense of being away. The viewer escapes from habitual activities.
3. The environment is a source of soft fascination. There are aspects of the environment that capture attention effortlessly.
4. The environment is compatible with the individual. Individuals must want to be exposed to the environment. (Kaplan 1995, 2001)

The third point is the key in Kaplan's Attention Restoration Theory. He argues that natural environments are more likely than built to contain features that simultaneously 'fascinate' and hold some level of attention while *also* allowing the mind to wander (Kaplan 1995, 2001). Elements that meet Kaplan's standard of 'soft fascination' include waterfalls, waves, and leaves rustling in the wind. However, despite natural environments containing 'soft fascination' elements, ART does not say built environments cannot meet the same 'soft fascination' standards. Nor does ART provide an objective definition to what constitutes as 'soft fascination'; when adopting ART in practice, it is up to the investigator to determine what elements in an environment qualify.

Nonetheless, many publications show that even without an objective definition, natural environments are consistently outperforming urban environments in their restorative effects (Herzog, Chen, & Primeau 2002; Purcell, Peron & Berto 2001; Staats, Kieviet & Hartig 2003; Tennessen & Cimprich 1995). This preference to natural environments has led to studies regarding place preference in individuals suffering from cognitive fatigue and once again, natural environments are consistently preferred by adults suffering from negative rumination or attention fatigue over both mixed natural-built

- 3) Preferred place is near a body of water (Wilson 2004).

Surpassing Ulrich, Wilson also distinguishes humanities preference to biological diversity in our natural environments (Wilson 2004). This biological diversity lends itself to the concept of symbiotic partnership with plants, insects, and other animals. These thoughts of 'connection' with the greater whole of the environment is reflected in several publications where garden therapy participants express mood elevation once they conceptually place themselves as a piece within a larger ecological whole (Adevi & Lieberg 2012; Adevi & Martensson 2013). In these same studies, actions taken within the gardens were perceived to be more symbolic and therefore meaningful to the participants. Wilson's biophilia hypothesis also draws upon symbolism in its defense. Humans have symbolically used nature imagery in our language via idioms and metaphors; in addition, there is a cross cultural and deeply historic spiritual reverence for animals and nature to be drawn upon (Rogers 2021).

The strongest defense for biophilia is the measurable evidence of biophobias, such as the fear of snakes or spiders, which are widely agreed on in the scientific community to be results of evolution's fight or flight mechanism (Rogers 2021). On the flip side of this measurable and instinctive fear, there may be a measurable and instinctive love. And therein lies the center of the biophilia hypothesis: humans love nature and therefore feel better for it. Experimental psychology studies have begun to show that humans experiencing love and a pair-bonding connection perform better on conceptually related mental tasks (Wlodarski & Dunbar 2015). Biophilia seems to suggest that there is an internal reward for exposure to nature rather than a restorative effect.

Within the field of landscape architecture, it is difficult to say from these brief reviews which theory would best guide the design of an outdoor therapy space. For the purposes of this research project, we can see that no matter the theory, the underlying concept of nature over built remains a consistent human preference. The next section of this literature review overviews the measurable impacts nature has on the human body and mind. The design applications of these theories and their presumed effects are explored in the final literature review section.

Effects of Exposure to Nature on Cognitive Function, Stress, and Mood

To further support ART, Berman, Jonides, and Kaplan 2008 used the Positive and Negative Affect Schedule (PANAS) to obtain self-reported moods and completed tasks of memorizing digits backwards before and after a randomly assigned 50-minute walk through either downtown Ann Arbor, Michigan or through Ann Arbor Arboretum, a nearby park (PANAS, Watson, Clark & Tellegen 1988). The PANAS assesses mood on a scale of 1 to 5. A separate group of students were assessed with the Attention Network Test (ANT) and given the same task to memorize digits backwards after viewing a collection of 100 nature and urban environment photos. The ANT measures alerting, orienting, and executive attention (ANT, Fan et al. 2002). In both cases, results aligned with the predictions based on ART. The only measured improvement in both groups were in the executive attention category of the ANT and only after viewing photos of nature and not urban environments. Despite this promising discovery, the sample sizes of the student groups were small and the executive attention category had the greatest standard error of the set.

Despite the widespread nature of ART, there is a pattern of 'inconsistent emergence' of environmental effects after testing (Berto 2005). Whether this is due to a lack of restorative power of nature or a consequence of the testing methods is uncertain at this time. Despite this, ART is a popular theory to test with individuals with cognitive decline, specifically Alzheimer's disease and other dementias. The benefit of therapeutic gardens and exposure to nature expand beyond cognitive improvement for this population; therapeutic gardens offer a change to practice mobility, sociability, and improve their self-worth (American Horticulture Therapy Association 2021; Gonzalez, Hartig, Patil, Martinsen & Kirkevold 2010; Uwajeh, Iyendo & Polay 2019).

The effect of exposure to nature on stress can be thought of as short term and long term. In the short term, exposure to nature has been shown to reduce stress and anxiety (Barton, Griffin & Pretty 2012; Pretty, Peacock, Hine, Sellens, Griffin & Green 2007; Park, Tsunetsuga, Kasetani, Morikawa, Kagawa & Miyazaki 2009). Viewing photos of nature has been shown to increase pain tolerance and provide distraction from pain in surgical procedures (Diette et al 2003; Tse, Ng, Chung, & Wong 2002). Viewing nature through a hospital window can reduce the amount of pain medications administered (Ulrich 1991). There are hundreds of studies on short term stress and nature (Brown, Barton & Gladwell 2013).

The literature for long term exposure is growing in numbers. There is mounting evidence that living in a city environment long term increases the risk of that individual developing a mood disorder (Lederbogen et al 2011). In Lederbogen et al.'s study, they found that city dwellers are twice as likely as rural residents to develop schizophrenia, a severe mental illness that can be debilitating to one's life. Additionally, their analysis revealed a correlation between cities and sensitivity to social stress. This study if framed in a way that focuses on the increased amygdala activity in urban settings instead of the soothing effects of nature but the relationship remains the same.

Rural and more natural settings register as less of a threat to human survival instincts; in this way, long term exposure studies could lend themselves to Wilson's biophilia hypothesis. In a review article, Gascon et al 2015 found causal relationship between long term residential exposure to green and blue spaces and improved mental health in adults compared to their urban dwelling counterparts. For this research proposal, emphasis was placed on short term stress relief rather than long term, due to the nature of therapy sessions being approximately 50-minutes.

With stress comes mood changes and studies have populated the environmental psychology sphere. Studies have shown that interacting with nature for 50-minute durations can relieve the self-reported symptoms of major depressive disorder (MDD) and living in areas with higher green space is associated with 'significantly' lower levels of reported symptoms for depression and anxiety (Berman et al 2012; Beyer et al 2014; Lee et al 2015). Morning sunlight can reduce the hospital stay length in patients diagnosed with bipolar disorder and light treatment is an effective way to combat the symptoms of depression (Benedetti et al 2001; Kripke 1998).

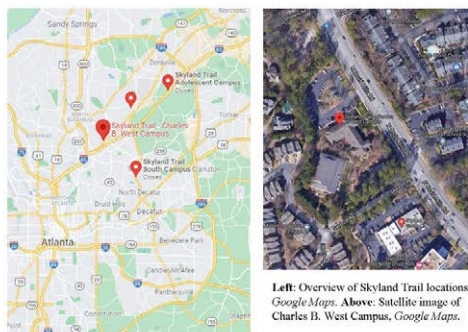
Ulrich and Lundin 2018 reported that in reducing the crowding stress and environmental stress, and by increasing stress reducing positive distractions within the psychiatric ward, hospitals

Project Site

The project site was required to 1) be a mental health treatment facility, 2) regularly conduct talk therapy sessions with adult patients, and 3) have existing healing gardens onsite. With these criteria in mind, Skyland Trails was selected for this research project.

Skyland Trail is a nonprofit mental health treatment organization with five campuses located throughout Atlanta, Georgia. The campus chosen for conducting the surveys is the main campus, Charles B. West Campus, because all adult clients must visit this campus for their therapy sessions. Charles B. West Campus is located at 1903 North Druid Hills RD NE, Atlanta, GA 30319 in Brookhaven Neighborhood.

In addition to meeting the above criteria, Skyland Trails seemed a prudent choice in part due to their stated mission to use evidence-based care and their selection of multidisciplinary experts, such as music coaches and horticulture therapists. These suggest a flexibility and willingness to entertain new ideas, such as outdoor therapy sessions, when there is sufficient evidence to indicate success for the client.



Left: Overview of Skyland Trail locations, Google Maps. Above: Satellite image of Charles B. West Campus, Google Maps.

were able to decrease aggression in their psychiatric patients. Adding a garden, providing nature views through windows, providing more daylight exposure, and hanging nature art were all listed as ways to provide stress reducing positive distractions. It is with these design notes that we move to the final section of the literature review.

How Measurable Effects of Exposure to Nature Influence Design

Jacques Mizan seemingly lays it all out in his 2004 article in the British Journal of General Practice. "Consider the patient as a guest not an inmate..." "Bring nature into the room – plants, pictures, views..." "Avoid seats in rows – small circular clusters work best..." (p 799). In fact, much of what he is report in 2004 is reflected again in Marcus and Saches 2014 publication *Therapeutic landscapes: An evidence-based approach to designing healing gardens and restorative outdoor spaces*, and in the feedback given by patients and family members at the Lady Cilento Children's Hospital in Brisbane, Australia and published by Reeve, Niebler-Walker, and Desha 2017.

The hallmarks of many healing gardens vary by the needs of the institution but commonly these gardens feature walking paths, when space allows, areas for socialization, such as family visitation, and intrapersonal reflection, such as resting areas with access to diverse plant life (Marcus 2014). According to Korpela 1989, the physical environment is a component of an individual's self-regulation. Other studies, such as Whitehouse et al 2001 and Adevi & Martensson 2013, suggest that the freedom to arrange seating is an important condition for establishing self-confidence and a sense of control in the space. This proposal proposes that outdoor therapy spaces would allow patients to have a greater sense of place identity and a better ability to self-regulate by using the environment to redirect the narrative of their therapy, as opposed to being in the therapist's or counselor's office.

Using the physical environment to maintain the self is a concept that has been accepted in literature for decades (Korpela 1989). One theory of place identity is that it is a structural component of the narrative construed by the individual (Sarbin 1983). For individuals suffering from mental illness, retaking the narrative is a struggle because, like with all diseases, the illness forces the individual to live in a state beyond control. Outdoor therapy spaces would provide opportunity to explore self-identity, place-identity, and narrative control within the field of environmental design and landscape architecture.

While the available research is broad, the lack of published data on *design* outdoor talk therapy spaces reinforces the intellectual merit of this proposal. The black and white evidence of cause and effect is clear. And while the genetic or inherent reason for this cause and effect remains effectively unsolved, the risks of outdoor therapy sessions is *not* in the nature exposure. As Hartig and Marcus point out in their 2006 essay, "Healing gardens – places for nature in health care," it is not the expectation that healing gardens can *cure*, rather that they can be valued and used to the benefit of its observers and inhabitants in a way that fits within the greater scheme of healthcare. We can potentially find value and a place within the greater scheme of healthcare for talk therapy spaces.

Research Questions

The research questions addressed in this proposed study are as follows:

1. Would the staff and clients of Skyland Trail conduct one-on-one talk therapy sessions in an existing garden on their Charles B. West Campus?
2. What changes, if any, would need to be implemented for the existing garden space to be used to conduct one-on-one talk therapy sessions?

Intellectual Merit

This section of the research proposal will explore the intellectual merit of the study through three lenses: medical professionals, design professionals, and psychiatric patients.

First, we begin with medical professionals, including but not limited to, psychiatrists, nurses, and counselors. On the academic end of the spectrum, this study addresses the gap in existing literature where nature, wellness, and outdoor one-on-one talk therapy sessions ought to exist. This study begins to mend the gap and brings a new application of nature-based wellness into practice; once it is in practice, there are opportunities for study. Continuing the slide towards practice, availability of outdoor green spaces for talk therapy sessions benefits more than the patient; therapists are not immune to the emotional effects of what their patients are telling them, nor are they impervious to stress and agitation. The practitioner may find increased job satisfaction when allowed to expand their practice outdoors. In the short term, during this period of Covid-19, outdoor therapy sessions can decrease the threat of transmission while allowing therapists and patients to forgo masks. In the long term, establishing a trusted method of designing and implementing outdoor spaces within healing gardens as alternatives to office rooms for therapy sessions may prevent a repeat of the problems faced at the beginning of 2020, when professionals and patients had to decide between pausing treatment or continuing virtually.

Second, there is obvious merit for design professionals. Once again, the missing piece in the healing garden, therapeutic garden, therapy garden, and so forth studies can begin to be addressed. Implementing a new programming element to these healing gardens offer up a new design 'job' that landscape architects are uniquely qualified for. The union of nature and human activity dominates the world today; in the spirit of progress, unifying the most common form of therapy with designed natural spaces is a simple next step. In the absence of success for turning healing gardens into therapy session spaces, there will still be valuable insight towards the design and perception of the healing gardens at Skyland Trails. Any new information could be applied to existing or future healing gardens anywhere. In the face of success, however, we can begin the journey of creating a new professional development path for landscape architects and be a part of a better future of global mental health.

Last but not least, we propose both intellectual and spiritual merit for psychiatric patients, meaning all those who are participating in one-on-one therapy sessions with a licensed counselor, therapist, or psychiatrist. The use of outdoor spaces for therapy sessions would introduce patients to the connection between nature and health. Working with their mental health professional, they could explore

the role of nature in wellbeing within an environment designed specifically for the task. Apart from being an education prospect, there are the observed effects on the physiological and psychological aspects of humans when exposed to nature. There is a chance that implementation of these designed spaces may decrease stress, elevate mood, and speed the healing process of patients. At this point in time, we can only speculate on how the cognitive performance of patients processing trauma may be effected by verbally processing their trauma in a safe, private natural setting with a mental health professional. In any case, there are a plethora of potential and likely benefits to exploring this path of research.

Research Methods

Data for this project will be collected using two mixed method surveys. Both the staff and the client survey follow the same four section format. Section 1 and 2 address their position at Skyland Trail and their opinions regarding the existing healing gardens, as well as provides space for them to provide feedback on alterations that may be suitable for talk therapy session areas. Section 3 and 4 for both surveys contains the same questions. Section 3 introduces the relationship between wellness and nature with three (3) multiple choice and one (1) open ended question and Section 4 contains five (5) multiple choice demographic questions. Sections 1, 3, and 4 are predominantly quantitative while Section 2 is generally qualitative in nature.

The staff survey's section one has eight (8) multiple choice questions regarding the participants position at Skyland Trails and their familiarity with the healing gardens located at Charles B. West Campus. Section two contains eight (8) open ended questions and two (2) multiple choice question regarding the healing gardens at Charles B. West and their current use and potential as talk therapy areas. In total, the staff survey has 27 questions.

The client survey's section one has nine (9) multiple choice questions regarding the participants experience at Skyland Trails and their familiarity with the healing gardens on the Charles B. West campus. Section two contains eight (8) open ended questions and two (2) multiple choice question regarding the healing gardens at Charles B. West and how the participant uses them and their willingness to use them for talk therapy. In total, the client survey has 28 questions.

We invite you to take an online survey to share your perspective. BEFORE PARTICIPATING IN THE SURVEY, PLEASE READ THE ATTACHED CONSENT FORM. If you experience any difficulties opening the Consent Form, please let us know and we will work to find a solution to provide you with a readable copy.

This survey is expected to take 20 minutes and because it is anonymous and requires no login information, it must be completed in a single session. There is no direct benefit to participation nor are there any repercussions for not participating. Participation is voluntary and anonymous.

If you would like to participate in this study, please use the following link or scan the QR code below to access the survey.

https://google.forms.com/to_be_created



(QR code to be created)

If you have any questions, please contact Annie Steele, Principle Investigator for the study, at asteele2@clemson.edu or Dr. Hala Nassar, Faculty Advisor, at hnassar@clemson.edu.

Thank you for your time.

Annie Steele
Masters of Landscape Architecture, '23
Landscape Architecture Program, Clemson University

For clients. Unlike the staff, client surveys (Appendix D) will be distributed physically and in person due to the restricted access to technology faced by the residential clients in Skyland Trail. While Day Treatment Program clients have access to technology, the decision was made to keep client survey distribution consistent throughout. The exact room or location on campus will be determined by the Skyland Trail administration.

The day-to-day programming of Skyland Trail prevents all eligible participants from being in any singular location together. Therefore, the survey will be distributed over the course of three consecutive weekdays from the Charles B. West Campus to reach as many eligible clients as possible. Identification of eligible participants will rely on self-identification of the client or identification from a staff member. Preferred time slots will need to be arranged with Skyland Trail leadership prior to traveling to Skyland Trail.

Each client or group of clients will be given a consent form by a research team member under supervision of a staff member and the study will be explained to them as directed by the consent form. Any and all questions will be answered by the present research team member(s) and if they do not have the answer, they will contact their Faculty Advisor before proceeding with the survey. Once all questions and concerns have been addressed, the team member(s) will give each participating client a survey form and a pen. The team member(s) will discretely remain with the participant to answer questions, if needed,

Plan of Work

Objectives

The objectives of this study are to 1) learn about the existing healing gardens at Skyland Trails and how they are currently used by staff and clients, 2) assess staff and client interest in using a space within the healing gardens for one-on-one talk therapy sessions, and 3) gather evidence to drive future designs of therapy spaces within healing gardens.

Study Setting and Population

This study will take place at Skyland Trail's Charles B. West Campus and will require participation from staff members and clients directly associated with or involved in the Adult Residential Treatment Program and the Adult Day Treatment Program. These programs at Skyland Trail serve adults who are years 18 and older. Of the 159 staff members credited on Skyland Trails website, it is estimated that 47 meet the above criteria for participation. Skyland Trail's published timeline states that they "serve more than 500 individuals – adult patients, adolescent patients, and their families – each year," but there is no indication of how many clients participate in the Adult Residential Treatment Program and the Adult Day Treatment Program at any given instance. It is estimated, based on residential room numbers and reported statistics, that the potential pool of participants falls between 100 and 150 clients. An accurate count of staff and clients will need to be provided by Skyland Trail prior to the initiation of the research project.

Survey and Distribution

For staff members. Once an official list of staff members has been provided by Skyland Trail leadership, research team members will mass email, with all potential staff participants blind copied, from a central email address to prevent point-of-contact confusion. Attached to the email will be the consent form (Appendix B). The body of the email will contain a link to the Google Form staff survey (Appendix C). A template is provided below. Changes can be made at the behest of the Skyland Trail leadership or as the study develops.

Dear Professionals of Skyland Trail,

We are a graduate research team from the Landscape Architecture Program at Clemson University, conducting a study on the use of healing gardens in mental health facilities and the interest of professionals and clients in using those healing gardens as spaces for talk therapy sessions. We will be visiting the Charles B. West Campus over the next three days.

You have been identified by Skyland Trail leadership as a staff member associated with the Adult Residential Treatment Program and/or the Adult Day Treatment Program and we would appreciate your participation in our study. This study aims to 1) learn about the existing healing gardens at Skyland Trail and how they are currently used by staff and clients, 2) assess staff and client interest in using a space within the healing gardens for one-on-one talk therapy sessions, and 3) gather evidence to drive future designs of therapy spaces within healing gardens.

and to retrieve the survey once the participant has finished. The supervising staff member is encouraged to remain for the client but is not required to do so, unless dictated by a participating agency. The completed survey will be delivered to the Principle Investigator within a reasonable timeframe for secure holding.

Documentation and Organization

Staff surveys. Staff surveys will be hosted online and any data downloaded from the host site will be secured by password on team members computers. Information from the staff survey will be transferred and coded in a spreadsheet for analysis. No identifying information will be kept or transferred.

Client surveys. Client surveys will be transferred and coded onto a spreadsheet for analysis. The survey hardcopies will be stored for a minimum of three years after digitizing, unless requested otherwise by a participating agency.

An example of coding for the client survey is shown below. Answers to open ended questions will remain in quotes with no changes to grammar or spelling.

	Q0101	Q0102	...	Q0201	Q0202	...	Q0301
C01	"I"	"N"	...	"No"	"I wante"	...	"I"
C02	"I"	"I"	...	"Maybe if"	"if that"	...	"IDK"

C01 – Client 01 (randomly assigned numbers)
Q0101 – Corresponds to Section Number and Question Number

General Conditions

Approvals

Skyland Trail's Board of Directors, or another Board acting on behalf of those members, will need to provide first approval to conduct this research project on their grounds and with their staff and clients. If approval from Skyland Trail, as an institution, is given, this project is to be submitted to Clemson University's Institutional Review Board (IRB), per university policy for all research involving human subjects. In the case that the Board of Directors or equivalent acting authority indicates that permission to interact with the clients of Skyland Trail is to be given by staff members, the indicated staff members will be approached for approval.

Dorothy C. Fuqua Center
Administrative Offices
1961 North Druid Hills RD NE
Atlanta, GA 30329
404-315-8333

Clemson University Institutional Review Board
Clemson Centre
391 College Ave, Suite 406
Clemson, SC 29631
irb@clemson.edu

Timeline

This timeline is intended to be general and flexible to change depending on coordination with Skyland Trails.

Day 1	AM	Email staff survey
Day 2	AM	Depart Clemson University
	AM	Arrive at Dorothy C. Fuqua Center to check in with administration
	PM	Check in to arranged hotel
Day 2	AM	Arrive at Charles B. West Campus (CBW) for introductions
	AM/PM	Distribute client surveys to clients
	PM	Leave CBW Campus by end of workday
Day 3	AM	Arrive at Charles B. West Campus (CBW) for introductions
	AM/PM	Distribute client surveys to clients
	PM	Leave CBW Campus by end of workday

Labor – Graduate Assistants (x3) @ \$54/day (4 days)	\$648.00
Lodging – Hotel Room (3 nights)	\$420.00
Estimated Total	\$1,328.00

Graduate Student Assistance Post-Data Collection

It is assumed that the graduate students will process the collected data at a cumulative 9 hours per week over the course of a 15-week semester.

Labor – Graduate Assistants (x3) @ \$9/hr.	\$1,215.00
Estimated Total	\$1,125.00
Final Estimated Total	\$2,543.00

Research Limitations

This research cannot be guaranteed to reach all eligible clients or staff members at Skyland Trail, nor can it guarantee participation by all or any individuals contacted throughout the duration of the research project. This study is intended to be a representation of the staff and clients at Skyland Trail and cannot represent the entire medical professional field or all adult patients of psychiatric care. While the survey questions have been written in an effort to best enable the participants to respond willingly and accurately, this study is assuming understanding and honesty from those surveyed.

Day 4	AM	Arrive at Charles B. West Campus (CBW) for introductions
	AM	Distribute client surveys to clients
	PM	Return to Clemson University

Transportation and Lodging

Given the small number of anticipated team members (three graduate students max), one team member will provide transportation for the group in their personal vehicle.

The Hampton Inn Atlanta-North Druid Hills is located next to the Charles' B. West Campus. Lodging there will allow research members to walk directly to the site without the need to drive. If the Hampton Inn Atlanta-North Druid Hills has no occupancy for the research team, there is Red Roof PLUS+ Atlanta across the street and Microtel Inn & Suite by Wyndham Atlanta down the road. Team members will share a room with two beds.

Departing from:
Clemson University
Lee Hall III
323 Fenow St
Clemson, SC 29631

Potential lodging:
Hampton Inn Atlanta-North Druid Hills
1975 N Druid Hills Rd
Atlanta, GA 30329

Red Roof PLUS+ Atlanta Buckhead
1960 N Druid Hills Rd
Atlanta, GA 30329

Microtel Inn & Suite by Wyndham Atlanta
1840 Corporate Blvd NE
Atlanta, GA 30329

Associated Costs

The following budget is an estimation based on prices seen in December 2021. Team members are expected to pay for their own food and incidentals during the trip to Skyland Trails but will receive a flat rate compensation for the four days spent on the research trip.

Trip to Skyland Trails to Distribute Survey

Transportation – Gas (228 miles)	\$125.00
Materials – Printing Consent Forms and Surveys	\$100.00
Materials – Pens for Client Use	\$10.00

Expected Results

By the end of the survey distribution to both staff and clients this project is expected to have a significant data set in which to begin analysis. Independent of the opinions housed within the survey, it is expected that the amount of data will be sufficient to compare the mindsets of staff and clients. We anticipate that staff and clients will have differing concerns regarding the use of outdoor spaces for confidential therapy sessions. Staff may experience more legal and logistical reservations whereas client's main concerns may lean more towards personal comfort and privacy. Obtaining the primary concerns of both sides, so to speak, will guide future design decisions, should the therapy session area idea continue to develop into practice. Both parties were asked about perceived benefits of using outdoor spaces independent of any worry and concern they may have and their inputs will be crucial for future design.

The project is expected to produce opinions on the existing garden spaces on the Charles B. West campus. Not only will this data inform our project but will provide an independent post occupancy study for the existing designed healing gardens. Data will be gathered on whether any portion of those gardens is already perceived suitable for one-on-one confidential therapy sessions. In addition, we expect to receive feedback on improvements and/or alterations that could be made to the existing gardens to make them perceived as suitable. As previously stated, we expect privacy to be a primary concern and hopefully the data returned will provide creative solutions to this challenge.

Like the information regarding the existing garden spaces, it is expected that clients and staff members who are agreeable to the idea of using outdoor spaces will provide additional information and insight regarding the conditions needed to make it so. In contrast, staff and clients who are not agreeable to outdoor spaces as therapy session areas will provide counter points and areas for further exploration in both theory and in practice. Either opinion introduces a creative problem-solving opportunity for both mental health professionals and designers, such as landscape architects.

Any and all opinions regarding healing gardens and therapy sessions will be cross referenced with a variety of supplemental data included in the surveys such as demographics and length of time at Skyland Trails. It is expected that we will determine the average amount of time participants both staff and clients spend in the healing gardens for both work and personal purposes. With this information we can deduce the efficacy of the existing design as its intended purpose as an area passively using nature to contribute to general wellbeing.

Within the broader framework of the field of healing gardens and therapeutic gardens this research will provide a necessary bridge over the gap in existing literature. Post-project completion we hope to have started the process of filling in the missing information on how healing gardens can be used in this very common area of mental health treatment. This crucial slice of information can lead landscape architect and mental health care professions down a new path of partnership in future psychiatric facility designs. Perhaps more importantly, it has the possibility of improving patient experience and alleviating some discomfort during times as vulnerable and stressful as therapy.

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Appendix A: Definitions

- Cognitive Behavioral Therapy (CBT)** – “[B]ased on several core principles, including: 1. Psychological problems are based, in part, on faulty or unhelpful ways of thinking. 2. Psychological problems are based, in part, on learned patterns of unhelpful behavior. 3. People suffering from psychological problems can learn better ways of coping with them.” (American Psychiatric Association 2021)
- Counseling** – “[A] professional relationship that empowers diverse individuals, families, and groups to accomplish mental health, wellness, education, and career goals.” (Kaplan, Tarydas, & Gladding 2014)
- Day treatment** – “[S]ometimes called partial hospitalization program or PHP... provides a more intensive therapeutic experience than meeting with an outpatient therapist once a week.” (Skyland Trail 2021)
- Healing gardens** – “A plant-dominated environment purposefully designed to facilitate interaction with the healing elements of nature.” (American Horticulture Therapy Association 2021)
- Horticulture therapy** – “The participation in horticultural activities facilitated by a registered horticultural therapist to achieve specific goals within an established treatment, rehabilitation, or vocational plan. Horticulture therapy is an active process which occurs in the context of an established treatment plan where the process itself is considered the therapeutic activity rather than the end product.” (AHTA Definitions and Positions Paper 2017)
- Intensive outpatient treatment** – “Outpatient treatment varies in the types and intensity of services offered. Such treatment costs less than residential or inpatient treatment and often is more suitable for people with jobs or extensive social supports.” (National Institute on Drug Abuse 2021)
- Psychiatrist** – “a medical doctor (completed medical school and residency) with special training in psychiatry. A psychiatrist is able to conduct psychotherapy and prescribe medications and other medical treatments.” (American Psychiatric Association 2021)
- Psychiatry** – “the branch of medicine focused on the diagnosis, treatment and prevention of mental, emotion and behavioral disorders.” (American Psychiatric Association 2021)
- Psychologist** – “has an advanced degree, most commonly in clinical psychology... Psychologists treat mental disorders with psychotherapy and some specialize in psychological testing and evaluation.” (American Psychiatric Association 2021)
- Residential treatment** – “The intensive therapeutic services offered by residential treatment centers require individuals seeking treatment to leave their homes and reside in a treatment facility for the duration of therapy.” (GoodTherapy 2021)
- Talk therapy** – “Treatment of mental, emotional, personality, and behavioral disorders using methods such as discussion, listening, and counseling. Also called psychotherapy.” (National Cancer Institute 2021)
- Therapeutic horticulture** – “The participation in horticultural activities facilitated by a registered horticultural therapist or other professionals with training in the use of horticulture as a therapeutic modality to support program goals. Therapeutic horticulture is the process through which participants enhance their well-being through active or passive involvement in plant and plant-related activities.” (AHTA Definitions and Positions Paper 2017)

protect your privacy, you should be aware that information sent through e-mail could be read by a third party.

Sharing De-identified Data Collected in this Research

De-identified data from this study may be shared with the research community at large to advance science and health. We will remove or code any personal information that could identify you before files are shared with other researchers to ensure that, by current scientific standards and known methods, no one will be able to identify you from the information we share. Despite these measures, we cannot guarantee anonymity of your personal data.

Taking part is voluntary

All participation is voluntary and you may refuse to participate before the study begins, discontinue at any time, or skip any questions that make you feel uncomfortable, with no penalty to you and no effect on your relationship with Skyland Trails or Clemson University.

If you have questions

The main researcher conducting this study is Annie Steele, a graduate student at Clemson University. Please ask any questions you have now. If you have questions later, you may contact Annie Steele at asteele22@clemson.edu or at 803-206-1984. If you have questions or concerns regarding the validity of this study, you may contact Dr. Hala Nassar, professor at Clemson University at hnassar@clemson.edu. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) for Human Participants at irb@clemson.edu or access their website at <https://www.clemson.edu/research/compliance/irb/>.

We encourage you to keep this form for your reference.

Appendix B: Consent Form

Consent Form

We are asking you to participate in a research study titled “Assessing Professional and Client Interest in Utilizing Healing Gardens at Skyland Trail for Talk Therapy Sessions”. We will describe this study to you and answer any of your questions. This study is being led by Annie Steele, graduate student of the Landscape Architecture Program at Clemson University. The Faculty Advisor for this study is Dr. Hala Nassar, professor in the Landscape Architecture Program at Clemson University.

What the study is about

The purpose of this research is to assess staff and client interest in using the existing healing gardens on the Charles B. West Campus for one-on-one therapy sessions. This research will inform future designs by landscape architects for healing gardens and build upon existing data on the link between nature and wellness, used by both medical professionals and designers.

What we will ask you to do

We will ask you to complete a three-part survey. The final section of the survey is demographic (i.e. age, gender, etc.). If you are a staff member of Skyland Trail, a link to the staff survey, hosted on Google Forms, will be emailed to you. If you are a client of Skyland Trail, we will provide paper copies of the client survey and pens for your use. Both staff and client surveys are expected to take around 20 minutes.

Risks and discomforts

The staff and client survey may cause emotional distress, such as feelings of sadness or anxiety due to the subject matter. You are free to stop the survey at any time in case of discomfort with no repercussions for not finishing.

Benefits

There are no direct benefits for participating in this research study. There are possible indirect benefits, such as gaining a new perspective on healing gardens and the therapeutic tools at your disposal. Information gathered from this study may benefit people now or in the future by providing an alternative location for therapy sessions. This research study will also benefit the psychiatric, medical, and architectural fields of knowledge. We hope to learn more about the criteria and conditions for staff and client comfort in therapy settings.

Compensation for participation

Participants will not receive any compensation for participating in this research study.

Privacy/Confidentiality/Data Security

We will protect all participants' privacy to the best of our ability. All identifying information found in the surveys will be removed. We will not keep any identifying information at all – the surveys are completely anonymous. Digital copies of surveys will be hosted by Google but accessible only by the research team members. Physical copies of surveys will be secured by the principle investigator and access will be restricted to the rest of the research team.

Staff members, please note that the survey is being conducted with the help of Google, a company not affiliated with Clemson and with its own privacy and security policies that you can find at its website. We anticipate that your participation in this survey presents no greater risk than everyday use of the Internet. Please note that email communication is neither private nor secure. Though we are taking precautions to

Appendix C: Staff Survey

Staff Survey Section 1

Section 1 will ask you eight (8) multiple choice questions about your position at Skyland Trails and your familiarity with the healing gardens on the Charles B. West Campus.

For the purposes of this survey, “healing gardens” refers to any outdoor open space with vegetation (grass, flowers, trees, etc.) that is NOT a pathway, sidewalk, parking area, or entryway to a building.

1. Which best describes your role at Skyland Trails? Please do not include your full position title as “Other” to protect anonymity.

- ☐ Leadership
- ☐ Psychiatrist
- ☐ Counselor
- ☐ Coach
- ☐ Specialist (Music, Art, Horticulture, etc.)
- ☐ Admissions
- ☐ Nurse
- ☐ Other: _____
- ☐ Prefer not to say

2. How long have you been employed by Skyland Trails?

- ☐ 0 – 6 months
- ☐ 6 months – 1 year
- ☐ 1 – 5 years
- ☐ 5 – 10 years
- ☐ 10 + years
- ☐ Prefer not to say
- ☐ I don't know

3. Do you work directly with adult clients in the Residential Treatment Program OR the Day Treatment Program? If Yes, proceed to Question 4. If No, Prefer not to say, or I don't know, skip to question 5.

- ☐ Yes
- ☐ No
- ☐ Prefer not to say
- ☐ I don't know

4. Does your work ever require one-on-one meetings with adult clients?

- ☐ Yes
- ☐ No
- ☐ Prefer not to say
- ☐ I don't know

5. Do you spend time *while working* in the Charles B. West healing gardens? *If Yes, proceed to Question 6. If No, Prefer not to say, or I don't know, skip to question 7.*
 - ☐ Yes
 - ☐ No
 - ☐ Prefer not to say
 - ☐ I don't know
6. How much time a week on average do you spend *while working* in the Charles B. West healing gardens?
 - ☐ 0 – 55 minutes
 - ☐ 1 hour
 - ☐ 1 hour and 5 minutes – 2 hours
 - ☐ 2 hours and 5 minutes – 3 hours
 - ☐ 3 hours and 5 minutes – 4 hours
 - ☐ 4 hours and 5 minutes or longer
 - ☐ Prefer not to say
 - ☐ I don't know
7. Do you spend time *recreationally or for personal purposes* in the Charles B. West healing gardens? *If Yes, proceed to Question 7. If No, Prefer not to say, or I don't know, skip to Section 2 Question 1.*
 - ☐ Yes
 - ☐ No
 - ☐ Prefer not to say
 - ☐ I don't know
8. How much time a week on average do you spend *recreationally or for personal purposes* in the Charles B. West healing gardens?
 - ☐ 0 – 55 minutes
 - ☐ 1 hour
 - ☐ 1 hour and 5 minutes – 2 hours
 - ☐ 2 hours and 5 minutes – 3 hours
 - ☐ 3 hours and 5 minutes – 4 hours
 - ☐ 4 hours and 5 minutes or longer
 - ☐ Prefer not to say
 - ☐ I don't know

Staff Survey Section 2

Section 2 will ask you eight (8) open ended questions and two (2) multiple choice question about the healing gardens at Charles B. West. There is no minimum or maximum limit for your responses. If you prefer not to answer any of these questions, please leave the answer field blank.

For the purposes of this survey, 'healing gardens' refers to any outdoor open space with vegetation (grass, flowers, trees, etc.) that is NOT a pathway, sidewalk, parking area, or entryway to a building.

1. What do you enjoy about the healing gardens on the Charles B. West Campus?
[Field for Response]

Staff Survey Section 3

This third section will ask you three (3) multiple choice questions and one (1) open ended question about the relationship between wellness and nature. There is no minimum or maximum limit for your responses. If you prefer not to answer any of these questions, please leave the answer field blank.

1. Are you aware of any scientific studies regarding the relationship between exposure to nature and human wellbeing?
 - ☐ Yes
 - ☐ No
 - ☐ Prefer not to say
 - ☐ I don't know
2. Were you aware that scientific studies have shown that exposure to nature generally improves wellbeing, such as reducing stress and improving mood?
 - ☐ Yes
 - ☐ No
 - ☐ Prefer not to say
 - ☐ I don't know
3. In your personal experience, how does exposure to nature effect you physically and mentally? *If you have noticed no effect, please indicate so in the answer field.*
[Field for Response]
4. Do you believe that knowing more about the generally positive relationship between mental health and wellness would change any of your answers from Section 2?
 - ☐ Yes, I would be more supportive of therapy sessions being held outdoors.
 - ☐ Yes, I would be less supportive of therapy sessions being held outdoors.
 - ☐ No, my answers would remain the same.
 - ☐ Prefer not to say
 - ☐ I don't know

Staff Survey Section 4

The fourth and final section includes five (5) multiple choice questions regarding demographics. All answers are anonymous and will not be associated with any identifying information.

1. What is your age?
 - ☐ 0-18 years old
 - ☐ 18-26 years old
 - ☐ 27-35 years old
 - ☐ 36-43 years old
 - ☐ 44-51 years old
 - ☐ 52-60 years old
 - ☐ 61+
 - ☐ Prefer not to answer

2. What do you feel could be improved about the healing gardens on the Charles B. West Campus?
[Field for Response]
3. In your opinion, do the healing gardens at Charles B. West contribute to the overall wellness of the adult clients? How?
[Field for Response]
4. How do you see or perceive the healing gardens on the Charles B. West Campus being used by staff and by clients?
[Field for Response]
5. In your opinion, do you think *any* section(s) of the healing gardens at Charles B. West is suitable for one-on-one, confidential therapy sessions between a staff member and an adult client? *If yes, proceed to Question 6. If No, skip to Question 7. If Prefer not to say or I don't know, skip to Question 8.*
 - ☐ Yes
 - ☐ No
 - ☐ Prefer not to say
 - ☐ I don't know
6. In your opinion, what conditions, features, or characteristics present at that section(s) of the healing gardens at Charles B. West makes it suitable for one-on-one, confidential therapy sessions between a staff member and an adult client?
[Field for Response]
7. In your opinion, what changes would need to be implemented to make a portion of the healing gardens at Charles B. West suitable for one-on-one, confidential therapy sessions between a staff member and an adult client? *If you feel no changes could make it suitable for this purpose, please indicate that in the answer field.*
[Field for Response]
8. Do you have any logistical concerns about holding one-on-one, confidential therapy sessions between a staff member and an adult client outdoors in the healing gardens of Charles B. West that has not already been addressed in the previous questions?
[Field for Response]
9. Assuming all concerns were addressed to your complete satisfaction, would you be willing to have one-on-one, confidential talk therapy sessions outdoors in a space designed for such a purpose?
 - ☐ Yes
 - ☐ No
 - ☐ Prefer not to say
 - ☐ I don't know
10. What benefits, if any, do you see in holding one-on-one, confidential talk therapy sessions outdoors? *If you see no benefits, please indicate so in the answer field.*
[Field for Response]

2. Please specify your ethnicity.
 - ☐ Caucasian
 - ☐ Black or African American
 - ☐ Latino or Hispanic
 - ☐ Asian
 - ☐ American Indian or Alaskan Native
 - ☐ Native Hawaiian or Other Pacific Islander
 - ☐ Two or More. Please specify: _____
 - ☐ Other. Please specify: _____
 - ☐ Unknown
 - ☐ Prefer not to say
3. What gender do you identify with?
 - ☐ Male
 - ☐ Female
 - ☐ Transgender Male
 - ☐ Transgender Female
 - ☐ Non-binary
 - ☐ Prefer to self-describe: _____
 - ☐ Prefer not to say
4. What is the highest degree or level of education you have completed?
 - ☐ Some High School
 - ☐ High School
 - ☐ Associate's Degree
 - ☐ Bachelor's Degree
 - ☐ Master's Degree
 - ☐ Ph.D. or higher
 - ☐ Trade School
 - ☐ Prefer not to say
5. What is your marital status?
 - ☐ Single
 - ☐ Married
 - ☐ Prefer not to say

Appendix D: Client Survey

Client Survey

Section 1

Section 1 will ask you nine (9) multiple choice questions about your experience at Skyland Trails and your familiarity with the healing gardens on the Charles B. West Campus. For the purposes of this survey, "healing gardens" refers to any outdoor open space with vegetation (grass, flowers, trees, etc.) that is NOT a pathway, sidewalk, parking area, or entryway to a building.

- Are you a client participating in either the Adult Residential Treatment Program OR the Adult Day Treatment Program? If yes, proceed to Question 2. If No, Prefer not to say, or I don't know, skip to Question 3.
 - Yes
 - No
 - Prefer not to say
 - I don't know
- How long have you been a client of Skyland Trails?
 - Less than 7 days
 - 8 days – 14 days (2 weeks)
 - 15 days – 21 days (4 weeks)
 - 29 days – 56 days (8 weeks)
 - More than 8 weeks
 - Prefer not to say
 - I don't know
- Have you been diagnosed with any of the following, either before coming to Skyland Trails or here by one of the Skyland Trail's professionals?
 - Major Depressive Disorder
 - Bipolar Disorder
 - Schizophrenia
 - Anxiety Disorder
 - Borderline Personality Disorder
 - Dual Diagnosis with a Primary Substance Use Disorder
 - Two or More. Please specify: _____
 - Other(s). Please specify: _____
- Does your treatment program include one-on-one, confidential talk therapy sessions with a counselor and/or psychiatrist? If Yes, proceed to Question 5. If No, Prefer not to say, or I don't know, skip to Question 7.
 - Yes, both counselor(s) and psychiatrist(s)
 - Yes, only counselor(s)
 - Yes, only psychiatrist(s)
 - No
 - Prefer not to say

o I don't know

- On average, how often do you have one-on-one, confidential talk therapy sessions with a counselor and/or psychiatrist?
 - One session every other week
 - One session per week
 - Two sessions per week
 - Three sessions per week
 - More than three sessions a week
 - Prefer not to say
 - I don't know
- On a scale of 1 to 10, with 1 being completely relaxed and 10 being very agitated, how stressed and/or anxious would you describe yourself during an average one-on-one talk therapy session?
 - 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10
- On average, how much time a week do you spend while participating in treatment program activities under staff supervision in the Charles B. West healing gardens?
 - 0 – 55 minutes
 - 1 hour
 - 1 hour and 5 minutes – 2 hours
 - 2 hours and 5 minutes – 3 hours
 - 3 hours and 5 minutes – 4 hours
 - 4 hours and 5 minutes or longer
 - Prefer not to say
 - I don't know
- Do you spend time recreationally or separate from program activities in the Charles B. West healing gardens? If Yes, proceed to Question 7. If No, Prefer not to say, or I don't know, skip to Section 2 Question 1.
 - Yes
 - No
 - Prefer not to say
 - I don't know
- How much time a week on average do you spend recreationally or separately from program activities in the Charles B. West healing gardens?
 - 0 – 55 minutes

- 1 hour
- 1 hour and 5 minutes – 2 hours
- 2 hours and 5 minutes – 3 hours
- 3 hours and 5 minutes – 4 hours
- 4 hours and 5 minutes or longer
- Prefer not to say
- I don't know

Client Survey

Section 2

Section 2 will ask you eight (8) open ended questions and two (2) multiple choice question about the healing gardens at Charles B. West. There is no minimum or maximum limit for your responses. If you need more space for your responses, please use the back of the survey and label each response with the corresponding question number. If you prefer not to answer any of these questions, please leave the answer field blank.

For the purposes of this survey, "healing gardens" refers to any outdoor open space with vegetation (grass, flowers, trees, etc.) that is NOT a pathway, sidewalk, parking area, or entryway to a building.

- What do you enjoy about the healing gardens on the Charles B. West Campus?
[Field for Response]
- What do you feel could be improved about the healing gardens on the Charles B. West Campus?
[Field for Response]
- In your opinion, do the healing gardens at Charles B. West contribute to the overall wellness of adult clients at Skyland Trail, including yourself? How?
[Field for Response]
- How do you see or perceive the healing gardens on the Charles B. West Campus being used by staff and by clients?
[Field for Response]
- Would you be willing to have one-on-one, confidential therapy sessions in any section(s) of the healing gardens at Charles B. West? If yes, proceed to Question 6. If No, skip to Question 7. If Prefer not to say or I don't know, skip to Question 8.
 - Yes
 - No
 - Prefer not to say
 - I don't know
- What conditions, features, or characteristics present at that section(s) of the healing gardens at Charles B. West makes it suitable for your one-on-one, confidential therapy sessions between a staff member and an adult client?
[Field for Response]

- In your opinion, what changes would need to be implemented to make any portion of the healing gardens at Charles B. West suitable for one-on-one, confidential therapy sessions between a staff member and yourself? If you feel no changes could make it suitable for this purpose, please indicate that in the answer field.
[Field for Response]
- Do you have any concerns about holding one-on-one, confidential therapy sessions between a staff member and yourself outdoors in the healing gardens of Charles B. West that has not already been addressed in the previous questions?
[Field for Response]
- Assuming all concerns were addressed to your complete satisfaction, would you be willing to have one-on-one, confidential talk therapy sessions outdoors in a space designed for such a purpose?
 - Yes
 - No
 - Prefer not to say
 - I don't know
- What benefits, if any, do you see in holding one-on-one, confidential talk therapy sessions outdoors? If you see no benefits, please indicate so in the answer field.
[Field for Response]

Client Survey

Section 3

This third section will ask you three (3) multiple choice questions and one (1) open ended question about the relationship between wellness and nature. There is no minimum or maximum limit for your responses. If you prefer not to answer any of these questions, please leave the answer field blank.

- Are you aware of any scientific studies regarding the relationship between exposure to nature and human wellbeing?
 - Yes
 - No
 - Prefer not to say
 - I don't know
- Were you aware that scientific studies have shown that exposure to nature generally improves wellbeing, such as reducing stress and improving mood?
 - Yes
 - No
 - Prefer not to say
 - I don't know
- In your personal experience, how does exposure to nature effect you physically and mentally? If you have noticed no effect, please indicate so in the answer field.
[Field for Response]

8. Do you believe that knowing more about the generally positive relationship between mental health and wellness would change any of your answers from Section 2?
- ☐ Yes, I would be more supportive of therapy sessions being held outdoors.
 - ☐ Yes, I would be less supportive of therapy sessions being held outdoors.
 - ☐ No, my answers would remain the same.
 - ☐ Prefer not to say
 - ☐ I don't know

Client Survey

Section 4

The fourth and final section includes five (5) multiple choice questions regarding demographics. All answers are anonymous and will not be associated with any identifying information.

1. What is your age?
 - ☐ 0-18 years old
 - ☐ 18-26 years old
 - ☐ 27-35 years old
 - ☐ 36-43 years old
 - ☐ 44-51 years old
 - ☐ 52-60 years old
 - ☐ 61+
 - ☐ Prefer not to answer
2. Please specify your ethnicity.
 - ☐ Caucasian
 - ☐ Black or African American
 - ☐ Latino or Hispanic
 - ☐ Asian
 - ☐ American Indian or Alaskan Native
 - ☐ Native Hawaiian or Other Pacific Islander
 - ☐ Two or More. Please specify: _____
 - ☐ Other. Please specify: _____
 - ☐ Unknown
 - ☐ Prefer not to say
3. What gender do you identify with?
 - ☐ Male
 - ☐ Female
 - ☐ Transgender Male
 - ☐ Transgender Female
 - ☐ Non-binary
 - ☐ Prefer to self-describe: _____
 - ☐ Prefer not to say
4. What is the highest degree or level of education you have completed?

- ☐ Some High School
- ☐ High School
- ☐ Associate's Degree
- ☐ Bachelor's Degree
- ☐ Master's Degree
- ☐ Ph.D. or higher
- ☐ Trade School
- ☐ Prefer not to say

5. What is your marital status?
- ☐ Single
 - ☐ Married
 - ☐ Prefer not to say



Assessing Professional and Client Interest in Utilizing Healing Gardens at Skyland Trail for Talk Therapy Sessions

LARC 8210 Research Methods | Dr. Hala Nassar
Research Proposal Presentation | Annie Steele

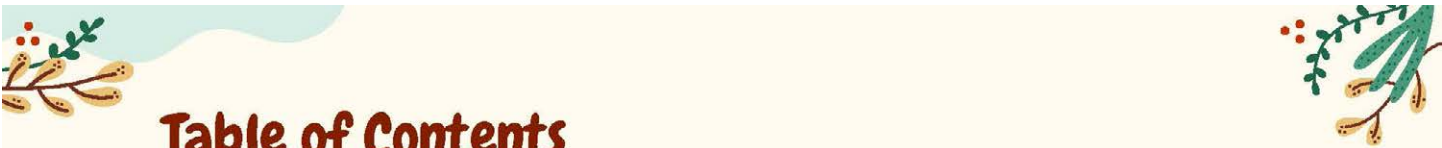
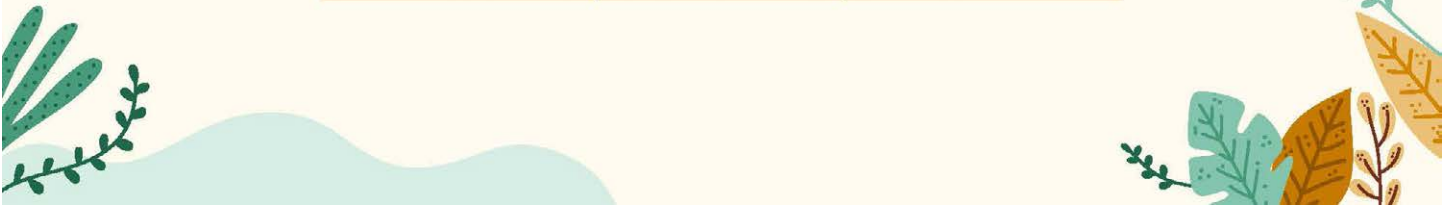


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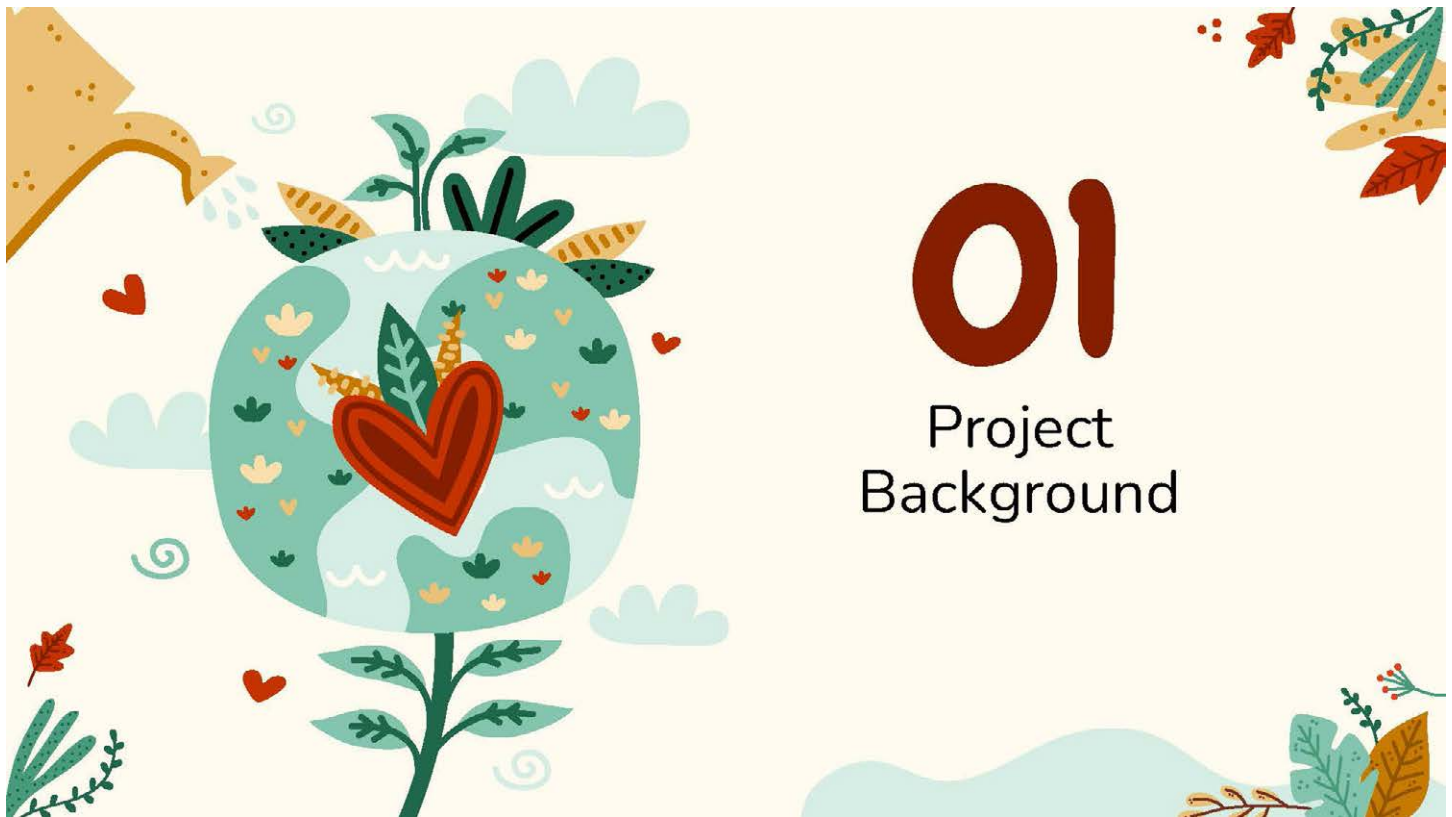
05

General Conditions
Materials and resources needed & limitations

06

Expected Results
Anticipated results & benefits thereof





Mental Health



The foundation for emotions, thinking, communicating, learning, resilience, and self-esteem; key for relationships, personal and emotional well-being, and contributing to community and society. – Psychiatry.org

Allows for:

- Productive activities
- Healthy relationships
- Ability to adapt to change and cope with adversity

Mental Illness



Refers to any health condition involving 1) changes in emotion, thinking or behavior, or any combination of the these and 2) distress and/or problems functioning in social, work or family activities. - Psychiatry.org

- **1 in 5** of US adults experience mental illness at some point
- **1 in 24** has a 'serious' mental illness (interferes or inhibits one or more major life activities, such as major depressive disorder and schizophrenia)
- **1 in 12** has a diagnosable substance use disorder

Mental illness is a medical condition that does not discriminate.

Psychotherapy



It is a way to help people with a wide range of mental illnesses and emotional difficulties. – Psychiatry.com

Problems addressed by psychotherapy includes, but is not limited to:

- Impact of trauma
- Medical illness or loss of a loved one
- Mental disorders, such as depression and anxiety

Psychotherapy (talk therapy) may be conducted with an individual, family, or group, and can help children and adults. Psychotherapy may be short term or long term.

Psychotherapy is often used in combination with other therapies and medication.



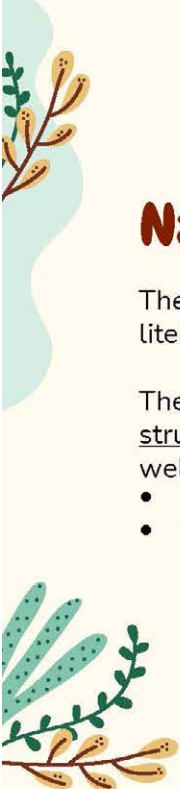
Holistic Therapy

Is

Understanding that a person's consciousness is an integration of mind, body and spirit with a belief that understanding the whole self leads to greater self-awareness, self-esteem, and self-acceptance

Is not

Pseudoscience or a replacement for institutionalized medical treatment



Nature and Holistic Health

The benefits of nature is undisputed in the literature.

There are existing structured and non-structured methods of nature-based wellness strategies:

- Horticulture Therapy
 - Therapeutic Horticulture
 - Walking through a park
 - Swimming
 - Etc.
- 

Foundational Nature and Wellness Theories

Year of Origin	Originator(s)	Theory
1981	Roger S. Ulrich	Psychoevolutionary Theory (PET)
1984	E.O. Wilson	Biophilia hypothesis (BET)
1989	R. Kaplan, S. Kaplan	Attention restoration theory (ART)

Psychoevolutionary Theory

- Exposure to natural elements reduce physiological and psychological stress in a measurable way
- Assumes humans process natural scenes more efficiently than urban scenes and thus cause less physiological and cognitive stress



Biophilia

- **Genetic motivation for humans to interact with and focus on nature**
- Universal appreciation of the appearance of the natural world
- Pervasiveness of spiritual reverence for animals and nature in human civilizations
- Biophobia provides measurable physiological responses upon exposure to natural fears, such as snakes or heights, which is a result of evolution

Attention Restoration Theory



- The natural environment encourages **effortless brain function and therefore replenishes directed action capacity** (AKA cures 'mental fatigue', improves concentration, and restores direct attention)
- The environment must have the following to be 'restorative'
 1. **Extent** – the scope to feel immersed in the environment
 2. **Being away** – provides escape from habitual activities
 3. **Soft fascination** – aspects of environment captures attention effortlessly
 4. **Compatibility** – individuals must want to be exposed to the environment

A Few Impacts of Exposure to Nature

Speed physical healing

Reduces symptoms of anxiety

Relieves symptoms of depression

Increase working memory

Improve cognitive function in people with dementia

Improve self reported mood

Evidence Based Design: A Sample

Redesigning hospitals to allow for more direct sunlight on patients

Sunlight



Providing paintings or photos of nature scenes

Imagery



Separate spaces within an urban or architectural setting for interacting with nature

Gardens



Water

Including indoor and outdoor fountains



Plants

Maintaining indoor plants for viewing/interacting



Healing Gardens

A result of evidence-based design.

Greenspaces within hospitals and health care facilities that are specifically intended to improve health outcomes.

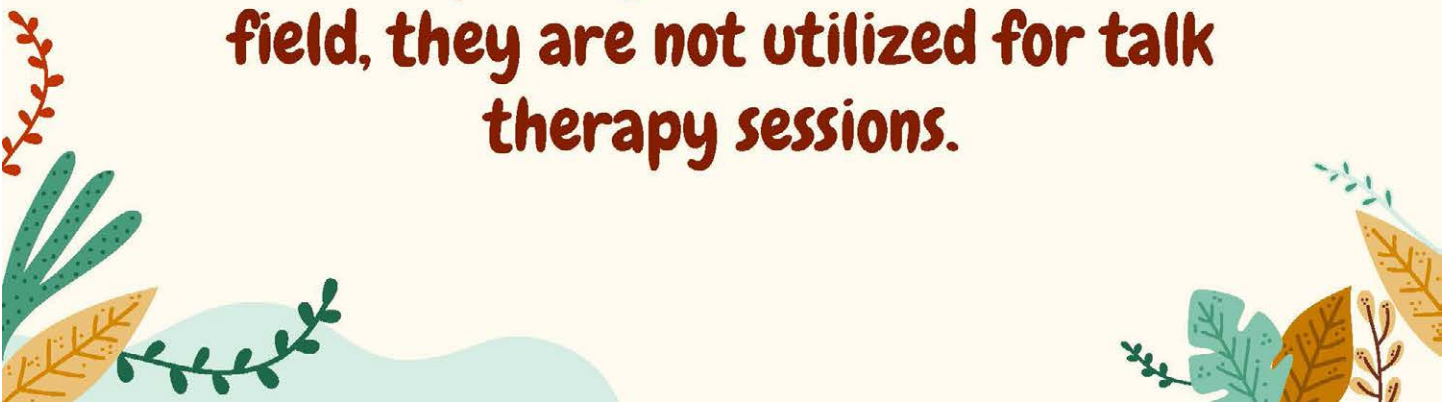
Unlike therapeutic landscapes, healing gardens are not designed to meet the specific needs of a specific patient population.

Healing gardens employ passive involvement and are intended to a diverse population with differing needs.

- University of Minnesota



While healing gardens exist and are used frequently in the mental health field, they are not utilized for talk therapy sessions.



Site Selection Criteria



Identify an existing facility that conducts talk therapy sessions and already have healing gardens onsite.

02

Skyland Trail



Skyland Trail



Charles B. West Campus
1903 North Druid Hills RD NE
Atlanta (Brookhaven), GA 30319

About

Nonprofit mental health treatment organization; residential treatment facility; holistic treatment model

Campuses

There are 5 campuses in Atlanta, GA. This project focuses on the Charles B. West Campus, where all adult clients must visit for therapy sessions.

Would the staff and clients at Skyland Trail conduct one-on-one talk therapy sessions in an existing garden on their Charles B. West Campus?

- RESEARCH QUESTION 1

What changes, if any, would need to be implemented for the existing garden space to be used to conduct one-on-one talk therapy sessions?

- RESEARCH QUESTION 2

03

Merit and Methods



Intellectual Merit



Medical Professionals

- Addresses the gap in the existing literature on nature, wellness, and outdoor therapy
- Provide new study opportunities in psychology and environmental design
- Decrease patient agitation and/or aggression; creating a safer, calmer space
- 2020+ potential protection in future conditions of airborne diseases



Design Professionals

- Addresses the gap in the literature on nature, mental health, and healing gardens
- Provide new design standards for healing gardens
- Provide novel design ideas for outdoor therapy areas within gardens
- Open a new avenue of professional development for designers



Psychiatric Patients

- Potential to decrease pain and stress during therapy sessions
- May speed recovery
- Opportunity to create a safe place outdoors that is less confining than an office
- Increase session satisfaction
- Provide flexibility of choice between indoor and outdoor sessions



Research Methods

Mixed methods approach.

2 multi-sectioned surveys –

- Staff survey for administration, therapists, and counselors
- Client survey for adult patients



04

Plan of Work

Population. Data to Collect.
Methods of Data Collection.
Research Design.



Population



Staff
47 of 159

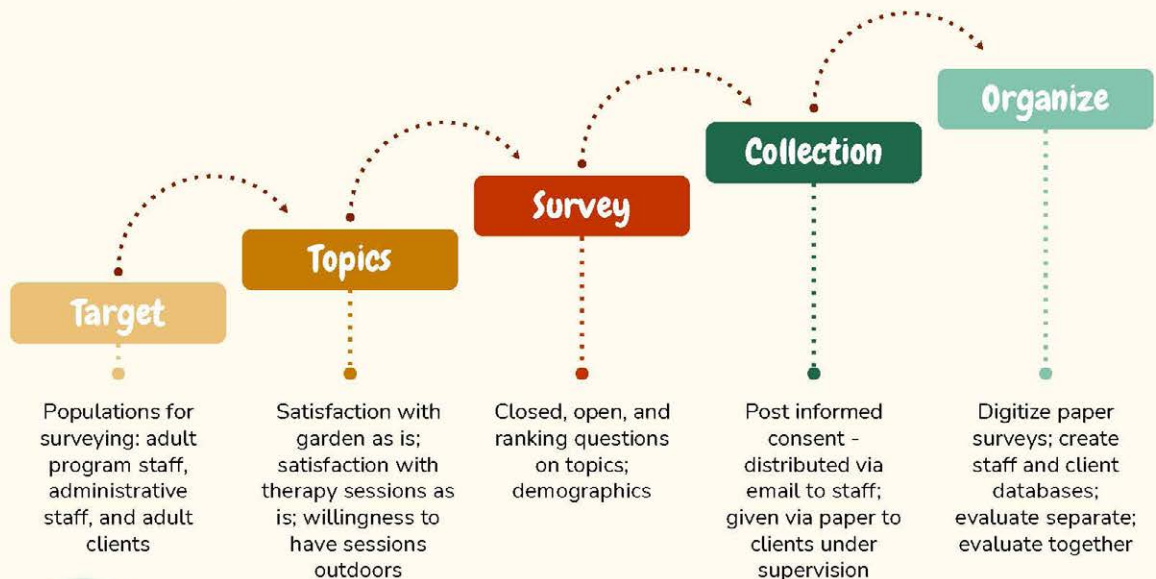
In adult and general programming (including psychiatrists, counselors, coaches, and adult program administration)



Clients
150 of 500

Adult clients out of all individuals served (including teens and family members) (approximate)

Data Acquisition and Methods



05

General Conditions

Approvals. Costs. Timeline.
Limitations.

Approvals Needed

1. Skyland Trail Administration
2. Institutional Review Board
3. Individual Staff and Client

Materials and Costs

Items	Costs
Gas	\$75.00
Printing (Consent Forms, Client Surveys, Extra Staff Surveys)	\$100.00
Writing Utensils (Pens for Clients)	\$10.00
Graduate Assistants (x2) @ \$9/hr	\$360.00
Hotel Room (3 nights)	\$420.00
	\$965.00

Timeline



"Before"

IRB Reviews and Approvals;
communications with
Skyland Trail
administration



Day 1 (Mon)

Travel to Skyland
Trail; introductions to
staff



Day 2 (Tues)

Email staff survey to
staff; introductions to
clients; distribute
client survey (Tues
groups)



Day 3 (Wed)

Introductions to
clients; distribute
client surveys (Wed
groups)

Timeline



Day 4 (Thur)
Introductions to clients; distribute client surveys (Thurs groups); return to Clemson



'After'
Organize and analyze data

Survey Samples

Staff Survey Section 1

Section 1 will ask you eight (8) multiple choice questions about your position at Skyland Trails and your familiarity with the healing gardens on the Charles B. West Campus.

For the purposes of this survey, 'healing gardens' refers to any outdoor open space with vegetation (grass, flowers, trees, etc.) that is NOT a pathway, sidewalk, parking area, or entryway to a building.

1. Which best describes your role at Skyland Trails? *Please do not include your full position title as 'Other' to protect anonymity.*
- ☐ Leadership
 - ☐ Psychiatrist
 - ☐ Counselor
 - ☐ Coach
 - ☐ Special
 - ☐ Admin

3. Have you been diagnosed with any of the following, either before coming to Skyland Trails or here by one of the Skyland Trail's professionals?
- ☐ Major Depressive Disorder
 - ☐ Bipolar Disorder
 - ☐ Schizophrenia
 - ☐ Anxiety Disorder
 - ☐ Borderline Personality Disorder
 - ☐ Dual Diagnosis with a Primary Substance Use Disorder
 - ☐ Two or More. Please specify: _____
 - ☐ Other(s). Please specify: _____

4. Does your treatment program include one-on-one, confidential talk therapy sessions with a counselor and/or psychiatrist? *If Yes, proceed to Question 5. If No, Please not to say, or I don't know, skip to*



06

Expected Results



If Agreeable to Outdoor Spaces

- What in the existing garden spaces make it agreeable
- What in the existing garden spaces need to change
- Perceived benefits of having therapy outdoors
- Perceived risks of having therapy outdoors



If NOT Agreeable to Outdoor Spaces

- What makes existing gardens unsuitable
- Reasons for preferring to remain inside for talk therapy sessions
- Perceived risks of having therapy outdoors



Independent of Outcome

- Possibility to compare client and staff results



In Summary

This research will provide:

- Insight on professional and personal preference for therapy session locations
 - Opportunities to study talk therapy success rates compared to indoor therapy sessions in the future
 - Potentially in the future allow flexibility and additional freedom of choice to professionals and patients
 - Aid in the overall awareness of mental health and the benefits of nature
- 
- 



Questions?

Thanks!



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Citations

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DESIGNING A BUILT ENVIRONMENT
TO SUPPORT ADHD LEARNERS IN HIGHER EDUCATION

How Lee-Hall at Clemson University can create more equity and inclusion for neurodiverse students by applying attention restoration theory, and universal design, and simple biophilic retrofits.

April Riehm

Landscape Architecture Program
Clemson University School of Architecture
Professor Hala Nassar, PhD
Research Methods 8210, Fall 2022

Keywords: adult ADHD, neurodiversity, equity & inclusion, campus planning, universal design, Attention Restoration Theory, Biophilia, higher education ,design education, Lee Hall



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The built environment plays an important role in the learning outcomes of higher education students, especially for those with physical or cognitive disabilities. The number of students entering college with a neurocognitive learning disability has risen exponentially in the last 20 years. (Wei Bao, 2018) The current university accessibility departments are not able, for a variety of reasons, to provide support for every student who needs it (Jones, 2019). Consequently, many may struggle to complete their degrees on time or drop out altogether (Horowitz, 2017). Students who are ADHD (Attention Deficit Hyperactivity Disorder) make up 25% of students with learning disabilities on college campuses in the US (CDC, 2022) At Clemson University, this statistic holds true (Clemson SAS, 2016). According to The World Health Organization, up to 16% of all college students globally are ADHD (Mak, 2022). Many ADHD students are drawn to creative and STEM fields, and in the US are entering art and design programs in higher numbers than before (Wood, 2022) ADHD students encounter a unique set of challenges in design school due to the way their symptoms present. Additionally, these students are encountering sensory barriers in the physical learning environment (Sworts S. R., 2022). Students do better academically when they have a system of support rather than just one type (Antshel K. P., 2022). We know that when people are close to nature, it can improve their physical and mental well-being (Kaplan R. a., 1989) (Browning W. A., 2014; Ulrich, 1984). To create a more inclusive learning environment where more students can succeed academically, my research asks if landscape architecture can play a role in supporting students with ADHD. I will examine Lee Hall at Clemson University School of Architecture to determine current usage and perceptions and ask whether biophilic elements and other sensory components can be integrated into the building complex so that it functions as an additional form of support for students with ADHD and other learning disabilities. The focus my of research is on biophilic design, attention restoration theory, and universal design.

Introduction

5

differences (Baumer, 2021). People who are neurodivergent have disabilities that are 'invisible' Because of this, it's sometimes hard for other people to recognize that they are struggling. For a person in a wheelchair, a physical barrier like a steep slope or flight of stairs is an obvious barrier to classroom access. Less obvious or 'invisible' barriers are related to sensory input in the learning/built environment. The terms neurodivergent and atypical are used to refer to people who have been diagnosed as having a brain that is different from the majority. Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Dyslexia, Tourette's Syndrome, Dyscalculia, or other learning disabilities (Dwyer & et, 2022) are considered neurodivergent. Although each of these diagnoses is unique, they can share symptoms. For example, someone who is ADHD and someone who is Autistic may have a similar reaction when processing sensory input such as bright flashing light. Even though each person falls somewhere differently on a spectrum, as a group, neurodivergent college students respond to external stimuli differently than their neuro-typical classmates. This means they are more likely to have poor educational outcomes as a result (Evans, 2003).

When the American Disability Act (ADA) was passed in 1990, a system of support was put in place for students with learning disabilities in all US K-12 public schools (US Department of Justice, 2022). This law required schools to provide accommodations for students to help them succeed on level ground with their neurotypical peers. ADHID was added to the list of learning disabilities that received accommodations through ADA, in 1997. (Horowitz, 2017) This resulted in more students with ADHD who were able to complete high school and go to college than previously (Horowitz, 2017). The exact number of neurodivergent students in higher education is unknown due in part to many students still not being diagnosed and the stigma preventing some of those who are from disclosing their diagnosis (Horowitz, 2017) (Green A. L., 2012). One estimate says 2-8% of college students have ADHD. (Green A. L., 2012). Another study estimates the number of college students who have ADHD has increased in the last 20 years from 2% to over 11% (Antshel, 2022). Globally, according to a World Health Organization report, 16% of students in higher education have ADHD. At Clemson University, the Accessibility Department reported that 1210 out of 22,000 (or 5%) of enrolled students were registered for disability services in fall 2016. (Clemson SAS, 2016). Of these 1210 students, 537 (or 44.4%) were diagnosed with ADHD (Figure 8). This represents 2% of the student body. If the higher percentage of 11% is used instead, it means hypothetically that there could be over 2400 Clemson students with ADHD. Using The World Health Organization's average instead (16 percent), it goes up to over 3500 students. Within Clemson's School of Architecture, there are approximately 570 people. Statistically, that means there may be 91 people who are ADHD. It follows that the difference between those receiving accommodations and those who have ADHD but no support accommodations could be as high as 3000 students.

Without academic accommodations or support, otherwise intelligent ADHD students are at risk of academic failure (Horowitz, 2017). Statistically, they end up with lower GPAs than non-ADHD students, earn fewer credits per semester, and are more likely to drop out without earning a degree. (Green A. L., 2012).

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Because we know the built environment can affect the learning outcomes of junior high students (Yin, 2017) we can try to apply this knowledge in a higher education setting (Sasaki, 2022). Landscape architecture interventions have been used in buildings to remove barriers and create a more equitable learning environment (Dwyer & et, 2022). Can this be applied at Lee-Hall? At Clemson University School of Architecture, Lee Hall is the primary learning environment for design students. It is where instructors and students meet for seminars and studio classes, practice their design skills, and collaborate. A showcase building with modern design sensibilities, Lee Hall has won numerous awards and accolades (Caudle, 2013) and has been described as "a tool for learning" (Stephens, 2013). The open communal workspaces are a whirl of activity on studio days when the cacophony of sounds is amplified through the open space. Tall banks of windows on each side of the building help provide views to the exterior and light the interior space. Twenty-five skylights provide additional light (TransSolar, 2012). Landscape architecture elements currently present at Lee Hall include a single row of trees in the front of the building, a row of cypress trees in the back, an allé of trident maples planted beyond the rear courtyard, and a copious amount of grey gravel. There's no vegetation installed inside the building. A notable feature is a 30,000-SF green roof, but it's not accessible to students (Marrow, 2012) (Kate E. Lee, 2015).

Colleges and Universities are beginning to examine ways their campuses can be more inclusive (Ridout, 2020) (Clemson, 2022). Many universities have formed Justice, Equity, and Inclusion departments and taskforces (Dwyer & et, 2022). Creating an equitable and inclusive educational environment means ensuring fairness and access to opportunities for a diverse student population. Diversity is often used to describe differences in a group of people and can encompass race, gender, age, ethnicity, sexual orientation, religion, disability, or anyway people choose to categorize themselves. For this study, I am looking at neurodiversity and inclusion in the built environment. Neurodiversity is a type of diversity (Shmulsky, 2022). I have focused on ADHD students, who, as a percentage, are currently the largest group of students with a neurological learning disability in higher education, both globally and in the US. This group, despite being the highest in numbers, and having symptoms and behaviors that are affected directly by their immediate environment are rarely included in design considerations. For architects, planners, and designers, more often, guidelines revolve around designing for Autism Spectrum Disorder, ASD. An inclusion guide created by Dublin City College, Dublin, Ireland, acknowledges that the "architectural environment" has a role in the inclusion and support of its students (Mostafa, 2021). ADHD students learn differently. They have difficulty regulating sensory input. When it's too much, they are distracted and overwhelmed, and when there is not enough, they tune out. Either way, this can interfere with their ability to learn successfully (Shmulsky, 2022). Without support and understanding from faculty and their peers, they can suffer from anxiety and social isolation (Logan, 2021) (Robinson, 2019). If they routinely struggle, they can fall behind, which can take a toll on their mental health (Evans, 2003). The way that environmental sensory input is received and processed by people who are neurodivergent is different from the way it is received and processed by neurotypical people (Francis, 1982).

Neurodiversity is a term that was introduced by sociologist Judy Singer in 1999 to describe how varied human neurology is and how equally valuable to society everyone is despite (or because of) these

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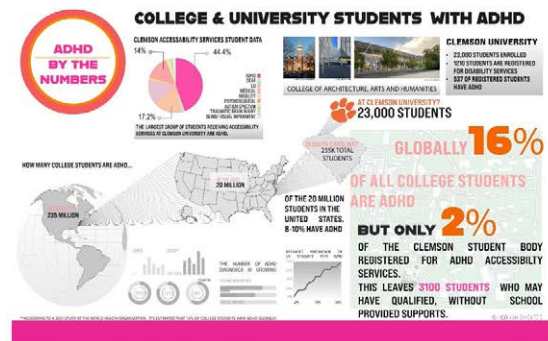


Figure 8: Summary of statistical information on ADHD in higher education in the US and globally.

One of the reasons students don't receive accommodations is that they don't apply for them. (Podlucks, 2020) This is thought to be because of one of the following reasons: they don't think they need help; they don't know they are ADHD, they cannot afford the cost of a required doctor's diagnosis, which may be

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cost-prohibitive for some students, or they do not want to disclose their diagnosis. (Podlucka, 2020) The latter reason may be a result of the stigma that exists about the legitimacy of ADHD as a real diagnosis. Despite the raised awareness, scientific research, and medical proof, 35% of educators say what some people call a learning disability is simply 'laziness' (Horowitz, 2017) (Speerforck S, 2019). They feel that academic accommodations give ADHD students an unfair advantage (Horowitz, 2017). Originally, ADHD was believed to be a disorder that only boys had. Although now diagnoses of girls are more common, beliefs have not changed as quickly. ADHD was also considered a childhood diagnosis that would be outgrown (Green A. L., 2012). Now we know adults have ADHD too. There has been ongoing research to help increase the understanding of the way neurodivergent brains work (Green A. L., 2012). Advances in medical science have allowed researchers to use brain scans to illustrate how the minds of people with atypical neurodiversity behave differently (Horowitz, 2017). But despite knowing more about the condition, many misconceptions and stigmas surrounding the diagnosis still persist. (Gershon & Leve, 2022).

Students might not be receiving academic support because the process of applying for them is too daunting for them (Podlucka, 2020). At Clemson, students are required to register with the accessibility department in order to qualify for help. Each student then must wait for the approval. Next, they have a meeting with a specialist to talk about the type of accommodations they can ask for. Then they send emails to each of their professors at the start of every semester. At that point can then schedule meetings with each of their professors to create an individual accommodation plan (Clemson SAS, 2016). This requires time management and executive functioning, and working memory, all skills which ADHD students are lacking in. Since many ADHD students either don't apply for help or don't follow through with the process, they're not receiving support.

Even if the students do successfully register with their university accessibility department, the accommodations available in college are not typically as extensive as what students received during their K-12 education (Podlucka, 2020). Some of the accommodations that are available for an ADHD diagnosis are the use of a special testing center, extra time on exams, and the ability to record lectures. Most of these accommodations do not help in design school, especially in a studio setting. However, students with ADHD are drawn to creative fields, and they have been proven to be more creative and have more divergent thinking than their neurotypical peers, which means that design school could be a place where they would excel if they were supported (White, 2005) (Podlucka, 2020)

In order for the built environment to become part of a system of support, it must first stop being a barrier. In my research, I will study The Lee Hall complex, to see how students interact with the built environment. Based on my research on ADHD and neurodiversity, higher education, and sensory elements in the built environment, I will focus on three topics in my literature review that I believe are the most relevant: biophilia, Attention Restoration Theory (ART), and Universal Design.

CHALLENGES IN THE BUILT ENVIRONMENT FOR ADHD LEARNERS

- BRIGHT LIGHTS, CLUTTER, OFFENSIVE COLORS
- NOISE, ESPECIALLY CERTAIN FREQUENCIES
- STRONG ODORS, FOOD SMELLS
- SITTING STILL FOR LONG PERIODS OF TIME

Figure 10: Sensory stimuli in the learning environment may distract ADHD learners.

LITERATURE REVIEW:

Biophilia, Attention Restoration Theory and Universal Design

Biophilia is a theory that humans have an instinctive desire to connect to nature and other living things. (Wilson, 1993). The term was used first in 1964 by a psychologist named Eric Fromm. Twenty years later, Edward Wilson wrote *Biophilia: The Human Bond With Other Species*, which popularized the term (Figure 11).

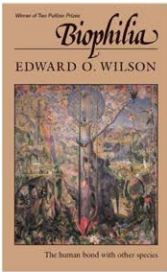


Figure 11: Biophilia by Edward O. Wilson

Biophilic design helps people feel connected to nature. It can help people feel calmer and safer. (Browning W. A., 2014) A connection to nature improves mental health (Han, 2009). Views through windows, sunlight through skylights and shapes and patterns that mimic those found in nature are a few of the biophilic elements that can be found in Lee Hall.



Figure 12a: Do the columns at Lee Hall have biophilic qualities?



Figure 12b: Exterior columns at Lee Hall.



Figure 12c: Above left: Tree-like columns at The SC Johnson Wax Administration Building, Racine Wisconsin, designed by Frank Lloyd Wright, 1939. Figure 12d: Right: A baobab tree grove in Africa. Note the similar forms.

The use of biomorphic elements and forms in the built environment brings a feeling of nature to indoor spaces (Caudle, 2013). But biophilic design does not mean just using plants or referencing plant shapes. There are many ways to create a connection to nature in buildings like Lee Hall. In the often-cited publication *14 Patterns of Biophilic Design, Improving the Health and Well-Being in the Built Environment*, the authors organize 14 patterns into three categories: *Nature in Space*, *Nature of the Space*, and *Natural Analogues* (Browning W. a., 2014). Although the categories help explain the differences in the patterns, it's important to remember that in design, often one design detail might reference more than one of the biophilic patterns, and even if they are in different categories, they can be used together in a complementary way.

The principles of Biophilic design can be compared and integrated with existing guidelines recently developed for designing neurodivergent-friendly spaces (Logan, 2021). For example, the biophilic design principle that incorporates prospect and refuge can inspire calming spaces that ADHD students can retreat to when they are over stimulated by their environment. Prospect and refuge theory is rooted in early human existence and survival by hiding (refuge) but with a view out (prospect) (Browning W. A., 2014)(Figure 13b)



Left: Figure 13a. Medical-University-of-South-Carolina-Children's waiting area. Right: Figure 13b The Bird's Nest at Amazon Headquarters.

The Children's Hospital and Woman's Pavilion at MUSC designed by Perkin's and Will and MacMillan Pazdan Smith were designed to be cognizant of challenges in the built environment being faced by autistic users (Figure 13a). Special attention is paid to acoustics, scale, color, and materiality. The hospital is surrounded by a park, and there's a rooftop garden, so nature is close by. Using this example, landscape architects can apply similar strategies to create a more supportive and equitable learning environment for neurodivergent students at Lee Hall. Adding color is one adjustment that doesn't cost very much (Sargent,

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2021). On the most basic level, this can be simple, such as bringing potted plants into the space. This has already been proven as a method to improve educational outcomes in elementary-aged children (Han, 2009). Preferences for a more cohesive design can be expected from different demographic groups. (Hami, 2017). A temporary biophilic installation at Lee Hall could help gauge preferences and interest.

Recent work to build a toolkit or design framework that addresses neurodiversity in the built environment has been undertaken by The Ohio State University, Dublin City University, and private firms such as Sasaki for The University of Kentucky (Williams, 2021) (Mostafa, 2021) (U of Kentucky, 2022). These guides provide solutions not only for the design of campus interiors but the entire campus including transportation and connections with the surrounding communities. Some of these guides are focused on Autism but can be used more broadly to meet the needs of the entire neurodivergent population. However, no single solution can meet the needs of every individual. Despite that, what is significant about these guides is that they exist at all. Colleges and universities have only started to work on this issue in a meaningful way in the last several years.

SENSORY ISSUES ARE A RESULT OF...

- Overprocessing sensory input
- Underprocessing sensory input
- Sensory input is lost in transit (low registration)



Figure 14: A graphic demonstrating how sensory input is processed for someone who is ADHD.

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Figure 15: The stages of attention

Attention is critical in learning. People who are ADHD learn differently. They may have trouble with long term assignments that require sustained focus (Sarter, 2001). Attention Restoration Theory or ART is a theory that says people can regain focus by interacting with nature, even very briefly. (Kaplan, 1989). The application of this theory is useful in work or educational settings where the schedule doesn't allow enough time for sleep and the work needs to be completed. For people who are ADHD, attention is interest based. So, although they can be distracted by too much sensory stimuli in their environment, they can also lose focus and 'zone-out' when they don't have enough stimuli (Logan, 2021). Applying ART and biophilic design can help students who are ADHD refocus their attention (Peters & D'Penna, 2020). Biophilic design and ART are an important part of part of creating equitable learning environments which equates to universal design for neurodiversity. Dublin City University's *Autism-Friendly University Guide* reviews the 7 principles of Universal Design which are: equitable use, flexibility of use, simplicity or intuitiveness of use, easily perceptible information for use, low tolerance for error, low physical effort for use, and the right size and space for approach of use. These principles were developed in 1997 by a group of architects, designers, and engineers, including Richard Mace who was physically disabled. In 2012, The Center for Inclusive Design and Environmental Access at The University of Buffalo updated and expanded the definition of the principles of universal design to include the modern paradigm of social participation and health and wellness. They came up with eight goals of universal design which are body fit, comfort, awareness, understanding, wellness, social integration, personalization, and cultural appropriateness. The American Society of Landscape Architects (ASLA) has developed a "living resource" on their website to address Universal Design as a means to ensure the right for people of all abilities to access public spaces (Groen I. D., 2022)

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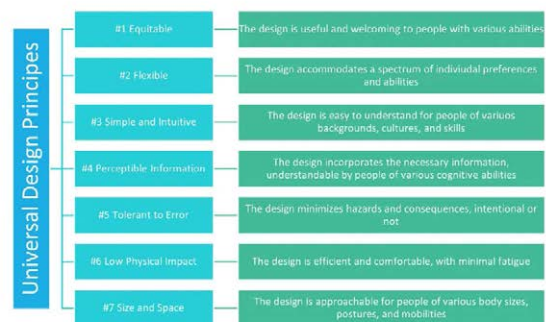


Figure 16: A graphic showing the seven Universal Design Principles and goals.

Even though sometimes a design for someone who is ADHD may not meet the needs of someone who is Autistic, the point is to try to consider the solution that can work for the most individuals possible. There is an expression for this: design for the most of us by designing for "the least of us." For landscape architects and other designers, this means thinking of more than just ADA ramps. Accessibility for neurodivergence means thinking of both the details of the design and the big picture. Natural materials, biophilic patterns, water sounds, and shade/light control, are details that can be used to design a quiet zone near the entrance of a park to help people with sensory integration disorders transition into the park at their own pace. The same materials or details may then be repeated deeper into the park where the space opens up. The quiet zone is a node that helps make the park more accessible. It can be used and enjoyed by anyone visiting the park. Most people would not know that the designer included the space to consider the needs of neurodivergent people because it's integrated into the overall design.

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Figure 17a: and 17b: Left, Tongva Park in Santa Monica, California designed by James Corner, Field Operations Uses the element of biophilic prospect and refuge to meet universal design goals. Left: A covered overlook is accessible by ramp. Right: an area of the enclosure allows visitors to pause before transitioning into the open area beyond it

Intellectual Merit:

This research is important because it although the learning environment and neurocognitive learning disability has been examined in the context of elementary education there is less research on this topic in higher education. With the expected increase of ADHD students entering college and universities in the coming years, it would be prudent for campuses to rethink how the built environment can affect the learning outcomes of its students (Horowitz, 2017). Preparing now means understanding how ADHD students perceive the built environment, and how they react to it on a sensorial level. The more diverse the student population is, the better it is for everyone. A built environment that is supportive and inclusive, leads to higher student success which is in the best interest of higher education institutions. In the future, all campus buildings might be designed and constructed with neurological differences in mind. This can also be applied in cities in the form of building codes that guarantee equitable access for users across the spectrum of neurological diversity, much the way the ADA guarantees access for users across a spectrum of physical abilities. A rating system similar to LEED could also be used which would encourage designs to go beyond the minimum code requirements. (Van Alen Institute, 2019)

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Plan of Work:

To complete the research, on site observations will examine two things: the building and the occupants of the building. The building will be observed as a multi-sensory learning environment. An inventory of sensorial elements will include sounds, light, color, materiality, and texture of surfaces, spacing, scale and dimensionality and proximity of usage area. These will be categorized according to the principles of biophilia and universal design. (Figure 16). Observations of the occupants will include their behaviors, experiences, and perceptions of the building.

Site Observation of Lee Hall Building

Visual inventory:

On Monday, Wednesday and Friday afternoons between 1:30 and 5:30, Lee Hall 3 holds studio classes in architecture and landscape architecture. On these days the building reaches high capacity. On Tuesdays and Thursdays there are very few classes and fewer people in the building. I will plan to observe on one peak day and one off-peak day and record what I observe in a notebook. These observations will help me to understand how the building is being used. A notebook will be used to record visual data. Items will coded on a scale of 1-10 and categorized as follows:

The 7 Goals of Universal Design

1. Equitable
2. Flexibility of use
3. Simple and intuitive
4. Perceptible Information
5. Tolerant to error
6. Low physical impact
7. Size and space

And

The 14 principles of Biophilic Design

1. Visual Connection to Nature
2. Non-Visual Connection to Nature
3. Non Rhythmic Sensory Stimuli
4. Thermal Air Flow Variability
5. Presence of Water
6. Dynamic & Diffuse Light
7. Connection With Natural Systems

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Research Methods:

The purpose of this research is to determine how Lee Hall is being used and if students' experiences at Lee Hall are facilitating their learning or hindering it. Looking especially (Van Alen Institute, 2019) at how the environment inside the building and the surrounding complex is impacting ADHD students may reveal ways that landscape architecture interventions or retrofits can act as part of a system of supports for ADHD students. Designers, Architects and Planners may wish to understand how to create environments for ADHD students in higher education who have specific sensitivities to sensory inputs. Further, when designing for these sensitivities, they can build an environment that creates more inclusive spaces, leading to a better experience for all students. This research work at Lee Hall hopes to suggest that all college campuses can very simply alter their learning environments in a significant way to improve learning outcomes. It also asks colleges and universities to think critically about their entire campus through the lens of inclusivity, so that they can be prepared for the increasing number of students with ADHD as well as students with other neurological learning disabilities who wish to pursue their educational dreams. Three subject areas of this research are biophilic design, attention restoration theory, and universal design.

General Process:

Step one"

Collect data related to the way people are interacting with the built environment at Lee Hall.

Step two:

Analyze and synthesize the data looking for commonalities and differences to answer these questions:

- Who are the users/occupants of Lee Hall?
- How many users are ADHD or otherwise neurodivergent?
- How do they use the space?
- What is their preferred learning environment?
- Is Lee Hall providing a learning environment that its users prefer?
- If not, where is Lee Hall falling short as a learning environment?

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8. Biomorphic Forms & Patterns
9. Material Connection With Nature
10. Complexity & Order
11. Prospect
12. Refuge
13. Mystery
14. Risk/Peril

Special equipment for auditory inventory:

What is the level of sound, in decibels during different times and in different areas of the building? What types of sounds are heard? (soft, loud, pleasant, unpleasant, musical, non-audible; vibration only) What frequency (high/low) are the sounds? Audio volume will be measured using a decibel meter. This tool is an app accessed via the Apple App Store available for iPhone (Figure 20).



Figure 20: Screen shots of decibel meter application "Decibel X". The application allows the user to record audio data. The application can record sounds and calculate an average over a specified duration of time. The user can also take photos of the location while measuring sound. The app overlays location name, date and decimal readings on the screen This can be captured using the screenshot function of the smartphone. This app is free to download and many of the functions are free to use. Some premium applications require a subscription and 4.99 USD per month.

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Site observation of Lee Hall Occupants:

I will observe human interactions in the built environment to determine how occupants are using the building, such as which entrance is used most frequently and how the pedestrian circulation flows. From a quantitative perspective, I will count how many workspaces there are available in relation to how many are occupied. I will make note of how many occupants are wearing noise cancelling headphones or earbuds. Will make a note of modifications that have been made by occupants to their work areas.

Survey:

An online survey made using Google forms will be made available to all occupants of the building. Survey questions that ask about user experiences, current attitudes, and perceptions at Lee Hall. Demographic information about survey takers will be gathered as part of the survey. The survey will be emailed to students, faculty, administrators, staff and other occupants of Lee Hall using *Listserve* mailing lists. There will be an initial email followed up by a reminder email. The survey will also be mentioned on social media. The survey will remain open for a period of two weeks to allow for more participation. A printed flyer will be posted at various locations in Lee Hall announcing the research project and encouraging participation in the survey. This flyer will include a QR code that when scanned with a smartphone quickly links to the survey.

Charette:

Occupants will also be asked if they would like to participate in a mini-charette. This will be mentioned on the flyer and in emails sent. Survey takers will be asked if they would like to participate in the mini charette at the end of the online survey. Sign-up will be via google forms. The purpose of the mini-charette is to engage in further discussion about the questions asked in the survey using a map and floor plan of Lee Hall as a visual cue. As an alternative to a written survey, the use of this format may engage occupants who do not want to take a survey but still have insights they want to share. Using a map, they may elaborate on specific areas of the building. This charette will take 20-30 minutes and will take place in Lee Hall either in a conference room or in the kitchen area. Small red, green and yellow stickers colored stickers will be provided for participants to apply to the maps and floor points to indicate areas where they experience the highest and lowest satisfaction. Post it notes can be used to elaborate on why they chose these areas. The post-it notes will be hung next to the map and serve to facilitate further discussion. Blank note cards and a slotted box will allow participants to write additional comments and suggestions that they don't want to share with the group. The box will be opaque and locked to preserve anonymity.

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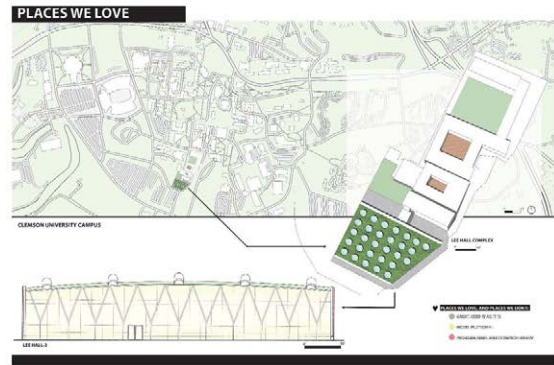


Figure 22: This charette method was piloted in October 2022 with eight students and one faculty member. (figure111) Pilot participants were asked to place a sticker on their "sacred" places across campus and specifically at Lee Hall.

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Figure 23a: Red, yellow and green stickers were used in a pilot charette which included Lee Hall and surrounding campus at Clemson University.

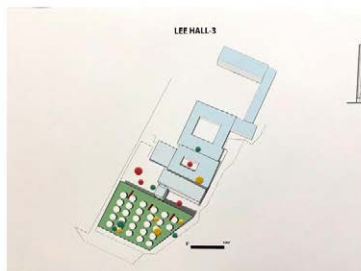


Figure 23b: Detail view. Green stickers were positive (keep as it is) Yellow stickers represent neutral feelings about a space. Red designated a space that was associated with either negative experiences and memories or was uncomfortable for the user and had something about it that they would change or improve.

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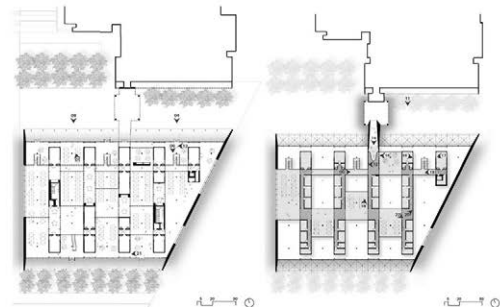


Figure 24: Floor plan of Lee Hall-3 to be used at charette. Seen on the left, first floor and courtyards, on right, 2nd floor and walkover to Lee-2.

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Expert Interviews:

Interviews with multiple stakeholders and experts in the research areas were conducted.

Scott Sworts:

Oxford Brookes University, United Kingdom

Topic: Supports for neurodiverse students in Design Education, specifically architecture.

John Lopes, Clemson University

Associate Provost and Dean of the Graduate School

Topic: Inclusive Excellence at Clemson University, faculty incentives.

General Conditions

Research will be conducted at Clemson University School of Architecture, Lee Hall Complex, 323 Fernow Street, Clemson, South Carolina. The data collection will take place over a period of two weeks as follows:

The on-site observations will take place on two separate days. One day will be a studio day and one will be a non-studio day. The duration of observation on both days will be four hours, from 1:30 pm to 5:30 pm. This is a total of 8 hours of observation. The observation will be held on sunny, good weather days. The survey will be open for a period of two weeks. Charettes will take place in the second week and will be scheduled between 12:00 and 1:00 pm to allow occupants to attend during their lunch break. Charettes will take 15-30 minutes each and 2-4 will be held, depending on interest. Charettes will be limited to six people at a time due to space limitations.

Expected Expenses:

Expenses for this research are expected to be relatively low. The location is easily accessible since this is where I attend classes. Since I am already commuting to the building, there are no additional transportation costs. Expenses are for printed material, and miscellaneous office supplies and are estimated to be less than one hundred US dollars.

Quantity	Item	cost	Total
1	package of color stickers	9	9
1	post-it notes	6	6
1	package 3x5 cards	3	3
1	slotted box	12	12
3	24x36 prints	6	18
100	color prints	0.2	20
			68

Figure 35: Chart of estimated costs of the study.

Greetings,

Over the past several years, Clemson University has been “undergoing a process whereby every college, division, university commission, as well as Faculty and Staff Senates are developing, implementing, and assessing strategic plans focused on diversity, equity, and inclusion.”* This process includes many priorities, among them is having more inclusive and equitable facilities. I am researching conditions at Lee Hall Complex to see how well they are aligned with the current goal of inclusive excellence.

The built environment can play a large role in the learning outcomes of individual students. I am researching ways that architects, landscape architects, and planners can create more equitable & inclusive college campuses by designing for students who have learning disabilities, specifically attention deficit hyperactivity disorder (ADHD). ADHD is a neurological disorder that affects behavior, thought processes, and learning. It is one of several learning disabilities that can prevent students from being able to pursue their educational dreams.

Please share your experiences at Lee Hall by completing the attached survey. You do not have to be ADHD to complete the survey. All responses are welcome. Your input is important and may be used to help develop and prioritize the implementation of strategies to create a more inclusive and equitable learning environment for everyone.

The following series of questions will take 15-20 minutes to complete. If you choose to participate, your answers will be anonymous, and your personal information will not be shared in any way.

If you have questions about the study, please contact me or Professor Haka Nassar using one of the methods below. Thank you in advance for your response.

Sincerely,
April Riehm
Landscape Architecture Graduate Student



Clemson University, School of Architecture
Professor Haka Nassar, PhD Clemson University School of Architecture
Lee Hall-3, 323 Fernow Street, Clemson SC 29631

Call/text 321-277-2759

*Please indicate that you understand and consent to participation in this research.

(User checks box to proceed to survey.)

Survey design:

Expected Results:

Expected results of building inventory (quantitative):

I expect an analysis of the building inventory when categorized and coded using a scale of how well it is meeting the principles of universal design to do poor to average. This is based on my previous experiences as a student attending studios, and seminars at Lee Hall and my personal bias. I will remain as impartial as possible and rate with impartiality, but I do understand my bias may affect the validity of my data. If this becomes an issue, I can increase my budget to hire a member of my cohort to assist in gathering data.

Expected results of occupant observation, surveys and charettes (qualitative):

Recognizing that the diversity of the occupants of Lee Hall reflects the diversity of the general population, I expect there to be a wide range of preferences based on individual perspectives, behaviors and experiences. I am offering a variety of ways for occupants to participate in this research because people have different preferences in the ways they share information. By collecting data in different ways, I hope to reach not only more people but a larger variety of people. This should help me form a more complete picture of the entire population at The School of Architecture. From the data, I hope to see some similarities or hot spots in their responses that indicate positives and negatives in the learning environment. I believe participants will deliver honest answers and have useful input and suggestions that may improve the learning experience for everyone at Lee Hall. Although I am specifically interested in how the building can act as a support for ADHD students, the survey and charettes are available for everyone to participate in. Occupant observation will be of all occupants present on the day of site observation. ADHD is an “invisible” disability,” and I will not know whether the people I am observing are ADHD, have other learning disabilities or are neurotypical. Survey takers will have an option to anonymously disclose their diagnosis, but I do not expect everyone to choose to do so. Therefore, I only know theoretically that that about 100 of the potential participants may be ADHD. However, many people who are neurotypical have sensory responses that are shared with neurodivergent people. The sound of nails on a chalkboard is an example of a sound that almost universally elicits a negative response. This leads me to believe that answers and input received from all occupants will be helpful for ADHD students when analyzing Lee Hall. Conversely, input from ADHD students may offer insight into ways that Lee Hall can be retrofitted with landscape architecture interventions in a way that would benefit not just ADHD users but everyone across a wide spectrum of neurological diversity

Letter to precede survey and to be given to charette participants:

Link to survey on Google:

https://docs.google.com/forms/d/e/1FAIpQLSeY4mJdPGEzui80UL8cXqtoGh6HCb7NK7HYuHgeb7Tp9EWutQ/viewform?usp=sf_link

The survey questions will be divided into sections as follows:

Section One

These questions pertain to how you use and experience Lee Hall:

- How many hours do you attend classes at Lee Hall Complex?
- How many hours do you attend classes at Lee-3?
- How many hours outside of class time do you spend at Lee3?
- Where do you spend the most time while at Lee Complex
 - Personal workstation/desk
 - Shared workspace
 - Kitchen or dining area
 - Plotter/ scanner room
 - Laser cutter room
 - Woodshop
 - Private office
 - Conference room
 - L.ARC graduate student space: G4
 - L.ARC undergraduate space G-8
 - The Wedge
 - Gunnin Library
 - Auditorium
 - Other
- Do you prefer to work at Lee Hall or somewhere else?
- Please indicate which floor your primary workspace is located:
 - First floor Lee-3
 - Second Floor Lee-3
 - Lee Hall 2
 - Lee Hall 3
 - Other

Section Two: Sensorial input and Learning

The following questions relate to the senses; Sight, sound, touch, Smell, and kinesthesia (the sense of movement):

1. Do you have a workspace that is:
 - a. Too bright
 - b. Too dim
 - c. Just right
2. Do you have a workspace that is
 - a. Too quiet
 - b. Too noisy
 - c. Just right
3. Do you have a workspace that is
 - a. Too large
 - b. Too small
 - c. Just right
4. Does the furniture at your workspace feel
 - a. Too hard
 - b. Too soft
 - c. Just right
5. Are the smells at your workspace
 - a. Pleasant
 - b. Unpleasant
 - c. Other
6. While working do you: (check all that apply)
 - a. Sit
 - b. Stand
 - c. Move around
7. Do you have a learning disability? (Can be diagnosed or undiagnosed)
 - i. Yes
 - ii. No (If no, skip to part 2b)
 - iii. Prefer not to answer
8. Is your learning disability diagnosed by a medical doctor?
 - iv. Yes
 - v. No
 - vi. Prefer not to answer
 - vii. Does not apply

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2. Do you receive academic accommodations for your disability?
 - i. Yes
 - ii. No
 - iii. Prefer not to answer
 - iv. Does not apply

3. Do you feel the accommodations help you to succeed academically?
 - i. Yes
 - ii. No
 - iii. It depends on the class/professor

4. Are you registered with the Clemson Accessibility Office?
 - i. Y/N
 - ii. Does not apply

5. Please indicate which learning disability you are diagnosed with:

(Check all that apply)

- a. Attention Deficit Hyperactivity Disorder (ADHD)
- b. Deaf/Hard of Hearing
- c. Learning Disability (LD)
- d. Medical Disability
- e. Mobility Impairment
- f. Psychological Disability
- g. Autism Spectrum Disorder
- h. Traumatic Brain Injury
- i. Visual Impairment/ Blind
- j. Other Diagnosis (Fill in the blank)

Section 2b Sensory integration:

When working at Lee Hall:

1. Do you work best when it is
 - i. Quiet
 - ii. Noisy
 - iii. Somewhere in between

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2. Do you work best when the room is
 - i. Bright
 - ii. Dark
 - iii. Somewhere in between
3. Do you work noise cancelling headphones or earbuds at Lee Hall
 - i. Sometimes
 - ii. Always
 - iii. Never
4. Do you work noise cancelling headphones or earbuds during studio
 - i. Sometimes
 - ii. Always
 - iii. Never
6. Please indicate from the list below which of these causes or has caused you to stop working or adjust the way you work:
 - i. Noise (volume)
 - ii. Noise (low or high pitch sounds)
 - iii. Noise (sudden, unexpected noises)
 - iv. Bright light/other lighting changes
 - v. Sitting still for long periods of time
 - vi. Uncomfortable seating
 - vii. Someone speaking to you
 - viii. The activity of others around
 - ix. Activity seen through windows
 - x. Loss of focus due to low/no interest in the work
 - xi. Hungry/tired
 - xii. Unable to concentrate
 - xiii. Mental distress such as anxiety or depression
7. If you have stopped working due to any of the above, how long does it take you to start working productively again?
 - i. I can re-start immediately
 - ii. It takes me a few minutes to start working again
 - iii. I can start working for more than 5 minutes of stopping.
 - iv. I need to take a break and then I can start again.
 - v. I'm done for the day

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8. If you have trouble restarting work after stopping what strategies do you use:
 - i. Stretch or take a walk around the building
 - ii. Go outside
 - iii. Have a snack or get something to drink
 - iv. Listen to music
 - v. Switch to another project
 - vi. Find a quiet space to work at Lee Hall
 - vii. Find another place to work on campus
 - viii. Go to the gym
 - ix. Work at home
 - x. Other
9. Additional comments; Please feel free to provide relevant input.

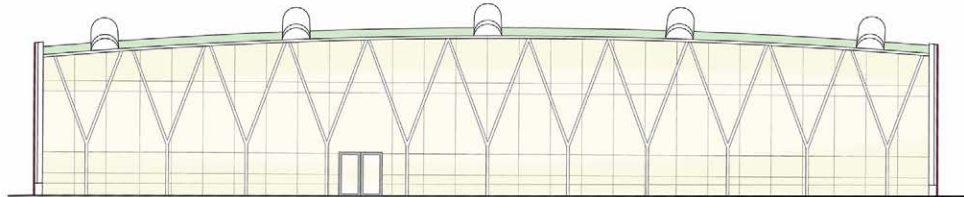
Section Three: User information/ demographics"

1. Are you a student, faculty, staff or visitor at Lee Hall?
2. What is your gender?
3. What is your age?
4. What is your current class rank?
5. What is the highest degree/level of education you have received?
6. Do you live on campus or off campus?
7. How long is your commute to Lee Hall?

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DESIGNING A BUILT ENVIRONMENT TO SUPPORT **ADHD** **LEARNERS** IN HIGHER EDUCATION



An examination of Lee Hall, Clemson University for potential biophilic retrofits, kinesthetic sensory integration, and attention restoration theory applications in the pursuit of inclusive excellence.

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ABSTRACT

INTRODUCTION

- Terminology
- Universal Design and The ADA
- Neurodiversity in the context of equity and inclusion
- Neurodivergence and learning disabilities
- ADHD students in higher education
- Gaps in the system of academic supports
- Lee Hall Complex background

LITERATURE REVIEW

- Biophilia
- Attention Restoration Theory
- Kinesthesia

INTELLECTUAL MERIT

GENERAL CONDITIONS

- Lee Hall history and current features
- Type of research anticipated
- Logistics and cost
- Limitations

RESEARCH DESIGN

- Does Lee Hall support ADHD learners in an inclusive and equitable way?
- Can the following be applied as landscape architecture interventions?
- Attention Restoration Theory, Kinesthesia, and Biophilia

RESEARCH METHODS:

- Site Observation
- Biophilic inventory
- Sensory inventory
 - Auditory
 - Visual
 - Olfactory
 - Kinesthesia (movement)
- Expert Interview
- Online Survey
- Charette with interactive mapping

PLAN OF WORK

EXPECTED RESULTS/ CONCLUSION

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LIST OF FIGURES
BIBLIOGRAPHY

INTRODUCTION

1 IN 4 PEOPLE IN THE UNITED STATES LIVES WITH A DISABILITY.

The CDC divides disabilities into 6 types:

- Mobility
- Cognition
- Hearing
- Vision
- Independent Living
- Self Care

At some point in everyone's life, they will be disabled, either temporarily or permanently.

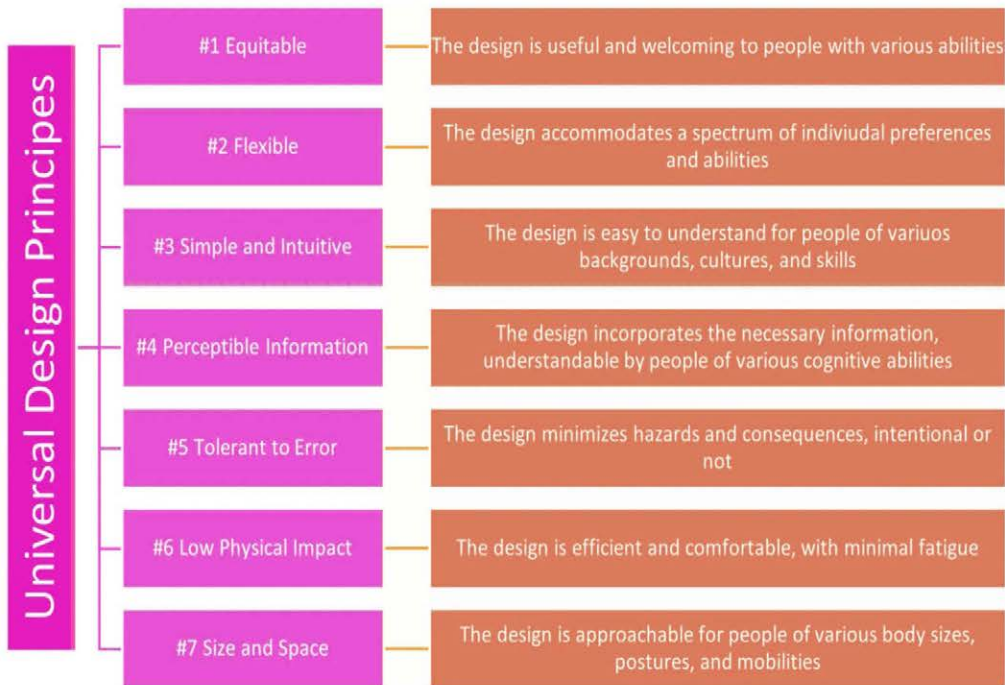
EQUITY AND INCLUSION THROUGH DESIGN

The ADA:

- A Civil Rights Law passed in 1990
- Prevents discrimination due to disability
- Specifies slopes, wheelchair ramps, other dimensional requirements for mobility access
- Also dictates access for hearing and sight impairments

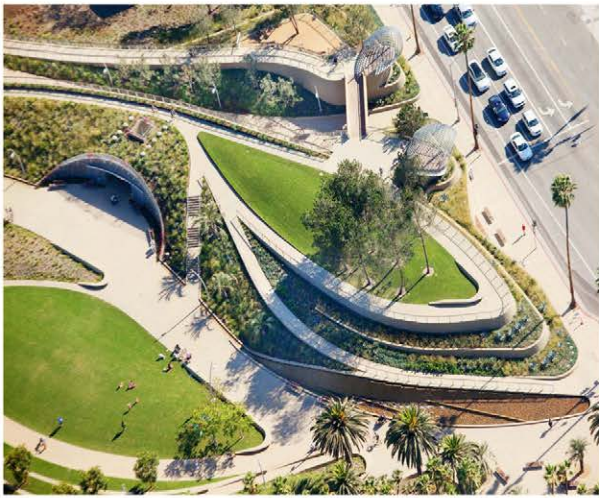
Universal Design:

- Set of principles that evolved out of the disability rights movement in the 1970s
- Design for everyone by designing for 'the least of us.'
- Applies to the built environment and as well as consumer products.



Ron L. Mace FAIA, Architect, product designer and educator, advocate for universal design.





Tongva Park, Santa Monica, CA
James Corner, Field Operations



Robson Park Stairs, Vancouver, Canada
Architect Jim Cheng

DESIGNING FOR INVISIBLE DISABILITIES

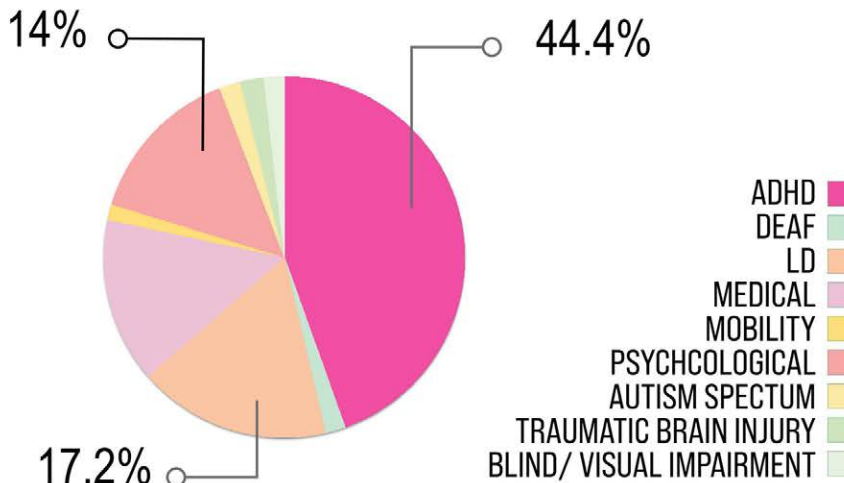
NEURO-COGNITIVE DIAGNOSES:

- MENTAL HEALTH DISORDERS
- COGNITIVE DECLINE (IE., DEMENTIA AND ALZHEIMERS)
- TRAUMATIC BRAIN INJURY
- PTSD

LEARNING DISABILITIES

- DYSLEXIA
- AUTISM SPECTRUM DISORDER (ASD)
- DYSPRAXIA AND DYSCALCULA
- ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

CLEMSON ACCESSABILITY SERVICES STUDENT DATA



THE LARGEST GROUP OF STUDENTS RECEIVING ACCESSIBILITY SERVICES AT CLEMSON UNIVERSITY ARE ADHD.

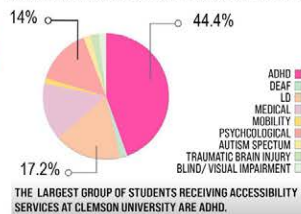
1210 students
(2016)

*Most recent data is from 2016



COLLEGE & UNIVERSITY STUDENTS WITH ADHD

CLEMSON ACCESSABILITY SERVICES STUDENT DATA



THE LARGEST GROUP OF STUDENTS RECEIVING ACCESSIBILITY SERVICES AT CLEMSON UNIVERSITY ARE ADHD.



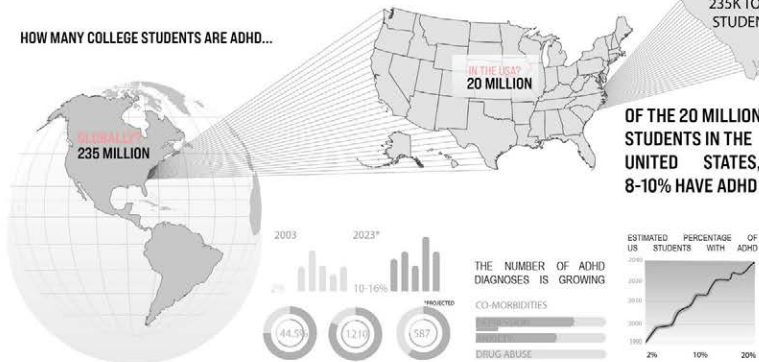
COLLEGE OF ARCHITECTURE, ARTS AND HUMANITIES

CLEMSON UNIVERSITY

- 23,000 STUDENTS ENROLLED
- 1210 STUDENTS ARE REGISTERED FOR DISABILITY SERVICES
- 537 OF REGISTERED STUDENTS HAVE ADHD

AT CLEMSON UNIVERSITY?
23,000 STUDENTS

HOW MANY COLLEGE STUDENTS ARE ADHD...



GLOBAL 16%
OF ALL COLLEGE STUDENTS ARE ADHD

BUT ONLY 2%
OF THE CLEMSON STUDENT BODY REGISTERED FOR ADHD ACCESSIBILITY SERVICES.
THIS LEAVES 3100 STUDENTS WHO MAY HAVE QUALIFIED, WITHOUT SCHOOL PROVIDED SUPPORTS.

**ACCORDING TO A 2021 STUDY BY THE WORLD HEALTH ORGANIZATION, IT'S ESTIMATED THAT 16% OF COLLEGE STUDENTS HAVE ADHD GLOBALLY.

*CLEMSON DATA IS FROM 2016

CHALLENGES IN THE BUILT ENVIRONMENT FOR ADHD LEARNERS



BRIGHT LIGHTS, CLUTTER, OFFENSIVE COLORS



NOISE, ESPECIALLY CERTAIN FREQUENCIES



STRONG ODORS, FOOD SMELLS



SITTING STILL FOR LONG PERIODS OF TIME



DESIGNING FOR SENSORY INTEGRATION

SENSORY ISSUES ARE A RESULT OF...

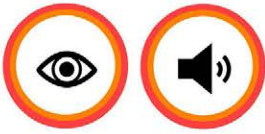
- Overprocessing sensory input
- Underprocessing sensory input
- Sensory input is lost in transit (low registration)



ADHD LEARNERS ARE INTEREST-BASED LEARNERS

ADHD LEARNERS ARE SENSITIVE TO EXTERNAL SENSORY INPUTS WHICH DISTRACT FROM LEARNING

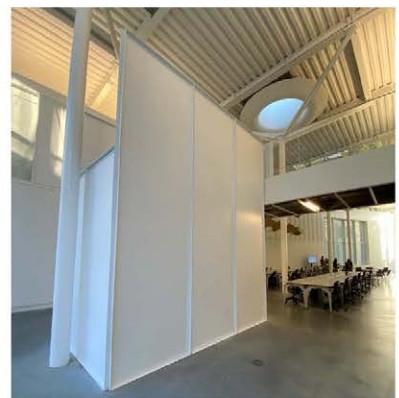
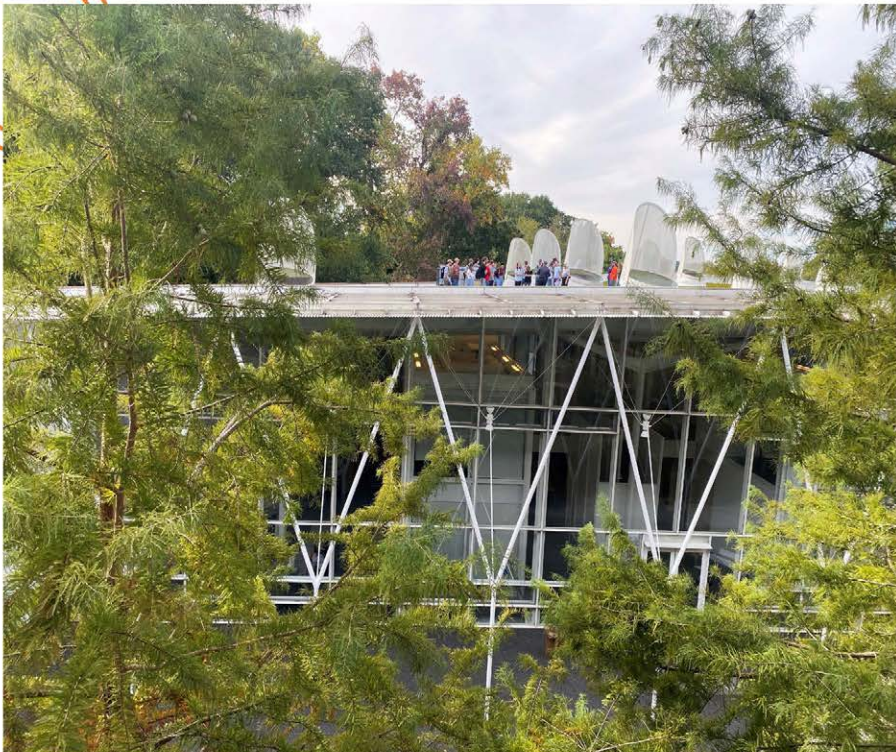
ADHD LEARNERS BENEFIT FROM AN ENVIRONMENT THAT CAN PROVIDE BOTH CALMING AND STIMULATING SPACES WHERE MOVEMENT IS ENCOURAGED.



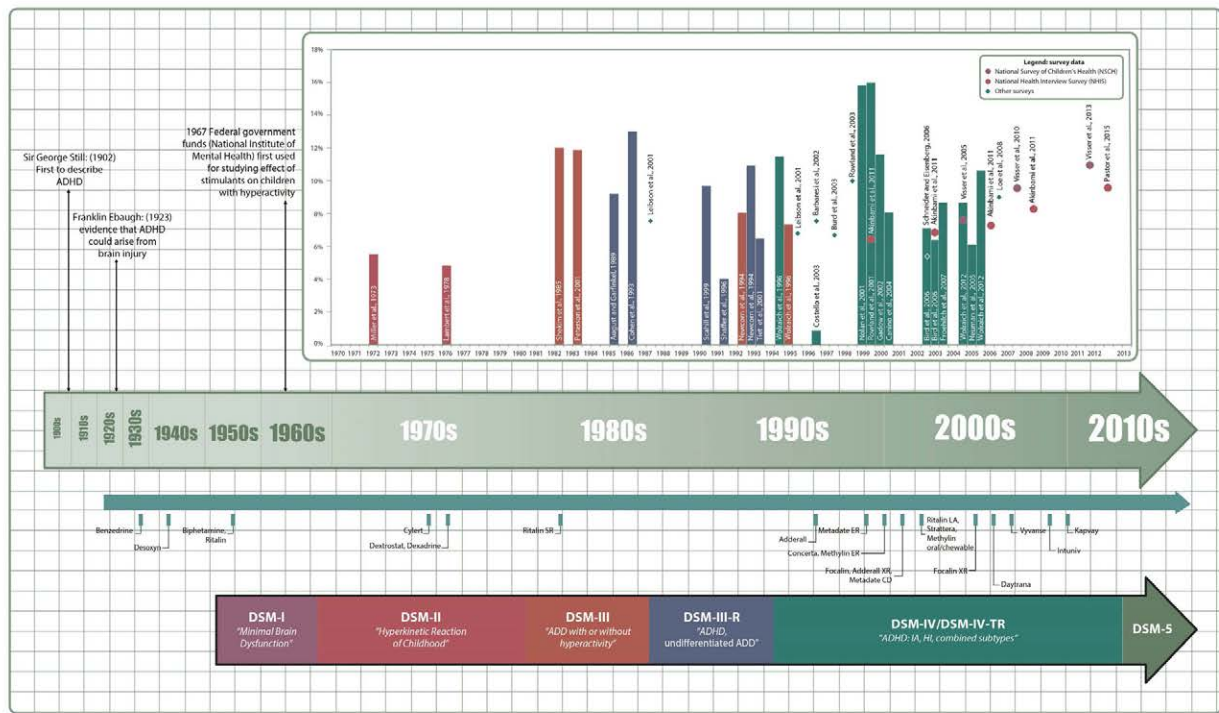
CLEMSON UNIVERSITY STUDIO CLASSES: LANDSCAPE ARCHITECTURE ART, AND ARCHITECTURE

LEE HALL-3

- BRIGHT
- NOISY
- CONSTANT ACTIVITY
- NOT HUMAN SCALE



INTELLECTUAL MERIT



BIOPHILIA:
AN INTRINSIC HUMAN INSTINCT TO BE CONNECTED TO NATURE



KINESTHESIA:
RELATES TO THE SENSE OF BODY AWARENESS AND MOVEMENT



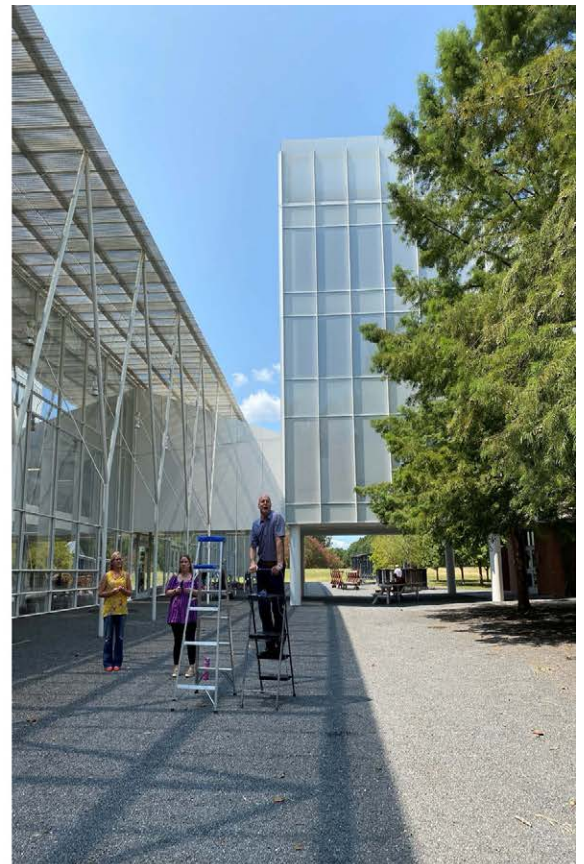
OUTDOOR PLAY & RESTORATIVE NATURE:
A CHANCE TO REFOCUS WHEN LEARNING IS STUCK

EXAMPLES OF BIOPHILIC DESIGN



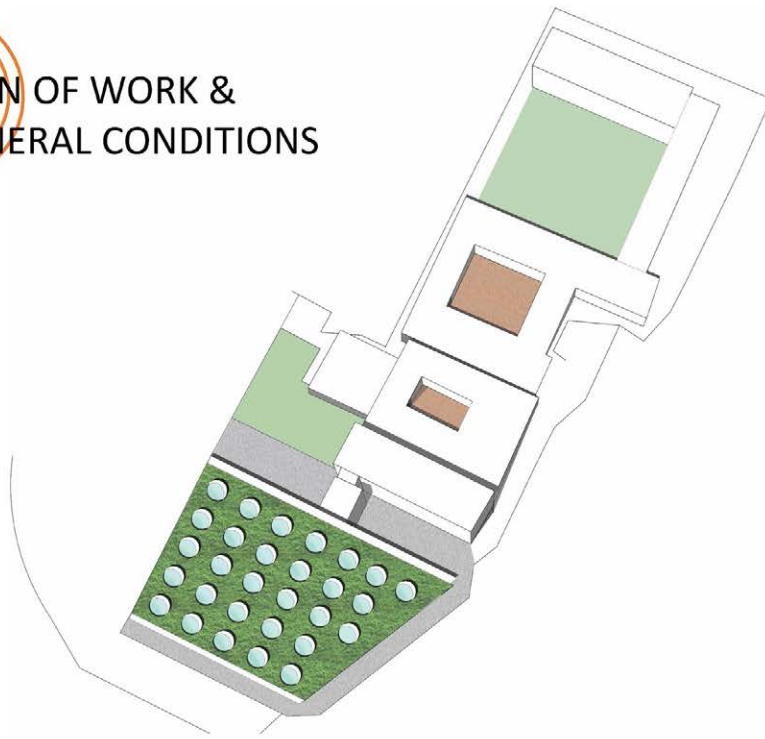
RESEARCH DESIGN:

1. SITE OBSERVATION:
 - CIRCULATION AND USE
 - BIOPHILIC INVENTORY
 - SENSORY INPUT CATALOGING:
 - AUDITORY (DECIBEL METER)
 - VISUAL
 - OLFACTORY
 - KINESTHESIA(MOVEMENT)
2. EXPERT INTERVIEW
3. ONLINE SURVEY
4. CHARETTE WITH INTERACTIVE MAPPING





PLAN OF WORK & GENERAL CONDITIONS



EXPECTED RESULTS/ CONCLUSION



Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

By: Steve Kurtz

December 6, 2021

LARC 8210 Research Methods

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

2018). Across the eastern coast of the United States, we are seeing similar results. Few studies have been conducted showing the impacts that green roofs can have on migratory species. The collection of these results shows promising data on the biodiversity that can be introduced within urban areas (Eakin 2015).

Investigating these green infrastructures that are already in existence could lead to further studies that could aid in bird migration and urban biodiversity (Canero 2010). Understanding the ecosystem within urban areas could incentivize local businesses to take part in the effort to increase biodiversity within urban environments.

This research looks to investigate the effects of green roof design facilitating migratory patterns in order to improve bird biodiversity in urban areas. Specifically, this research examines the willingness of residents and owners of green roof buildings to participate in green roof implantation or modifications.

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Steve Kurtz

Professor Nassar

Research Proposal

Fall 2021

Atlantic Flyway Migration:

Willingness for urban green roof design implementation in the City of Atlanta

Abstract

Green roofs present an opportunity to create a viable habitat for various bird species. This could be beneficial for endangered bird species and urban biodiversity. The Atlantic Flyway sees over 500 bird species migrate through every year. Recently, literature has shown the fragmentation that has been occurring due to urbanization along the flyway. This has led to various issues within our urban environments, most notably, species homogenization. This causes a weakening in ecosystems and could have some serious consequences. This study looks to investigate various aspects of green roof designs that could facilitate migratory patterns along the Atlantic Flyway. This research will then lead to surveys that will be conducted across six companies in Atlanta, Georgia. These buildings have green roofs that have potential in aiding and creating suitable habitats for migratory birds. Research highlights the importance of this investigation, bringing benefits for the urban ecology, but also the regional benefits that can occur. The survey will research the willingness for these companies to participate in creating or redesigning their green roofs.

Key Words: bird migration, urban biodiversity, bird conservation, green roofs, urban ecology.

Introduction

Migratory bird flyways exist through various corridors around the world (Tietze 2018). These system have been divided by urban areas (Hilty, Keesley, Lidicker Jr., and Merenlender 2019). There exists an opportunity to restore original migratory bird routes and endangered species through the examination of green roof location and design in urban settings (Bronnstein 2004).

Urban areas have fragmented many of the natural migratory corridors that existed before urbanization (Hilty, Keesley, Lidicker Jr., and Merenlender 2019). The direct impacts of this fragmentation have led to various consequences. Fragmentation can be a natural process, although natural and human induced fragmentation vary significantly. Human induced fragmentation is far more accelerated than naturally occurring fragmentation. This acceleration has changed the structure and habitat of countless bird species (Hilty, Keesley, Lidicker Jr., and Merenlender 2019).

Green roof designs have shown positive consequences when implemented throughout urban areas (ASLA Green Roof, 2021). Many cities across Singapore have quantifiable evidence of environmental benefits that are directly related to their green roof designs. Singapore has maintained a high level of avian biodiversity through their green roof design. They have created suitable habitats through their green roof design and have identified 36 bird species, that are identified to be on the International Union for Conservation of Nature (IUCN) global Red List for threatened birds, within these green roofs (Tietze

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Literature Review

Green Roofs

Green roof implementation has become highly incentivized through government mandates and has been seen by the public as a wonderful effort to create a rich environment in urban areas. These assumptions have largely proven benefits. As green roofs continue to be implemented other benefits have been highlighted. They are beginning to have a positive impact with bird migration patterns along flyways. For this study, highlighting benefits of green roofs builds the argument for further implementation and innovation of green roofs, and moving towards new research showing potential in stepstone migratory connectivity in green roofs within urban areas.

The leading incentive for urban green roofs is the benefits against heat island effect. Heat island effect is a measured issue that has been occurring in large cities throughout the world. This phenomenon has caused temperatures throughout cities to spike and increase levels of pollution in our atmosphere. This heat traps various gases and volatile organic compounds (VOCs) that then react with sunlight to create what is known as smog (Figure 1). Green roofs have proven to help increase albedo and reduce surface temperatures (Pong and Jim 2013). Research indicates that 50-60% of rooftops within densely populated areas could decrease summer temperatures by as much as 10 degrees Fahrenheit (Luckett 2009). This has been the leading incentive for green roof implementation. Typically, in design, this is the argument presented for green roof designs and budgeting within urban areas.

Another incentive to green roofs is increase in air quality. This claim is true, but not in the way many may assume. Research shows that oxygen is produced by sunlight-driven photosynthesis is water, not carbon dioxide (Luckett 2009). Typically, due to weight concerns, green roofs look to use minimal amounts of water and therefore the production of oxygen is limited. This loosely disproves another leading argument for green roof implantation.

The final popular use for green roofs is storm water management. Green roofs have been proven to be very effective in storm water management practices. Research conducted at Southern Illinois University, Edwardsville concluded that a green roof with 4 inches of growth media can retain over 50% of annual rainfall in relation to surface area and conventional roofing methods. Live measurements can be found on the ASLA website. The ASLA has created a green roof with live monitoring to see real time results and benefits of green roof design. This research enforces the use of green roof in urban areas and is a pillar of urban sustainable design (Figure 2).

In recent studies, a new benefit has been noticed. As green roof implementation increases, more birds have been migrating through cities. Historically, bird species have seen major shifts as urbanization rapidly occurred throughout the migratory flyways. A new field has risen in recent years focusing on ecological resilience. This is defined as the capacity of a system to withstand changes to the processes that control its structures (Holling and Gunderson 2002). Disturbing ecosystems can reduce resilience and cause weakening in ecosystem's capacity to sustain basic necessities to the wildlife (Hilty, Lidicker, and Merenlender 2019). Urbanization has led countless flyways to be fragmented for various migratory species. This pressure on the ecosystem has led to various negative effects on bird species.

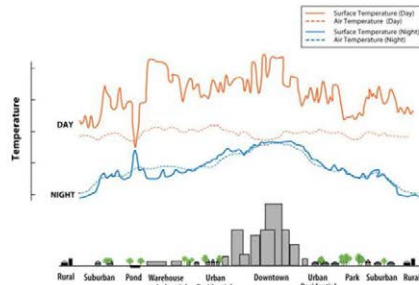


Figure 1 Illustration of temperature increase between the various urban zones due to Heat Island Effect. (Image from EPA)



Figure 2 Image of the ASLA green roof with live data results posted on the ASLA website. (Image from ASLA)

Today, urbanization can be considered one of the biggest threats to wildlife. Habitat loss and fragmentation have had substantial impacts on bird species. Bird species can be categorized between three groups: Avoiders, adapters, and exploiters (Tryanowski, Morelli, and Moller 2020).

There have been countless species that have adapted to living in very close proximities to humans. A few examples would be pigeons or crows. These species are notable for their high rate of adaptability and high risk-taking characteristics. They also tend to exploit the human interaction for forage. Evidence can be found within many cities as these birds are seen roaming plazas and open spaces. This has led to issues within the ecology of birds within urban areas. Homogenization of urban areas has led to a decline in the overall health of urban ecosystems. As these birds learn to adapt while others have avoided these areas, it leaves an imbalance in diversity of species in urban areas.

A corridor is any space that facilitates connectivity over time among habitat patches (Hilty, Lidicker, and Merenlender 2019). Specific corridors are used by migratory birds. These corridors are known as Seasonal Migration Corridors. Fragmentation is a cause of breaking these corridors. There are two variations of this. They are natural and human-induced fragmentation. There are three primary differences between the two. The first is the speed and pattern of change. Typically, human induced fragmentation is much faster. Examples include the rapid building of cities within the Atlantic flyway. The second would be the scale of the change. Naturally, many changes are localized. Human induced fragmentation happens at a much larger scale, as one can imagine the footprint of many structures within a city. The final is the ability of the resulting fragments to recover from the changes. This is usually the measure of an ecosystem's resiliency (Hilty, Lidicker, and Merenlender 2019). As fragmentation continues, there are notable negative effects on migratory patterns. Migration patterns have become longer, and more strenuous for some species of birds. As green roof implementation increase, viable environments are being created within urban areas for these migratory birds. Birds making this long journey use these green roofs as a point to rest and feed. Data can be seen through European green roofs, as they provide environments for migratory birds. This begins to build the argument further for green roof implementation, outside of the benefits of runoff and heat island reduction.

Fragmentation

Fragmentation has led to various consequences that have directly impacted bird species. The literature suggests the following changes among bird species. Generally, with the reduction of habitat for bird species, specifically grasslands, the overall reduction has led to lower species richness (Schmiegelow 2002). This suggests the cities that have been created on these lands that were once grasslands has led to reduction of species diversity. This has been observed within urban areas and highlights the homogenized bird species found in urban areas. Research continues to show that these bird species that have been fragmented are species specific. This applies to the categories of birds being avoiders, adapters, and exploiters. Studies have documented that those species of lower densities are more likely to go extinct. Species that are fragmented face attrition with limited resources and typically do not survive in long term situations (Freeman et al. 2018). The stress placed on these bird species is not sustainable. Habitat for

Migratory Flyways

Urban habitats are vastly different than the natural world the migrating birds once used. Many cities have been created in the direct passage of various flyways. There are four primary flyways in the United States. They include the Pacific Flyway, Central Flyway, Mississippi Flyway, and the Atlantic Flyway (U.S. Fish and Wildlife Service 2021) (Figure 3). This study focuses on the Atlantic flyway, as it can be the most closely observed for this study. The Atlantic flyway generally covers the states along the east coast of the United States and extends as far as Ohio state. There are approximately 500 bird species that migrate through the flyway every year. Along the journey many birds fly around urban areas, and few have been spotted resting along green roofs in some urban areas.



Figure 3 Illustration created to highlight North American Flyways (By Author)

these birds is being destroyed continuously as we create more cities. The effects do not necessary always need to be in a negative light. The opportunity for habitat creation, is equal to urban development. The technology exists to amend the fragmentation.

Relevant Studies

New York Study

A study conducted by the department of biological sciences in Fordham University, Bronx, NY examined the potential of green roofs providing new habitat for wildlife in New York City. The study surveyed birds and arthropods on green roofs in Manhattan, Brooklyn, and downtown Bronx. The study was conducted during the spring migration period and the breeding season. The birds were monitored using automated acoustic recorders (Model SM2). The monitors record the sounds of birds that are nearby, and that audio is then downloaded and analyzed. The software can separate the sounds and isolate bird species that were on the roofs.

The study concluded that green roofs appear to be an effective tool for wildlife conservation. The green roof system holds various arthropods that are prey for the birds and provide a valuable food source, that are more sparse across urban areas. The study also shows that there were more urban utilizers than urban avoiders on the green roofs. This conclusion leads to further studies that can be conducted in order to investigate potential factors in providing a viable environment for urban avoiders. The study found that the American goldfinches and cedar waxwings were some of the more common urban avoiders that were spotted in their testing.

The study supports the research in investigated green roof designs for urban bird migration. The study shows promise to incorporate bird species based on plant design within the green roof. Further research can be conducted to increase species diversity through green roof design.

Midwest study

Carly Eakin, part of the department of fisheries and wildlife at Michigan State University conducted a study in 2015 that observed 12 green roofs in the midwestern United States. The study looked to find avian responses to green roofs found in urban areas in the Midwestern United States. The study was focused on the Mississippi flyway and the study began a visit to over 108 green roofs, and the largest were then selected for the study. The data was collected over 2 seasons and recorded over 2,973 species of birds.

The study concluded that there exists an opportunity for green roofs to provide a rich environment for bird species. A few bird species were found to have occupied the green roofs more than the surrounding areas of landscape. This suggest that there exists an opportunity for green roofs to facilitate a rich environment for bird species. The study also explains that there doesn't seem to be a correlation between the size of a green roof and bird occupancy, although when cross referencing this claim with the habitat study of birds, it is biologically important for birds to have an appropriately sized area for nesting and forage (Evans 2008). The study also shows that some unexpected species that were recorded in the study

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

may have been in the green roof environment due to fewer disturbances in the surrounding area (Eakin 2015).

The study supports the investigation of green roof designs, reflecting species specific environment, further backing the research in tailoring a green roof design for a specific species of bird. A critical issue that needs to be resolved within urban areas and the larger migratory system as a whole.

Switzerland study

A study was conducted by Nathalie Baumann from the University of Applied Sciences Wädenswil, Switzerland, to investigate the habitat potential of flat roofs in Europe. The study was conducted through direct observation of the green roof sites. The researchers examined five sites within different Swiss cantons during the years 2005 and 2006. They focused on two endangered species, the northern lapwing and the ringed plover. The observations were conducted during the breeding season, end of March, until the middle of July. Observations were made once a week with field glasses and field books from a high vantage point. The results were promising in illustrating the utilization of green roofs for nesting habitats. The search was conducted after data showed a decline in bird populations due to increase loss in habitat and fragmentation due to urbanization. The data continues to show some situations in which the northern lapwing actually permanently changed its breeding site to the green roof.

This research provides an incentive to continue gathering more data to incentivize and inform green roof design as an ecologically valuable habitat for bird species. This data can be used to understand that green roof investment is critical to urban environments. These observations show first hand evidence of the benefits that proper green roof design brings.

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Research Question

This research investigates the willingness of companies and large corporations within the Atlanta area, an area falling within the Atlantic Flyway, for green roof implementation that would facilitate urban bird migration. Specifically, this research examines the design applications in green roofs that can facilitate bird migrations through urban environments, leading to various benefits, most notably, urban biodiversity.

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Case Studies

Species Action Plan (Grant, 2006)

The Species Action Plan was created in England to create green roofs that were specifically tailored for the black redstart, an endangered bird species (Figure 4). Green roofs were designed to mimic the conditions found on the derelict sites that the redstarts lived in. The study concluded that there does exist a potential solution to habitat loss through green roof design.



Figure 4 Image of green roof design for Black Redstart (Laban-2011-view-of-wildflowers-1-1280x853.jpeg (1280x853) (dustypedge.co.uk))

City Hall Plots in Toronto: The Bird and Butterfly Meadow (Nowak, 2004)

This design was implemented in Toronto. This green roof design was designed to create a unique environment that would be tailored specifically for butterfly and bird species through native plants from Western Ontario (Figure 5). It was in an urban center in order to push the boundaries of green roof design. The project concluded the potential of creating specific green roof habitats in urban areas for a range of species. These studies highlight the small-scale breakthroughs that have been proven to bring bird species to urban areas, through green roof design. The opportunity exists to scale these studies to a larger area to generate higher positive results across urban areas within migratory flyways. Urban areas can bring benefits to an existing migratory system, countering the negative impacts that exist today.



Figure 5 Image of the Toronto City Hall green roof (fc-f1-20101102-potd.jpg (2048x1365) (bloato.com))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Specific Site Background

The Atlantic flyway is the selected study area for this research. This flyway has various cities within the corridor allowing for an optimal application of the study (Figure 4). Looking at a smaller area of study, the city selection would be the Atlanta.

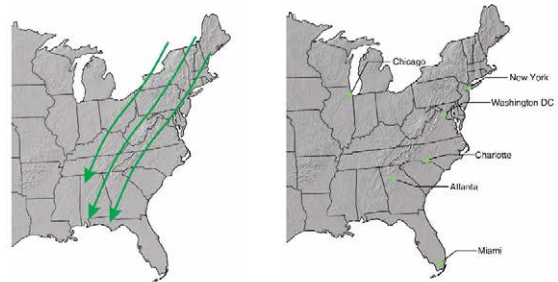


Figure 6 Illustration of the Atlantic Flyway Path (Left). Map of city locations within the Atlantic Flyway (Right) (By Author)

The six green roofs that have been selected from the study are located in the Atlanta area (Figure 5). The green roofs vary in size, but all show the structural capability of carrying a design that would be suitable for the target species of this research.

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Location Map

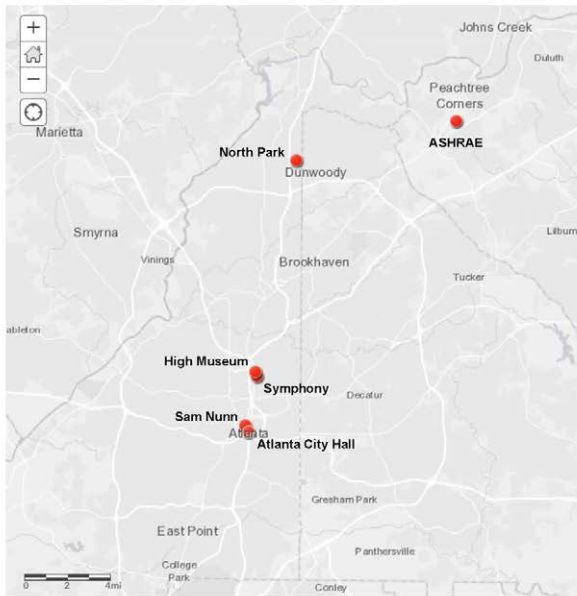


Figure 7 Map of selected green roofs in the Atlanta area (By Author)

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Symphony Tower

Owned by GE Assets Management. It was built in 2006 and has a green roof on the 18th floor. It is approximately 35,000 ft². With a soil depth of 15"-18" and consisting of 2,500 trees and 35 large trees. The system has enough depth to create an intensive green roof design for migratory birds. The existing green roof shows high level of maintenance and budget.



Figure 8 Image of Symphony Tower green roof ([Greenroofs.com Projects Database - Greenroofs.com](https://www.greenroofs.com/projects/database-greenroofs.com/))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

ASHRAE

Owned by ASHRAE Commercial. It was built in 2008 and has private green roof. It is Approximately 1,800 ft². The system shown is a modular system allowing for versatility in planting implementation. The units allow for more flexibility in design for migratory birds.



Figure 9 Image of ASHRAE green roof ([Greenroofs.com Projects Database - Greenroofs.com](https://www.greenroofs.com/projects/database-greenroofs.com/))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Atlanta City Hall

Owned by the City of Atlanta and built in 2003. It is approximately 3,100 ft² and has an average soil depth of 3"-10" with over 2,800 plants. This case would allow for more resources in design as it is owned by the city. The system is built in place and would allow for various plant growth for nesting birds.



Figure 10 Image of Atlanta City Hall green roof ([Greenroofs.com Projects Database - Greenroofs.com](https://www.greenroofs.com/projects/database-greenroofs.com/))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

High Museum of Art

Owned by the High Museum of Art and it was built in 2008. It is approximately 6,680 ft². This particular green roof has a modular system. This system is large and would allow for extensive data collection and observation for planting variations of bird species attraction.



Figure 11 Image of Symphony Tower green roof
([Greenroofs.com Projects Database - Greenroofs.com](#))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

North Park 500

Owned by the Bank of Ireland and the green roof was designed in 2007. It is a modular green roof system that is approximately 59,000 ft². This green roof design has various tree plantings allowing for a larger incorporation of bird species.



Figure 12 Image of North Park 500 green roof ([Greenroofs.com Projects Database - Greenroofs.com](#))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Sam Nunn Atlanta Federal Center

Owned by the GSA and built in 2010. The green roof is approximately 68,000 ft² and has an average of 4" of growth media with 198,000 plants. This green roof has an expansive plant palette and would serve well for observation of minimal intervention in plant material for accommodation for migratory birds.



Figure 13 Image of Sam Nunn Atlanta Federal Center green roof ([Greenroofs.com Projects Database - Greenroofs.com](#))

Atlantic Flyway Migration: Willingness for urban green roof design implementation in the City of Atlanta

Beginning of research method

The research will be a survey analysis. The structure of the survey will be as follows. Beginning with questions of work and the role of the individual in the firm or corporation. The survey will then highlight the benefits of green roofs. The third section will be the benefits that green roofs can serve to wildlife and birds. Following these sections, conditioning the individual towards birds, the questions will then be in relation to knowledge of flyways. Finally, the survey will question the importance of bringing back the flyway and what it would take to be done. Concluding these sections will be a demographic study. The survey will be limited to a few questions for concise results and incentive for participation. The survey results can then be used to further push design for critically important green roof designs within urban areas facing homogenized ecosystems.

Intellectual Merit

This research is multifaceted in its application and importance towards landscape architecture and urban planning. The key issues highlighted are most notably urban biodiversity, along with the urban issues that have been discovered by previous literature on heat island effect etc. This research shows promise in the incentive for green roof application for a larger ecosystem. The migratory systems have shown to be stressed due to urbanization and the study shows some applications of green roofs that could facilitate migratory patterns for the benefit of the larger system, but also the benefit of urban biodiversity within various large cities along the Atlantic Flyway. The application of this study could be done within any flyway around the world, and the benefits could be equally as applicable as this is an issue that applies to other areas outside of the United States.

Research Method

- Survey
- Follow Up Key Interviews

Plan of Work

The plan of work would be to contact various entities of the buildings with the green roofs selected. The owners of the green roofs have been listed. The contact points would be reached through email and phone. With the contacts made, the survey would then be conducted virtually for ease and quickness. After the survey has been conducted, follow up interview will be conducted with those willing. Some incentives could be implemented at this point if participation is low.

General Conditions

- This research would be completed in approximately 5 months
- The costs would include transportation from Clemson to Atlanta, Food, Lodging, Print money, and cost of software for survey conduction
- IRB Approval

Expected Results

The results of this survey will bring evidence of willingness for industries to implement green roofs with a greater purpose outside of the aesthetics. The results will provide evidence for research incentives in green roof designs that can facilitate migratory birds along the Atlantic Flyway. This evidence will be applied for further designs of green roofs within the Atlanta Area.

Section 1

What is your current position within the company? _____

How long have you been working at this location? _____

Are you aware of the green roof within the building?

Yes No

Do you have access to the green roof?

Yes No

Section 2

Do you enjoy having a green roof in the building?

Yes No

Are you aware of the psychological benefits that green roof brings?

Yes No

Did you know that there are also benefits for wildlife?

Yes No

Are you aware of yearly bird migrations?

Section 3

Did you know that Atlanta falls within the Atlantic Flyway?

Yes No

Did you this is one of four flyways within the United States?

Yes No

Did you know that this green roof could potentially impact this migration pattern?

Yes No

Would you be interested in learning about the benefits from a green roof design?

Yes No

Section 4

On a scale of one to ten how interested are you in green roofs?

1 2 3 4 5 6 7 8 9 10

Would you be willing to allow the implementation of a green roof that brings benefits for migratory birds?

Yes No

Would you like further access to the green roof?

Yes No

Would you be interested in the results of the design study?

Yes No

Section 5

What is your age?

What is your ethnicity?

What is your gender?

What is your annual income?

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Atlantic Flyway Migration: Willingness for urban green roof implementation in the City of Atlanta

Steve Kurtz

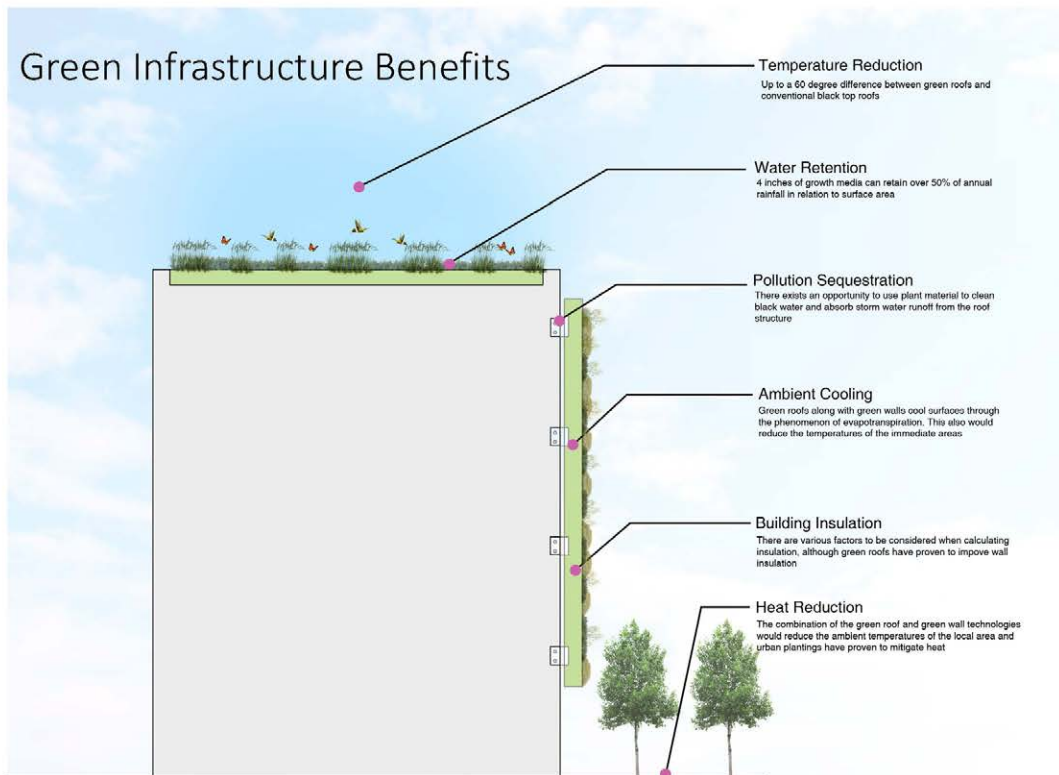
Introduction

- Green roofs present an opportunity to create a viable habitat for various bird species. This could be beneficial for endangered bird species and urban biodiversity. The Atlantic Flyway sees over 500 bird species migrate through every year. Recently, literature has shown the fragmentation that has been occurring due to urbanization along the flyway.
- This study looks to investigate various aspects of green roof designs that could facilitate migratory patterns along the Atlantic Flyway. This research will then lead to surveys that will be conducted across six companies in Atlanta, Georgia.

Literature Review

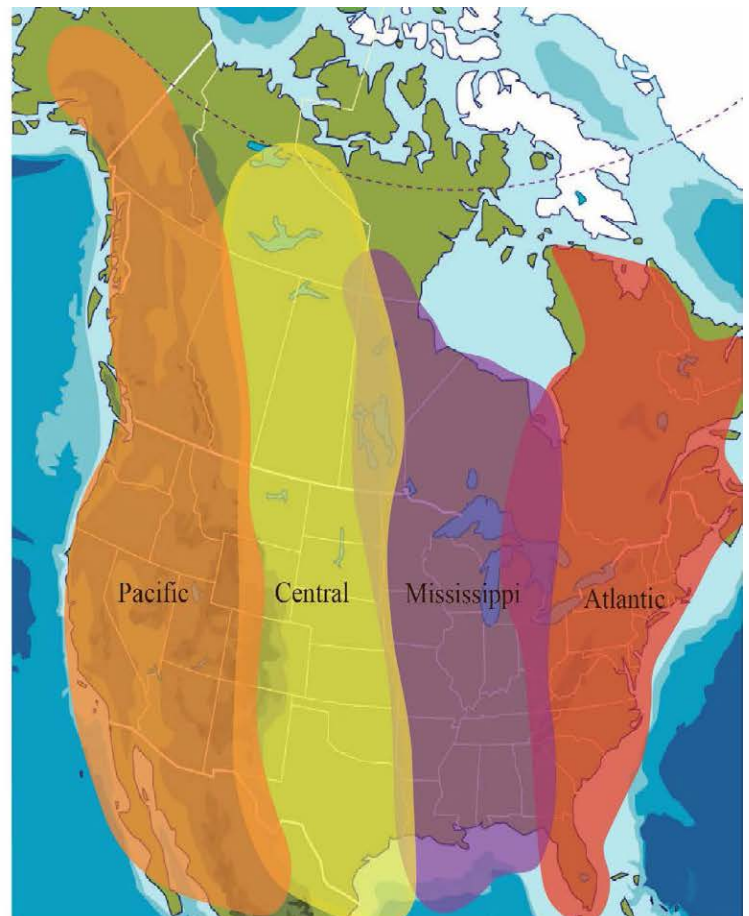
- Green Roofs
- Migratory Flyways
- Fragmentation





4 Primary Flyways

- Pacific
- Central
- Mississippi
- Atlantic
 - Atlantic will be the focus



Fragmentation

- Fragmentation has led to various consequences that have directly impacted bird species. The literature suggests the following changes among bird species. Generally, with the reduction of habitat for bird species, specifically grasslands, the overall reduction has led to lower species richness (Schmiegelow 2002).
- Research continues to show that these bird species that have been fragmented are species specific. This applies to the categories of birds being avoiders, adapters, and exploiters. Studies have documented that those species of lower densities are more likely to go extinct. Species that are fragmented face attrition with limited resources and typically do not survive in long term situations (Freeman et al. 2018).

Research Question

- This research investigates the willingness of companies and large corporations within the Atlanta area, an area falling within the Atlantic Flyway, for green roof implementation that would facilitate urban bird migration. Specifically, this research examines the design applications in green roofs that can facilitate bird migrations through urban environments, leading to various benefits, most notably, urban biodiversity.

Case Studies

- Species Action Plan (Grant, 2006)
- City Hall Plots in Toronto: The Bird and Butterfly Meadow (Nowak, 2004)

Species Action Plan

- England
- Target Species: Black Redstart
- Green roofs were designed to mimic the conditions found on the derelict sites that the redstarts lived in. The study concluded that there does exist a potential solution to habitat loss through green roof design.

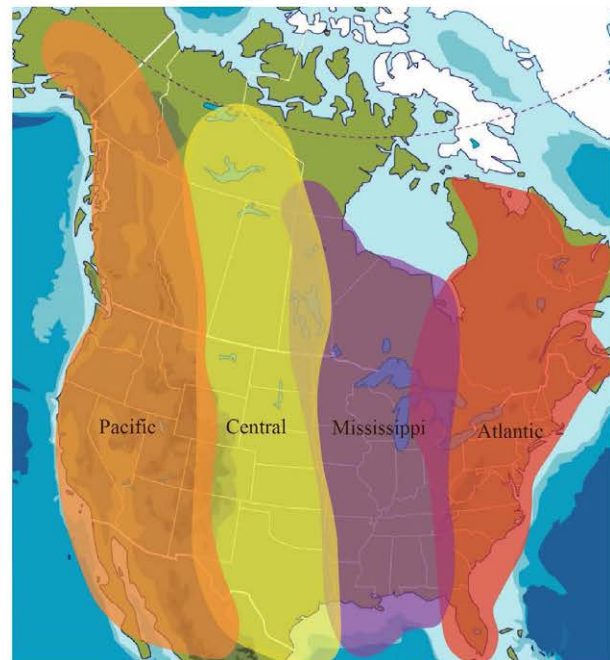


City Hall Plots in Toronto: The Bird and Butterfly Meadow

- Toronto, Canada
- Target Species: Butterfly
- The project concluded the potential of creating specific green roof habitats in urban areas for a range of species. These studies highlight the small-scale breakthroughs that have been proven to bring bird species to urban areas, through green roof design.

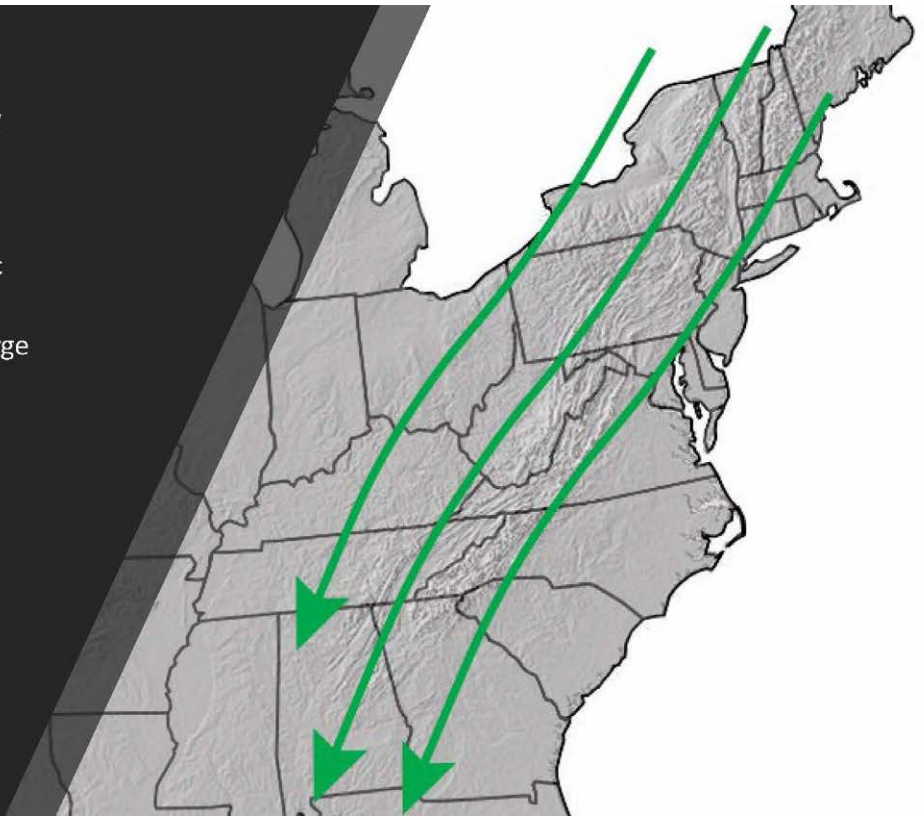


Site Specific Background



Atlantic Flyway

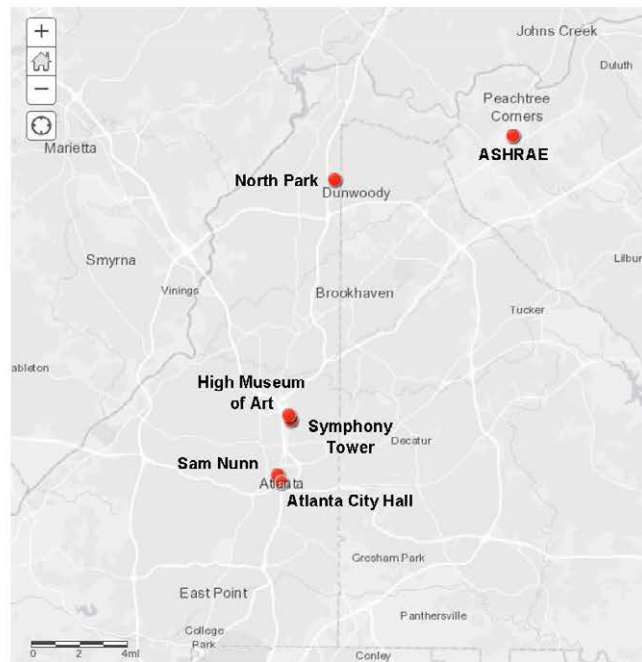
- Focus is placed on the Atlantic Flyway
- Fragmented due to various large cities



City Fragmentation



Atlanta Green roofs



Symphony Tower

- Owned by GE Assets Management
- Built in 2006
- 18th floor
- 35,000 sq. ft.



ASHREA

- Owned by ASHRAE Commercial
- Built in 2008
- 1,800 sq. ft.



Atlanta City Hall

- Owned by City of Atlanta
- Built in 2003
- 3,100 sq. ft.



High Museum of Art

- Owned by High Museum of Art
- Built in 2008
- 6,680 sq. ft.



ASLA Green Roof



North Park 500

- Owned by the Bank of Ireland
- Built in 2007
- 59,000 sq. ft.



Sam Nunn Atlanta Federal Center

- Owned by the GSA
- Built in 2010
- 68,000 sq. ft.



Plan of Work

- The plan of work would be to contact various entities of the buildings with the green roofs selected. The owners of the green roofs have been listed. The contact points would be reached through email and phone. With the contacts made, the survey would then be conducted virtually for ease and quickness. After the survey has been conducted, follow up interview will be conducted with those willing. Some incentives could be implemented at this point if participation is low.

Survey

- 6 Sections
 - Questions about their role/position
 - Benefits of green roofs
 - Benefits to wildlife and birds
 - Question on knowledge of flyways
 - Bringing back flyways to urban environments
 - Demographics

Expected Results

- The results of this survey will bring evidence of willingness for industries to implement green roofs with a greater purpose outside of the aesthetics. The results will provide evidence for research incentives in green roof designs that can facilitate migratory birds along the Atlantic Flyway. This evidence will be applied for further designs of green roofs within the Atlanta Area.

Intellectual Merit

- This research is multifaceted in its application and importance towards landscape architecture and urban planning. The key issues highlighted are most notably urban biodiversity, along with the urban issues that have been discovered by previous literature on heat island effect etc. This research shows promise in the incentive for green roof application for a larger ecosystem. The migratory systems have shown to be stressed due to urbanization and the study shows some applications of green roofs that could facilitate migratory patterns for the benefit of the larger system, but also the benefit of urban biodiversity within various large cities along the Atlantic Flyway. The application of this study could be done within any flyway around the world, and the benefits could be equally as applicable as this is an issue that applies to other areas outside of the United States.

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Section 1

What is your current position within the company? _____

How long have you been working at this location? _____

Are you aware of the green roof within the building?

Yes No

Do you have access to the green roof?

Yes No

Section 2

Do you enjoy having a green roof in the building?

Yes No

Are you aware of the psychological benefits that green roof brings?

Yes No

Did you know that there are also benefits for wildlife?

Yes No

Are you aware of yearly bird migrations?

Section 3

Did you know that Atlanta falls within the Atlantic Flyway?

Yes No

Did you this is one of four flyways within the United States?

Yes No

Did you know that this green roof could potentially impact this migration pattern?

Yes No

Would you be interested in learning about the benefits from a green roof design?

Yes No

Section 4

On a scale of one to ten how interested are you in green roofs?

1 2 3 4 5 6 7 8 9 10

Would you be willing to allow the implementation of a green roof that brings benefits for migratory birds?

Yes No

Would you like further access to the green roof?

Yes No

Would you be interested in the results of the design study?

Yes No

Section 5

What is your age?

What is your ethnicity?

What is your gender?

What is your annual income?

Combating Density in Modern Use Communities
Post Occupancy Evaluation of Patrick Square, Central, South
Carolina as a Model for Mixed Use Villages

Density, Urban, Rural, Townhome, Condominium, Single Living, Mixed Use, Village Living



Alex Leonard
LARC 8210
Dr. Nassar

ABSTRACT

The study and evaluation of subdivisions and communities is an essential step to developing and understanding objective characteristics of success. Design is taught as a cyclical process of planning, implementation, and evaluation, furthering design standards. The past several decades of residential design has been categorized with row housing, slab on grade lots, garage entrances, and high volume of street scape. Development of commercial zones, mainly for convenience, has separated residential and commercial communities, requiring the need for automobile focused design and amenities (Schurch, 2021). Mixed-use designs that begin to connect commercial and residential zones, such as Patrick Square in Central, South Carolina, are used as models and precedent for design, yet merit as to why they are used is arguably inadequate. With detailed and complex designs that include a mixed-use approach, combining residential and commercial aspects, understanding such designs with a holistic approach is often difficult. This research is a Post Occupancy Evaluation of Patrick Square which focuses on the opinions, preferences, and satisfaction of its residents. Qualitative and quantitative data regarding experiences, development, and social impact of Patrick Square will provide a model for mix used communities as well as a model for evaluation of implemented residential design. The design and procurement of survey responses from a variety of user sources within Patrick Square aims to asks questions of what occupants and visitors deem as sources for their overall enjoyment and satisfaction of living or visiting in Patrick Square. The designed survey methods and questions



Figure 1-Site Plan of Patrick Square

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will be guided by precedent studies such as Preiser, Rabinowitz, and White's 1988 Post Occupancy Evaluation of New York City, New York and Hofer's 2008 evaluation of False Creek North in Vancouver, Canada. With the additional resources and study of design standards from *Landscape Journal*, the experiential qualities observed at events and within the daily patterns of Patrick Square will prompt logical responses of habitants that can be deemed as successful or unsuccessful design programs. This evaluation of Patrick Square is meant to provide conclusions on the effectiveness of mixed-use neighborhoods and resident satisfaction with the incorporation of walkability, proximity to commercial zones, planned exterior maintenance, communal open space, and community programming. This research also aims to double as a model for Post Occupancy Evaluations in similar mixed-use residential spaces and add to the general knowledge or research methods and research design within the field of Landscape Architecture.

INTRODUCTION



Figure 2-The street outside of Rick Erwin's Steak House

Within the American population, close to 40% of the population (ages 20-35 and 65+) live in single person households ("US Population by Year, Race, Age, Ethnicity, & More." 2022). As land use and sustainability become scarcer within suitable living areas, density of homesteads becomes a topic that architects, engineers, and specifically landscape architects face every day. Do we build upward and form skyscraper homes? Do we restrict the open space of subdivisions to make room for more homes? Do we take away privately owned land from homeowners?

An emerging trend of residential design that begins to address the larger issue of land use and sustainability is the mixed-use neighborhood. These communities are characterized by a variety of home typologies, a mix of residential and commercial zones, smaller lots, walkability, common open space, and an emphasis on community social programs (Andrzejewski, 2009). Economically, there is a general higher cost associated with homes, but the cost covers village greens, cleaner and safer roads, community events and public transportation (patricksquare.com). The mixed-use neighborhood creates a unique community that focuses on both resident and visitor, a feature found lacking in the traditional residential district today. Designs that incorporate a wider variety of user demographics creates local significance, relevance, and high use. The process for design of these mixed-use communities shifts priority from vehicular access and circulation to human scale and experience. (Cook, Bose, Marshall, & Main 2013).

The quality of life of the next generation starts with the quality of living today. Evaluation and understanding the quality of living is a beneficial study in terms of design and success of planned programs and integrated concepts. The method of evaluation of mixed-use developments in this research is a Post Occupancy Evaluation, a mix of case study, behavioral observation, and survey methods. Case studies of well-functioning mixed-use subdivisions will provide characteristics and plausible solutions to open space restrictions and design. Asking these residential communities their preferences on mixed use housing characteristics will give us firsthand qualitative data on the human condition in these communities. This research investigates the opinion, preferences, and satisfaction of residents in mixed-use communities and their defining characteristics.

Answering and giving possible solutions to residential design that address the mixed-use design provided a suitable option for development in both urban and rural settings. The qualities and faults discovered in existing mixed-use communities will add to a database of design strategies. Landscape architects will be able to implement these strategies and characteristics as both functional and aesthetic components of design while offering a personal connection to homeowners, their livelihoods, and their futures.

The Mixed Use (or Village) Typology



Figure 5-Downtown Mixed Use Proposal

An opposing approach to the modern day subdivision design that creates uniform and monotonous housing communities, the Mixed Use typology was developed. Starting in the 1970's, as a way to mix urbanization with technological advances, residential communities began to model the historic small town America atmosphere. The term "Mixed Use" is drawn from the variety of building plans within these communities. Single family, multi-family, detached homes, rental homes, commercial developments, and village greens were combined to mimic small towns across the United States. Sustainable technology around energy use, materials, water management, and planted landscapes were built into residential zones that surrounded open village greens with parks, play areas, and shared gardens. The economic risk associated with housing designs such as Village Homes in Davis, California were deemed too high, and the model of the mixed use village was placed on a shelf with many other optimistic designs. Today, problems around economic balance, ecological emphasis, and immediate need for residential complexes could be solved with the Mixed Use typology. (Francis, 2002)



Figure 6-Mixed Use Diagram

LITERATURE REVIEW

Urban Sprawl Design

To better understand the benefits of the Mixed Use (or village) subdivisions, the comparison to the modern day subdivision creates a firm line of distinction. The modern day subdivision is not quite so modern, as many newer subdivisions look identical to those built in the post World War 2 era. The end of the second world war saw an enormous population boom in the United States. Not only did the nation see the return of soldiers, many who started a family of their own, but it also saw a wave of immigration that the likes of have not been seen since. To tackle this growing population and housing shortage, the idea of the standard row housing along a street with a garage and driveway was created. Almost identical to each other, each house was affordable, easy to construct, and replicable all across the United States. Today, some flexibility has been added, such as custom homes, but many characteristics are exact mirror images of the 1950's and 1960's. Neighborhoods have been designed to create privacy and small relations with neighbors. Achieved through cul-de-sacs, prioritized window frontage, large property lots, vegetated privacy screens and fences, large interior rooms, and a sense of seclusion, these modern subdivisions became pockets of isolation and poor land use that created lost communities (Andrzejewski, 2009 and Schurch 2021).



Figure 3-Post WWII Urban Sprawl

Introduction

Mental health is the foundation for human success. Thinking, communicating, learning, resilience, and self-esteem are all directly influenced by an individual's mental health. A healthy mental prognosis is necessary in order for any individual to efficiently complete productive tasks, maintain healthy relationships, or master and maintain the ability to adapt and cope with adversity (American Psychiatric Association 2021). On the flip side, mental illness can negatively impact or completely prohibit all of the above. Mental illness is classified as any health condition involving changes in emotion, thinking or behavior, and distress and/or problems functioning in social, work, or family activities (American Psychiatric Association 2021). It is a medical condition that can affect anyone, regardless of race, gender, or ethnicity. It strikes with impunity and as of 2021, one in five adults living in the United States will experience mental illness at some point in their lives; one in twenty-four will suffer from mental illness severe enough to inhibit one or more major life activities.

Psychotherapy, also known as talk therapy, is one of many ways to treat mental illness. The concept of talk therapy has permeated American culture, usually in the form of a client laying on a couch and monologuing to an impartial psychiatrist. In reality, talk therapy is a method of active listening, discussion, and counseling conducted by psychologists, counselors, and psychiatrists in a way to treat or manage any variety of mood, personality, or anxiety disorders (National Cancer Institute 2021). Talk therapy may be conducted with an individual or a group and can help both children and adults. There is no session limit – talk therapy can continue as long as the patient desires. However, talk therapy is rarely a standalone treatment plan; talk therapy is often paired with one or more other strategies, such as Cognitive Behavioral Therapy and medication, for better results.

In this way, talk therapy is part of a holistic treatment plan. Holistic therapy is not using crystals or another pseudoscience to replace institutionalized medical treatment. Rather, holistic therapy is putting the understanding that a person's consciousness is a collection of the mind, body and spirit into practice so that the whole self can be led to greater self-awareness, self-esteem, and self-acceptance. Not only is the person's consciousness a collection, but the external influences on a person's wellbeing is also multifaceted. Nature is a well-documented source of influence to the human trifecta of mind, body, and spirit.

Improving wellness by exposure to nature gained a scientific foothold following Ulrich's seminal 1984 paper, "View through a window may influence recovery from surgery," offering evidence that the passive viewing of nature can speed physical healing, reduce patient painkiller intake, and decrease irritability. Since then, the collection of evidence and the subsequent evidence-based designs have been the standard for contemporary healing gardens (American Horticulture Therapy Association 2021). Healing gardens and the similarly spirited therapy gardens and therapeutic landscapes have emerged throughout the public and private health care domains. However existing literature does not show psychiatric professionals using these healing gardens to engage in talk therapy.

It is the purpose of this research proposal to examine the potential benefits of using existing healing gardens as spaces for talk therapy sessions, while addressing the potential limitations and

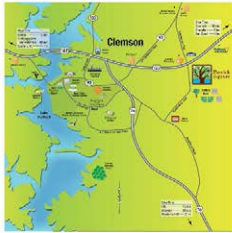


Figure 7-Location Map of Patrick Square

Patrick Square, Central SC

A child of Village Homes in Davis, California, that dreams of being a model for mixed use development, is Patrick Square in Central, South Carolina. Located within ten minutes of Clemson University, and directly off US Highway 123 leading straight into Greenville SC, this mixed use development is a perfect case study for determining the success of similarly designed residential communities today. Containing "preserve homes, single family, townhomes, and single level villa homes", the community is described as a "walkable, integrated community" with amenities targeting children, parents, college students, and the elderly. Homes are situated off the highway, separated by a commercial district that includes a village green, Prisma Health sponsored medical facility, multiple restaurants, a butcher, winery, brewery, and hotel. This town center is stated to foster social communities among residents, locals, and visitors. The newest addition to the long list of amenities is "The Inn at Patrick Square", a luxury hotel with a restaurant that targets a higher class demographic brought to the area by Clemson University. The village also promotes the "OLLI" program, designed to help upper aged adults contribute to the community and enrich their own lives with like minded individuals. The list of what there is to offer within Patrick Square continues for pages advertised online. This list offers invaluable launching points that proves Patrick Square is a perfect case study to determine the potential for mixed use residential communities.

PROJECT BACKGROUND

Using Patrick Square as a case study, performing a Post Occupancy Evaluation will produce significant results to conclude whether or not mixed use residential developments are a more compelling solution to the real estate market than the traditional subdivision design. Surveys will produce first hand data on the experience and preferences of residents, spanning numerous demographics through age, occupation, education, and lifestyles. Historical data spanning the lifetime of Patrick Square will produce a timeline starting at the earliest plans through construction and all the way to additional amenities that have been added during the community's tenure. Population studies that dive into the number of occupants in the village green and commercial district will ultimately determine its success by the number of users not only from the residential district but from visitors and adjacent communities.



Figure 8-Weekend Farmers Market at Patrick Square, 2022

The data collected is expected to highlight the cost-benefit analysis of Patrick Square as a direct competitor to cheaper alternatives. The objective success of amenities will be a key

conclusion in this analysis. Research conducted will be centralized around the experience and ramifications of habitants and visitors. Patrick Square value is not contained within the property lines of the communities, but reaches beyond the boundaries into the larger scale city and county. The POE that is conducted will result in potential characteristics that can be replicated in similar

case studies and mixed use development design. Patrick Square as a case study and POE will be a model for Landscape Architecture to follow and learn from, regardless of the results and lessons concluded.

INTELLECTUAL MERIT

As an objective evaluation of Patrick Square, this research is designed to identify, qualify, and quantify the success of this mixed-use development from the perspective of the habitant and visitors. The focus on habitant and visitor is derived from the concept that Patrick Square is mixed use. With distinct residential and commercial zones, a holistic approach incorporates the multiple populations of Patrick Square based on the reasoning for occupancy. For the powers that be and oversee Patrick Square, assuming the presence of an HOA or Commerce Board, data collected, and conclusions analyzed are both beneficial and necessary for future planning of events or development, along with the correction of elements that lack to achieve their designed purpose in the eyes of the habitants.

The intent of this research, outside the direct results of the Post Occupancy Evaluation, is to determine and create a best standards model to research mixed-use developments. As already stated in the Abstract and Introduction of this



Figure 9-The Corner Butcher and Pharmacy at Patrick Square

paper, evaluations of mixed-use developments often lack or allow elements of review to be

overshadowed. Research simply conducted for the sake of research and conclusions is small minded and weak in terms of design and understanding methods. This project has a strong emphasis on research procedure, integrity, methods, target populations, organization, precedence and methods of analysis. To use this project as a case study or precedent for future study of similar mixed-use developments would be more beneficial for understanding methodology and procedure to validate the concluded data rather than simply arrive at a conclusion.

The purpose of this paper seeks to reach a specific professional field as well. Landscape Architecture, a heavily design based profession, lacks the aspect of research and review following implementation. The cyclical nature of design requires evaluation and review, lending research within design the opportunity to strengthen subsequent designs. Punches 1998 *Introduction to Social Research* dictates that Case Study and Post Occupancy Evaluations are strong methods of review and revision. By modeling significant aspects of the methods of research conducted within the realm of study in Patrick Square, this project offers Landscape Architecture a model of review and revision. Firms and designers will add significant value to the validity of their work if they work can be proven successful through Case Study and Post Occupancy Evaluation. Research, while primarily sourced to conclude data, Landscape Architecture can specifically use evaluative research to defend, review, and progress design standards of mixed-use development.

RESEARCH METHODS

Post Occupancy Evaluations (POE) are conducted to better understand the workings of a built environment, specifically the success of the experience of occupants and their satisfaction of lifestyle. The qualitative characteristics of experience are near impossible to record in their entirety. Most models of POEs focus on identifying and studying a range of developed characters of the site. The most accepted model and categories come from Preiser, Rabinowitz, and White in 1988 when conducting a POE of New York City, USA. The evaluation of sub-categories of New York City, based on the perspective of occupants, reflects the design intention to design implications. Preiser, Rabinowitz, and White conclude that the major sub-categories are

- Planning
- Programming
- Design
- Construction
- Occupancy
- Recycling

Patrick Square, while a complex development, would be more successful studying by focusing on Programming, Design, Construction and Occupancy. The rich program of activities within Patrick Square; one of the strongest selling points for occupants and locals, validity and encompass the loudest experiences to evaluate. Occupancy includes more than the physical presence of habitants, but the character of occupancy. This constitutes the study of quality of materials, size of homes, amenities within homes, economic balance, proximity, and drivability. Evaluating the design aspect of Patrick Square requires comparison between initial design and the final implementation. Studying construction, in the terms of this project, specifically relate to the continuation and the stages of development that support the initial design. Patrick Square has expanded several times since the initial construction, within the residential and commercial zones.

Previous POEs of subdivisions and residential developments, while qualitative and experience based, lack a strong source of analytical comprehension. Connectivity, environmental impacts, demographics, and social status are easy data points to collect, however are glossed over and ignored. The analysis of this data speaks to the systemic failure of sites. Patrick Square's design speaks toward environmental cleanliness, diversity, and social cohesion, requiring collection and analysis of these categories.

The research design for this POE will include two surveys and observational studies of special events. The necessity of conducting a survey is entirely relevant to the identifiable resource of the human experience in relation to the research question. With much of this project relating to the success of occupancy and experience, the best method of firsthand data collection that can be compared and contrasted among occupants is to conduct a survey of said occupants. Questionnaires that incorporate a mix of multiple choice and scalable questions will provide a

The second survey will be for the visiting demographic of residents. Their opinions, preferences, and satisfaction are based on short, sporadic experiences of Patrick Square that are different from long term residents. These surveys will be handed out on 6" x 6" squares with a QR code and project overview on each side. These slips will be handed out at special events such as Weekend Farmers Markets, Movie Nights, and Tailgates. The same survey will also be posted on the visitor's boards and public events boards around Patrick Square and through the Patrick Square Facebook group.

The behavioral observation will occur to monitor the density of people through elements of Patrick Square. Studying the multiple uses of Patrick Square, observers will take notes and record the counts of people who visit the multiple residential types, the commercial zone, and supporting facilities.

Surveys will be open during May, June, and July, the most visited and popular months of the year to be outside and for Patrick Square. Surveys will be placed on residents doors the first weekend of May, and both surveys will be handed out on the third weekend of each month to target the most people throughout the summer. Facebook links will be sent out at the beginning of the month as to no clutter or bombard participants. Observations will occur the third weekend of the month as well, and last three hours from 11am to 2pm.

GENERAL CONDITIONS

For the days of each survey, the weather should be clear, sunny and temperate as to encourage the most participation and be tolerable by surveyors. Transportation will be supported by Clemson University vehicle renting services, specifically a van. Flyers, door hangers, and surveys will be printed at Clemson Variety and Frame. The need for volunteers varies task to task. The place door hangers on residences, a team of six would be needed to cover both sides of three streets at a time. The team that would be handing out surveys on weekend events would be a team of three, and the observation team would be another three. Each event will include transportation, lunch, and materials.

direct comparison between experience as occupants and their overall opinion and enjoyability of said experiences. There will be two surveys conducted, one for permanent habitants who reside in the residential corridor of Patrick Square, and another for the visiting habitants who reside within the commercial corridor for special events, programs, and the convince of commercial amenities. The two surveys combined will illuminate a broader picture on the success and evaluation of Patrick Square as a mixed-use development. The addition of an observational study will be beneficial for the subconscious use of Patrick Square. The study of habitants often skims over the mundane daily activities that do not seem to stand out. These habits are lost in surveys as they do not normally fall under quantifiable characters. With much of this study relying on the experiences of the habitants, the exciting and personal experiences must be compared and contrasted with the almost forgettable activities that would be seen through daily observation.

The combination of survey and observation is the strongest mixed method research that can be conducted regarding the Post Occupancy Evaluation of Patrick Square. With the detention of evaluation and the idea that Patrick Square is a case study of sorts, the best approach is to try to gain the most holistic and comprehensive understanding of the daily lifestyles and experiences of the occupants of Patrick Square. Surveys and observations will produce the widest range and most comparable data for the defense of design strategies for the overall success of a mixed-use development.

PLAN OF WORK

The first survey specifically targets the opinions, preferences, and satisfaction of residents who live long term in Patrick Square and its resident zone. These patrons have molded their lives so tightly with Patrick Square that their survey responses give an everyday answer to the research question. QR codes will be printed on door hanger fliers that will be attached to each residence. On the front is the QR code and on the back is a quick overview of the project, its goals, and why participation is encouraged, but voluntary. The same survey will be posted on the neighborhood Facebook page, adding an electronic method of outreach to get more participants.

EXPECTED RESULTS

The Residents Survey will reveal the opinions, preferences, and satisfaction levels on resident's experiences and the elements of Patrick Square. Their responses will highlight specific programs, concepts, and physical features of Patrick Square and Mixed- Use Design that can be analyzed as positive or negative. The Visitors Surveys will tell us the opinions, preferences, and level of satisfaction of the experiences of visiting Patrick Square. The results will specifically reveal visitors' thoughts regarding elements of Patrick Square that were created for non-residents. The Behavioral Observation will result in habits and patterns of residents and visitors. These habits and patterns will show subconscious preferences of characteristics and physical features. The survey questions and observations will directly highlight the residents' opinions, preferences, and satisfaction with Multiple House Typologies, Smaller Lots, High Density Living, Walkability and Circulation, Public Programs, Proximity to Commercial and Retail Shops, Common Space, and Environmental Planning. The answers to the opinions, preferences, and satisfaction with these mixed-use elements will determine the overall effectiveness of Mixed-Use Developments as a high-density design.

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APPENDIX

A. INFORMED CONSENT FORM

You are asked to participate in a research study funded by the School of Architecture, Arts, and Humanities and conducted by Clemson University Department of Landscape Architecture. The purpose of this study is to study the occupants of Patrick Square and their opinions, preferences, and satisfaction with amenities and characteristics of Patrick Square.

Participation in this survey is completely voluntary, anonymous, and will take less than 10 minutes. If you choose to participate, you may quit at any time without penalty of any kind. If you choose to discontinue the survey, your results will be discarded.

Your answers will be anonymous. The results of the study may be published but your name or any other identification will never be known. Participating in this survey present no foreseeable risks or direct benefit to you. However, data recorded by this survey has the potential to answer research questions beyond the scope of this work, therefore, data generated by this survey may be kept in perpetuity.

You may keep a copy of this consent form for your records. Would you like a copy? ☐ Yes ☐ No
If so, which format, paper or email?

If you have any questions or concerns about the research, please feel free to contact Principal Investigator Principal Investigator Alexander Leonard (xxx-xxx-xxxx) or Principal Advisor Hala Nassar (xxx-xxx-xxxx)

This research is approved by the Clemson Institutional Review Board. If you have questions regarding your rights as a research subject, you may contact the Clemson Institutional Review Board, Phone (864-656-0636, Email: irb@clemson.edu)

Thank you very much for your willingness to help advance this research.

Sincerely,

Research team

B. RESIDENT SURVEY

SECTION 1 - LIVING STATUS

This section is to answer questions regarding your living conditions and status in Patrick Square

How long have you lived in Patrick Square ?

Your answer _____

Is your home in Patrick Square your first home?

☐ Yes

☐ No

What feature of Patrick Square was most appeal when you decided to move?

Your answer _____

How many people live in your household?

Your answer _____

Do children (under the age of 18) live in your household?

- ☐ Yes
☐ No

How satisfied are you with your personal home? (1 being the least and 5 being most)

- 1 2 3 4 5
☐ ☐ ☐ ☐ ☐

SECTION 2-PUBLIC AMENITIES

This section regards the multiple zones of Patrick Square and Public Programs within the community

Do you prefer to maintain your personal lawn space or have a third party maintain it?

- ☐ I prefer to maintain it myself
☐ I prefer a third party to maintain it

How satisfied are you with the public spaces in Patrick Square? (1 being the least and 5 being the most)

- 1 2 3 4 5
☐ ☐ ☐ ☐ ☐

How many days a week do you use the stores and offices in Patrick Square?

Your answer: _____

Do you prefer to walk or drive to the stores at Patrick Square?

- ☐ Walk
☐ Drive
☐ Other

How satisfied are you with the roads around your house? (1 being the least and 5 being the most)

- 1 2 3 4 5
☐ ☐ ☐ ☐ ☐

Do you prefer to visit the store in Patrick Square over others in the area?

- ☐ Yes
☐ No

Do you feel safe walking through Patrick Square?

- ☐ Yes
☐ No
☐ Other

In a month, how often do you attend Public Events at Patrick Square?

Your answer: _____

If someone in your household works, how long is their commute?

Your answer: _____

What feature of Patrick Square do you most enjoy or appreciate?

Your answer: _____

What feature of Patrick Square do you least enjoy or appreciate?

Your answer: _____

What other comments do you have about your preferences, opinions, and satisfaction with living in Patrick Square?

Your answer: _____

SECTION 3- DEMOGRAPHICS

This section is simple demographic information to sort responses and categorize answers

What race do you identify as?

- ☐ White or Caucasian
☐ Asian
☐ African America
☐ Native or Eskimo
☐ Other: _____

What age group best identifies you?

☐ 0-18

☐ 19-29

☐ 30-39

☐ 40-60

☐ 60+

What is your total house hold income?

☐ Below \$20,000

☐ \$20,000 to \$60,000

☐ \$60,000 to \$100,000

☐ \$100,000 to \$200,000

☐ Over \$200,000

Never submit passwords through Google Forms.

C. VISITOR SURVEY

SECTION 1- VISITING STATUS

This section will ask questions regarding your visiting experiences in Patrick Square

How long have you been visiting Patrick Square ?

Your answer _____

How did you discover Patrick Square?

Your answer _____

What is your typical reason for visiting Patrick Square? (You can list more than one reason)

Your answer _____

What feature of Patrick Square is most appealing when you visiting?

Your answer _____

Do you typically visit alone or with others?

☐ Alone

☐ With others

Do children (under the age of 18) ever visit with you?

☐ Yes

☐ No

How satisfied are you with the experience of visiting Patrick Square? (1 being the least and 5 being most)

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

How satisfied are you with the roads around Patrick Square? (1 being the least and 5 being the most)

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

How satisfied are you with parking around Patrick Square? (1 being the least and 5 being the most)

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

Rank the Quality of public areas in Patrick Square

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

How many days a week do you visit Patrick Square?

Your answer _____

Do you generally walk or drive to visit Patrick Square?

☐ Walk

☐ Drive

☐ Other

Do you prefer to visit the store in Patrick Square over others in the area?

☐ Yes

☐ No

Do you feel safe walking through Patrick Square?

☐ Yes

☐ No

☐ Other

In a month, how often do you attend Public Events at Patrick Square?

☐ Option 1

What feature of Patrick Square do you most enjoy or appreciate?

Your answer _____

What feature of Patrick Square do you least enjoy or appreciate?

Your answer _____

SECTION 2- DEMOGRAPHICS

This section is simple demographic information to sort responses and categorize answers

What race do you identify as?

☐ White or Caucasian

☐ Asian

☐ African America

☐ Native or Eskimo

☐ Other: _____

What age group best identifies you?

☐ 0-18

☐ 19-29

☐ 30-39

☐ 40-60

☐ 60+

What is your total house hold income?

☐ Below \$20,000

☐ \$20,000 to \$60,000

☐ \$60,000 to \$100,000

☐ \$100,000 to \$200,000

☐ Over \$200,000

Never submit passwords through Google Forms.



Investigating Density in Mixed-Use Developments

Post Occupancy Evaluation
of Patrick Square, Clemson,
SC

Alexander Leonard

11/16/2022

Contents

- Abstract Overview
- Introduction
- Literature Review
- Project Background
- Merit and Importance
- Methods of Research
- Plan of Work
- Expected Outcomes and Conclusions



Outside patio at Joe's New York Pizza in Patrick Square

Abstract Overview



Master Plan of Patrick Square

- Design is a **cyclical process** of planning, implementation, and evaluation
- Evaluation is meant to **better and further the quality of design**
- Residential Design has been categorized with row housing, slab on grade lots, garage entrances, and high volume of street scape (Schurch, 2021)
- Large commercial districts have shifted circulation towards vehicle focused traffic (Preiser, Rabinowitz, and White, 1988)
- Mixed-use designs **connect commercial and residential zones**, such as Patrick Square and are high density designs that address practical land use
- This evaluation of Patrick Square will summarize resident's **opinions, preferences, and satisfaction** with mixed-use design

3

Introduction

- **40%** of the US Population live in single family homes ("US Population by Year, Race, Age, Ethnicity, & More." 2022)
- As the population grows and masses migrate to large cities, **Density** becomes one of the largest design criteria
- To address land use as the population grows, an emerging trend is **Mixed-Use Neighborhoods**
- Characterized by a variety of **home typologies**, a mix of **residential and commercial zones**, **smaller lots**, **walkability**, **common open space**, and an emphasis on community **social programs** (Andrzejewski, 2009)
- These mixed-use communities shifts priority from vehicular access and circulation to **human scale and experience**. (Cook, Bose, Marshall, & Main 2013)



The street outside of Rick Erwin's Steak House

4



Are Mixed-Use Communities a Successful Solution to Handling High Density?

This research investigates **the opinion, preferences, and satisfaction of residents in mixed-use communities** based on their experiences

5



Literature Review

Urban Sprawl
Mixed-Use Neighborhood
Cornel at Markham

6



Why do we have Urban Sprawl?

While considered a modern design standard, the origin of the common subdivision today is identical to the models post World War 2

Population boom required enormous spaces designated for residential construction to meet housing demands

Men returning from war, immigration, and the Baby Boomer generation

Post WW2 sprawling neighborhood, Fort Worth TX

7

Character of Urban Sprawl

To provide quick construction at a low cost, materials were easily manufactured plastics, wood, and brick. Houses were placed simply on a brick foundation and lacked little individual character from its neighbors

The spread of housing and the expanses between residential and commercial zones required priority of amenities and circulation for automobile traffic

(Schurch, 2021)



Common suburban house, Fort Worth TX

8



Urban Sprawl Today

There has been flexibility in materials and custom home designs

Still the idea of privacy and low density

Cul-de-sac, larger lots, driveway entrances, window frontage to the street, vegetated privacy screens, create pockets of isolation

City and state highways separate commercial districts and residential districts creating traffic complications (Andrzejewski, 2009)

Highway 83 in Denver, Colorado

9

Requirement of the Automobile



Highway interchange, LA County, CA

To achieve low density and continue sprawl, the only feasible method of movement was the automobile (Andrzejewski, 2009)

Required the additional resources of Oil, Gasoline, Service Stations, Highway Systems, Steel, Plastics, Manufacturing, Car Sales Lots etc...

The automobile became a requirement for living and functioning in society

To balance high density with the need for the automobile, there must be careful consideration to pedestrian movement, parking, safety, and traffic circulation

10

Mixed-Use Neighborhood

Developed in the 1970's to mix the need for high dense urban spaces, design, and advanced technology
 Model the traditional Small-Town America atmosphere
 Mixed-Use is derived from the incorporation of residential commercial, and additional space rather than just housing districts



Design for Mixed-Use in downtown areas



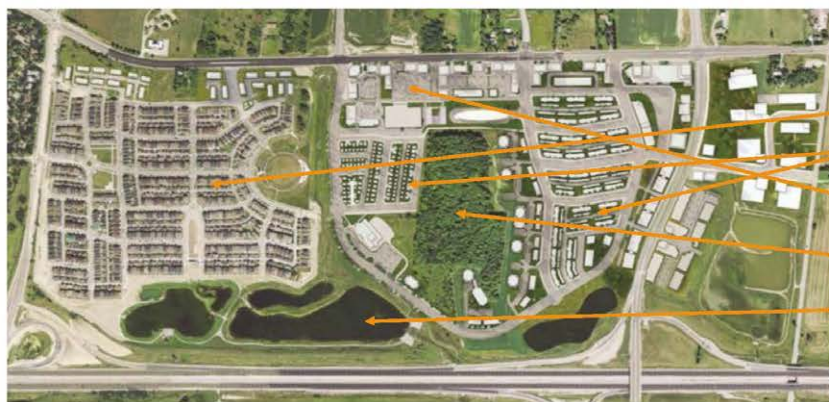
Mixed-Use Design Elements





Cornell at Markham, Canada

Cornell at Markham, Canada



Originally planned in 1994, this 200-acre section of the city was planned to hold 27,000 people, along with schools, commercial offices and supermarkets

Would follow several of the Mixed-Use concepts

High Density

Mixed Housing Typologies

Retail, Commercial, and Office Spaces

Parks and Open Spaces

Environmental Planning

Common Amenities

Cons of Cornell at Markham



The large scale of this project, and with it being a public funded project has halted and relaunched the project several times over

The most recent completion has been the surrounding infrastructure and sub-urban zones

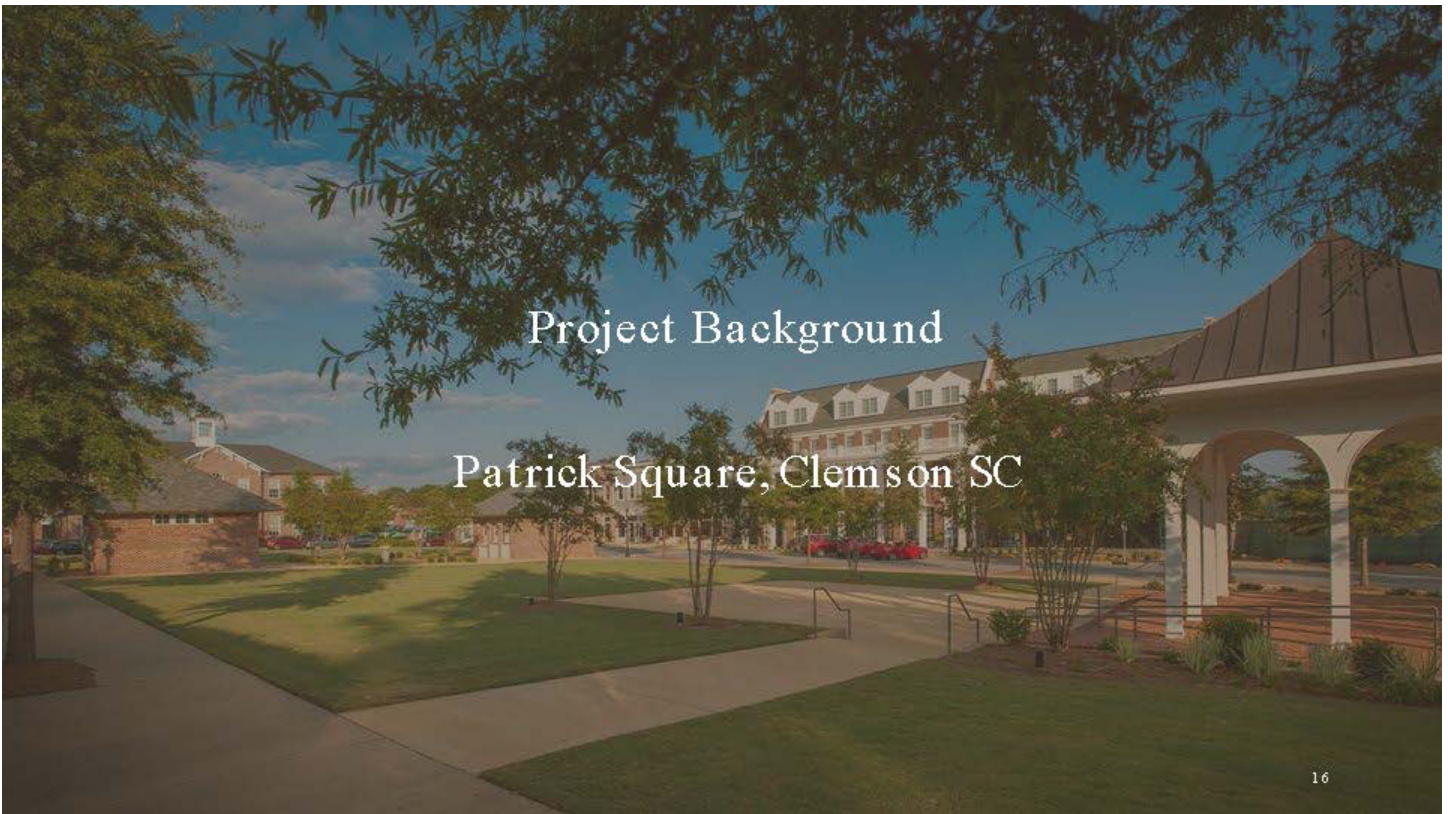
The plan for future construction requires residents to move in and help fund progress

Still need roughly \$600 million dollars

Has become reclassified and named as “Luxury Living”

Project Background

Patrick Square, Clemson SC



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Patrick Square

Located 10 minutes from Clemson University

Directly off Highway 123, connecting it to Easley and Greenville SC

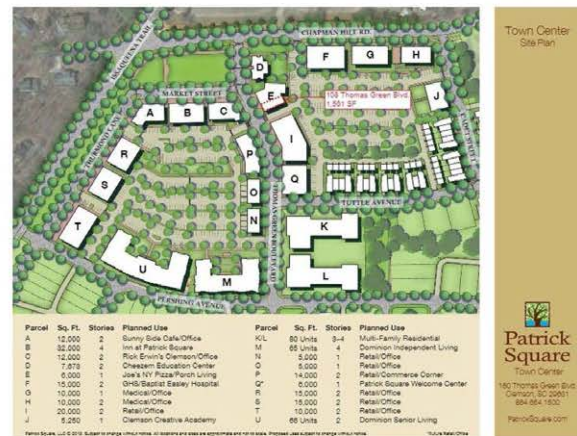
“Preserve homes, Single Family Houses, Townhomes, and single level villa”

Commercial and Residential Zones, along with public spaces, paths, and parks

17

Plans for Patrick Square

- “Walkable and Integrated Community”
- Commercial Zone and Village Green act as a buffer between the highway and residential buildings
- Hotel, Prisma Health facility, Kite Hill Brewery, multiple restaurants, a butcher, boutiques, and offices
- Meant to foster social communities among residents, locals, and visitors
- Promotes the OLLI Program, a senior citizen activeness program
- Community programs for weekends, holidays, Clemson football games, and year-round activeness



Why Study Patrick Square?

The study of an already implemented mixed-use development produces results that shed light on the benefits compared to traditional subdivision design

A Post-Occupancy Evaluation is similar to a cost-benefit analysis

Data of resident experience and satisfaction will isolate characteristics of Patrick Square that are successful elements of mixed-use design



The Corner Butcher and Pharmacy at Patrick Square

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Entrance and Pavilion on the Common Green

Merit and Importance

1. Understand the opinions, preferences, and satisfaction of residents and visitors in Patrick Square
2. Determine and create best practice standards for Mixed-Use Design
3. Inform designers and Landscape Architects on user satisfaction of mixed-use design

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Methods of Research

Resident Survey

Visitor Survey

Behavioral Observation

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INFORMED CONSENT FORM

You are asked to participate in a research study funded by the School of Architecture, Arts, and Humanities and conducted by Clemson University Department of Landscape Architecture. The purpose of this study is to study the occupants of Patrick Square and their opinions, preferences, and satisfaction with amenities and characteristics of Patrick Square.

Participation in this survey is completely voluntary, anonymous, and will take less than 10 minutes. If you choose to participate, you may quit at any time without penalty of any kind. If you choose to discontinue the survey, your results will be discarded.

Your answers will be anonymous. The results of the study may be published but your name or any other identification will never be known. Participating in this survey presents no foreseeable risks or direct benefit to you. However, data recorded by this survey has the potential to answer research questions beyond the scope of this work, therefore, data generated by this survey may be kept in perpetuity.

You may keep a copy of this consent form for your records. Would you like a copy? ☐ Yes ☐ No If so, which format, paper or email?

If you have any questions or concerns about the research, please feel free to contact Principal Investigator Alexander Leonard (xxx-xxx-xxxx) or Principal Advisor Hala Nassar (xxx-xxx-xxxx)

This research is approved by the Clemson Institutional Review Board. If you have questions regarding your rights as a research subject, you may contact the Clemson Institutional Review Board, Phone (864-656-0636, Email: irb@clemson.edu)

Thank you very much for your willingness to help advance this research.

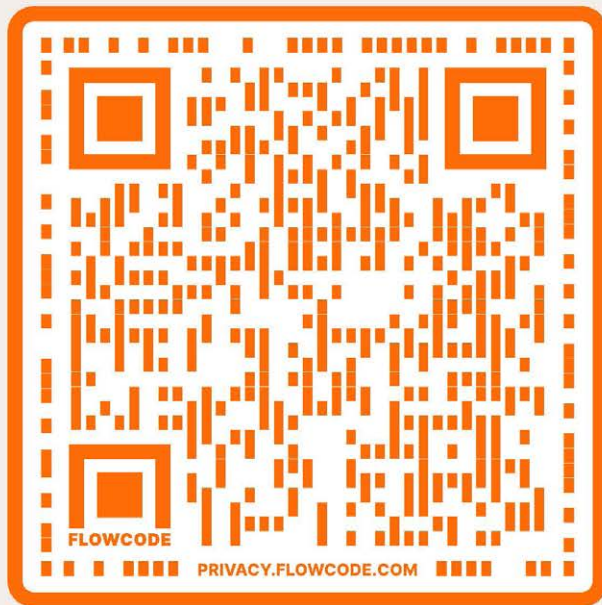
Sincerely,

Research team

Consent Form

The consent form will be published at the beginning of the survey, ensuring that participants see and read it before proceeding to the study

22



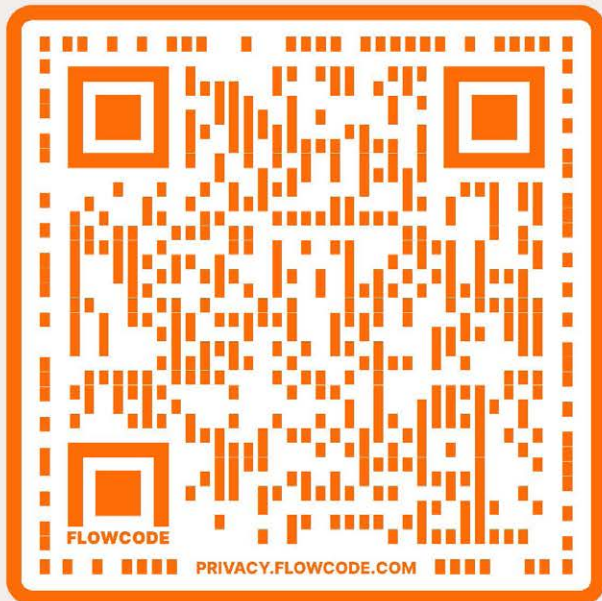
Resident Survey

https://docs.google.com/forms/d/e/1FAIpQLSfY69NkjUCDPn9LzbiuUlnZwoj0uJ_TO_-aJ_vOKIAxIMdfJg/viewform?usp=sf_link

Surveys will be accessed through a QR code that residents can scan on their phones and submit completely anonymously

QR codes will be found on flyers placed on their mailboxes

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Visitor Survey

https://docs.google.com/forms/d/e/1FAIpQLSfFQ6OgMsoRP18OosQNgT9OJBGeLW0V0UmV3XR2d6EjNvjqiA/viewform?usp=sf_link

Surveys will be accessed through a QR code that visitors can scan on their phones and submit completely anonymously

QR codes will be found on flyers handed out at special events and placed on the flyer boards around Patrick Square

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Count the number of cars entering and exiting the three entrances around Patrick Square

Record the average times of a visitors visit

Record the number of walkers through public trails and paths

Count the number of people vs. cars that enter

Observe and record the number of visitors on a regular day vs. a day with a planned public event

Behavioral Observation

Much of this study relies on the experiences and behaviors of residents and visitors

This will study and compare specific actions and places in Patrick Square

The observation will be a hands-off study by an observer with a set list of observations

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Resident Survey

These will be taped to residents' mailboxes or slipped into their mailboxes in the case of apartment mail rooms

Surveys are always available during the study and are anonymous with only the answers being recorded

Visitor Survey

These will be handed out during events such as Weekend Farmers Markets, Movie Night, or Football Tailgates

There are also several boards around the commercial zone where posters can be placed regarding other surveys and public events

Behavioral Observation

These observations will occur on well weathered weekday afternoons and weekends, the predicated day for highest volume of people. There will be a full week of study during each month

Plan of Work

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Expected Results



Resident Survey Results

The survey will reveal the opinions, preferences, and satisfaction levels on resident's experiences and the elements of Patrick Square

Their responses will highlight specific programs, concepts, and physical features of Patrick Square and Mixed- Use Design that can be analyzed as positive or negative

Sidewalk along Cadet St. in Patrick Square

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Honey stand at a local Farmers Market in Patrick Square

Visitor Survey Results

These surveys will tell us the opinions, preferences, and level of satisfaction of the experiences of visiting Patrick Square

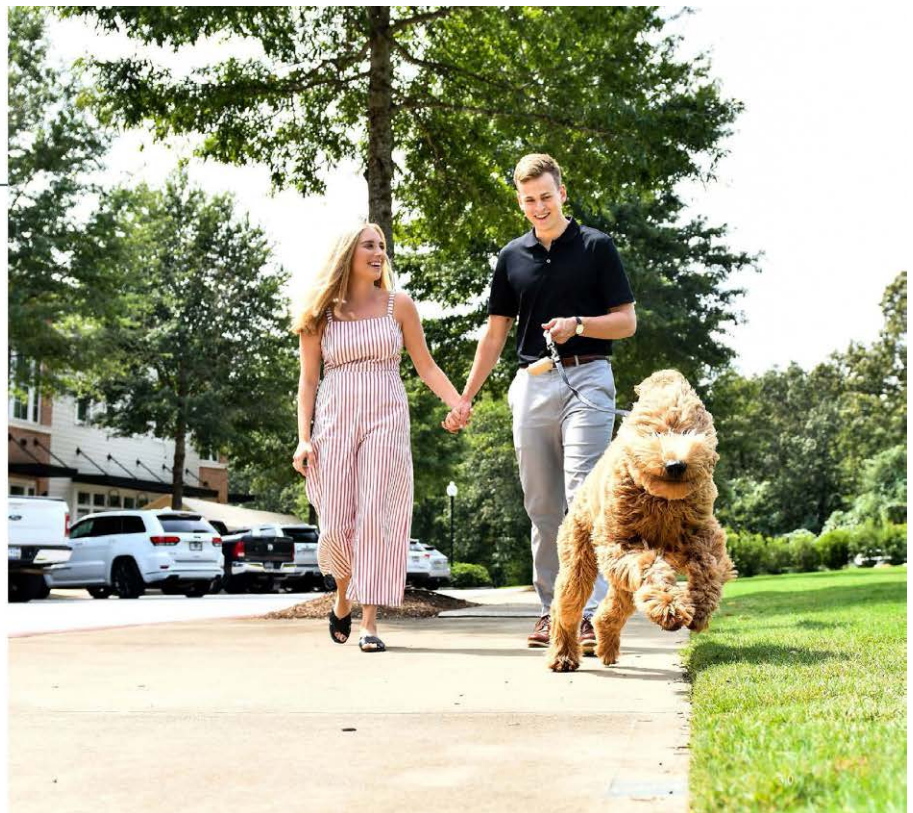
The results will specifically reveal visitors' thoughts regarding elements of Patrick Square that were created for non-residents

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Observation Results

Behavioral Observation will result in habits and patterns of residents and visitors

These habits and patterns will show subconscious preferences of characteristics and physical features



Overall Results

The survey questions and observations will directly answer the residents' opinions, preferences, and satisfaction with

- Multiple House Typologies
- Smaller Lots
- High Density
- Walkability and Circulation
- Public Program
- Proximity to Commercial and Retail Shops
- Common Space
- Environmental Planning



The answers to the opinions, preferences, and satisfaction with these mixed-use elements will determine the overall effectiveness of Mixed-Use Developments as a high-density design

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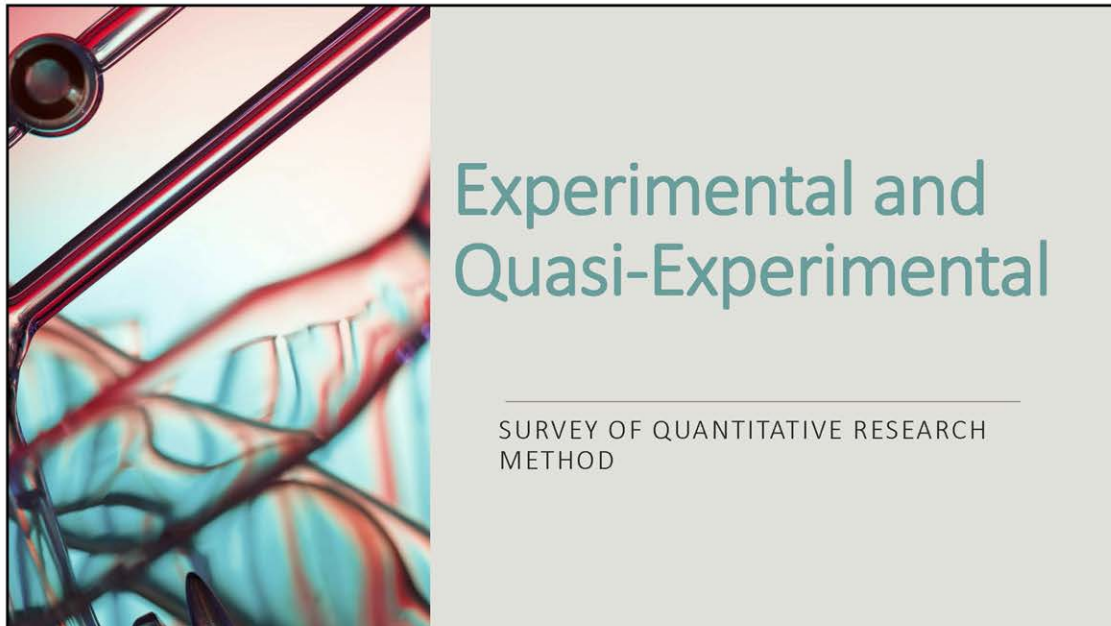
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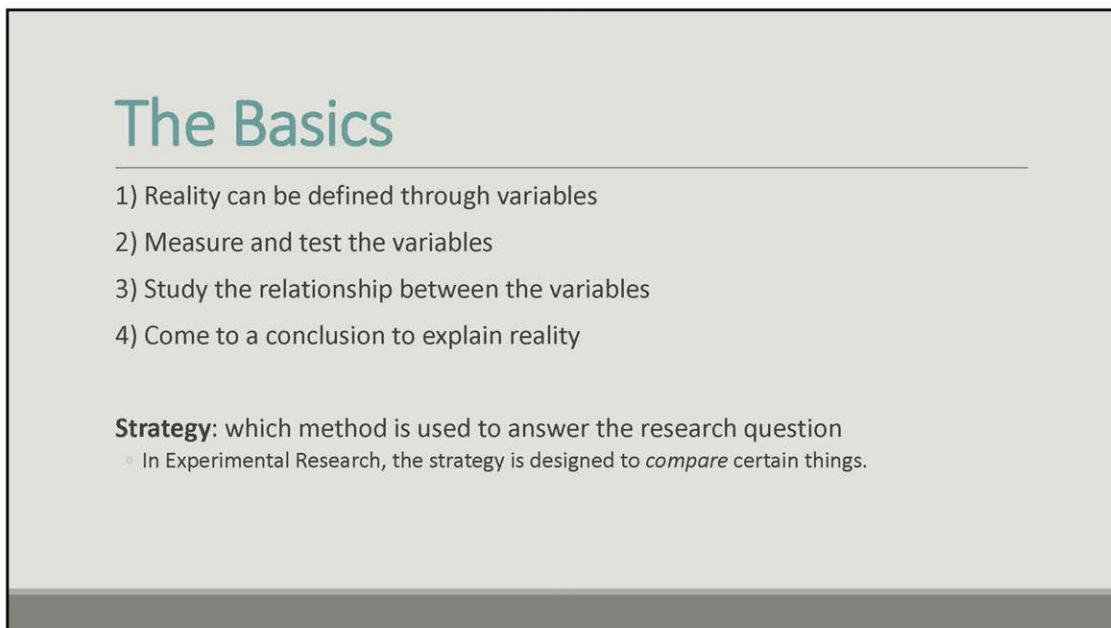
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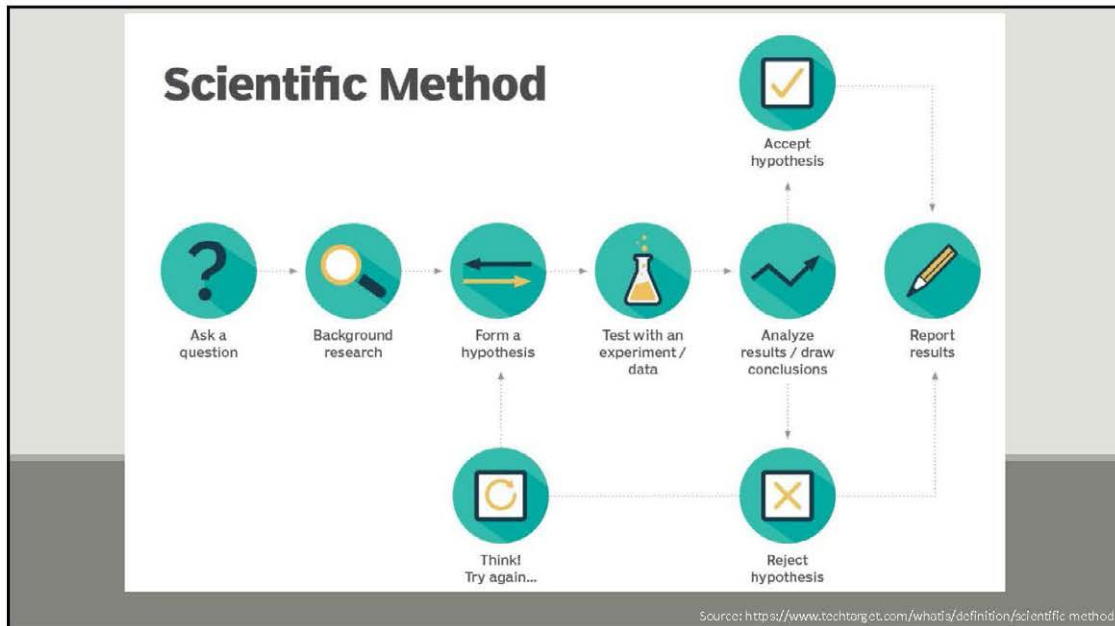


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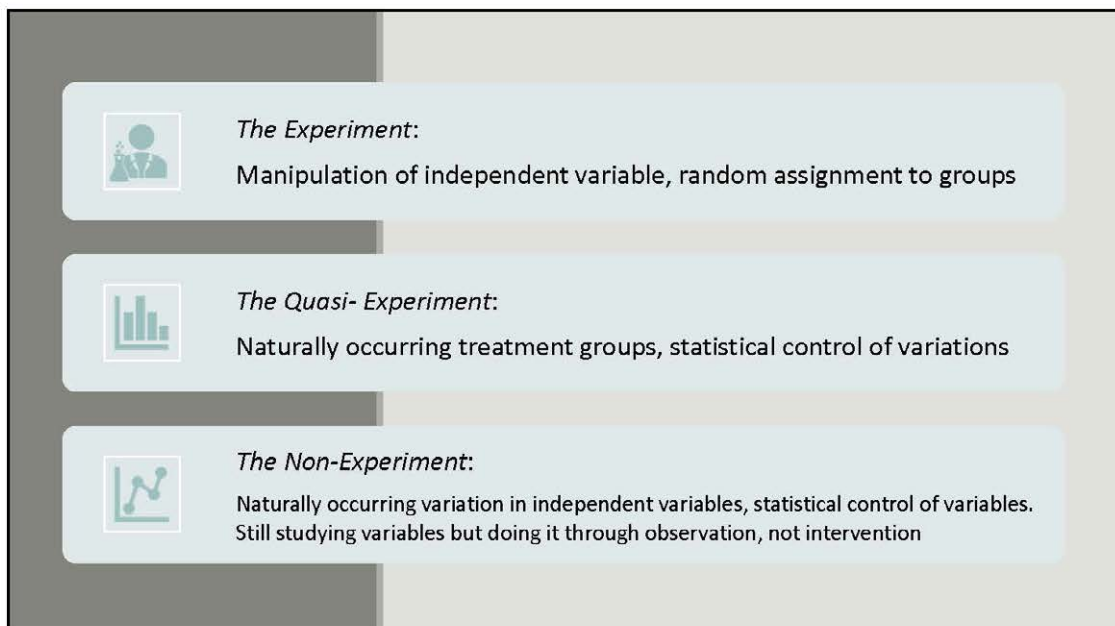


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3



4

2



Study of Plants in Classrooms

INFLUENCE OF LIMITEDLY VISIBLE LEAFY INDOOR PLANTS ON THE PSYCHOLOGY, BEHAVIOR, AND HEALTH OF STUDENTS AT A JUNIOR HIGH SCHOOL IN TAIWAN

Ke-Tsung Han
National Chin-Yi University of Technology

5

Hypotheses

1. Limitedly visible leafy indoor plants can **reduce the psychophysiological stress** of the students.
2. Limitedly visible leafy indoor plants can **enhance cognitive functioning**, focus attention, and even **improve academic** performance of the student.
3. Limitedly visible leafy indoor plants can **reduce student misbehavior**.
4. Limitedly visible leafy indoor plants can **reduce hours of student sick leave**.
5. The influences of limitedly visible leafy indoor plants on students' psychology, behavior, and health will **change through time**.

6

3

Variables

INDEPENDENT

The Cause

The Cause is applied to a treatment group

DEPENDENT

The Effect

The Effect is measured and compared

CONTROL

Other Factors

A group is created that does not have the Cause applied OR specific factors are controlled

- The goal is to have groups be alike except for the treatment being applied
 - *How do we do this?*

7

Experiment and Control Groups



Experimental group:
plants in the classroom



Control group: no plants in the classroom

Independent variable: THE PLANTS!

8

4

How to Control Variables

Why? There are some factors that might affect the outcome of the relationship we want to study or cause the data to be improperly interpreted.

Physical



Statistical



9

Physical

Variables are controlled in the design and application of the research – *before*

1. **Randomization:** not systematically present
2. **Restriction:** not allowing any variation
3. **Matching:** matched trait by trait

Statistical

Variables are controlled in the analysis of the data – *after*

1. **Stratification:** analyzed separately
2. **Partial Correlation:** separated from relationship with other variables
3. **Analysis of Covariance:** separated first

10

5

Defining Variables

DISCRETE VARIABLES

- Vary in category or type
- Example: occupation, presence or absence of something
- Sharpens comparisons



CONTINUOUS VARIABLES

- Vary in degree, level or quantity
- Example: age, height, weight, degree of interest
- Occurs on a continuum, more flexible
- Interval of measurement: distance between each rank



11



Latent Traits

In social and psychological research, a characteristic or trait that is *not directly observable*

- The interaction with the environment can produce observable indicators or items
- These items can infer the level that a trait is present
- *What are some observable interactions with the environment that we can use to infer level of stress?*

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Constructing the Measuring Instrument

- 1) Define what is being measured
- 2) Choose a measuring technique
- 3) Generate indicators
- 4) Pilot test with 5-6 people
- 5) Formal second draft with ~25 people
- 6) Modify and reduce scale in order to select the best items

13

Measuring Techniques



- 1) STAI – measure **immediate anxiety perceived** by individuals, uses a 4-point scale, 20 statements
- 2) RCS – measure if an environment helps reduce **mental fatigue**, 7-point scale, 22 statements
- 3) RS – measures the influence of environment on **psychophysiological stress**, 9-point scale, 8 statements
- 4) WBM – determines **attention level**, 5-point scale, 26 statements
- 5) Objective data:
 - Exam scores, hours of sick leave, punishment records



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Controlling the Administration of Survey

- The selection of the experiment and the control groups was randomly
- The same research assistant conducted the surveys for each group
- Survey given during regular class meetings at the same hour on the same day.
- Randomly decided which group would take the survey first
- Each survey took about 10 minutes to complete.

15

RELIABILITY

- Consistency over time
- Internal consistency
- High reliability = low error variance

VALIDITY

- Content validity
- Criterion related validity (concurrent, predictive)
- Construct validity

16



17

What are the independent, dependent and control variables?

INDEPENDENT: Cause, Treatment
DEPENDENT: Effect
CONTROL: similar group for comparison

18

What type of variables? Are there latent traits?

DISCRETE OR CONTINUOUS

LATENT: hidden, not directly observable

19

Does this experiment add to the body of knowledge?

LANDSCAPE ARCHITECTURE, ARCHITECTURE, CITY PLANNING

20

10

Is this a well designed and applied experiment?

ARE THERE WAYS IT COULD BE IMPROVED?

ARE THERE OTHER WAYS IT COULD HAVE BEEN CONDUCTED?

IF YOU WERE TO DO THIS EXPERIMENT, HOW WOULD YOU HAVE APPROACHED IT?

21

Compare/ contrast each experiment

22

11

How does the conclusion of this research affect how you would approach a design?

23

How could we synthesize both experiments into a new one to expand body of knowledge further?

24

New Experiment

Research question

Hypothesis

Independent variables

Dependent variables

Control group/ covariates

Measuring instrument

25