BIOPHILIA: A STUDY OF HOW NATURE-FOCUSED ENVIRONMENTS INFLUENCE BLACK STUDENT WELLBEING THROUGH AN ECOLOGICAL SYSTEMS THEORY LENS

by

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Dedication

This dissertation is dedicated to my husband and daughters. I hope our children's children are proud of the world we create for them as they fly high through the dandelion dreams of our ancestors.

Acknowledgments

Thanks to the support and love of those around me, I'm living my dream!

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now entering the next stages of our lives and careers. Let's continue supporting each other through everything that comes our way. Go Trojans! Fight on!

God is good!

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Abstract

Black students who live in low-income urban areas that lack nature continue to be disproportionately impacted by structural racism, environmental ecosystems, and social circumstances, which adversely affect academic achievement and wellbeing. The biophilia hypothesis posits that humans have an innate connection to nature that is integral to healthy functioning. Using Bronfenbrenner's bioecological systems theory as a foundation, this study further explores how a child's development is affected by inherited genes and behaviors, their interactions with people and objects in their environment, as well as symbols they encounter. This theoretical perspective was used when conducting surveys, interviews, and focus groups. This study found that, although some schools are beginning to provide features of biophilic design (e.g., community gardens, nature-based instruction) on their campuses, there is still room for improvement in other areas, including natural lighting, water features, animals, and indoor–outdoor learning opportunities. Findings also indicated that the lack of transportation, resources, and public policies that support access to green spaces are key reasons why Black students have little access to the natural world. Consequently, students still have much fear and apprehension about things like animals, the woods/forest, the jungle, and ocean swimming. The study provides recommendations for how different groups who influence kids, such as educators, nonprofit leaders, and policymakers, can create opportunities for students to spend time around nature to help address some of the systemic challenges in Black communities.

Key words: Biophilia, Black students, bioecological systems, structural racism, low-income urban settings, wellbeing, mental health, environmental justice, nature-based instruction, green spaces

CHAPTER ONE: INTRODUCTION

From the moment enslaved Black children stepped on Virginia's sandy shores, their inherent connection with nature has been fundamentally altered by European slave traders who kidnapped them from their nature-rich homes in Africa. Today, Black students and their families who live in urban areas continue to be disproportionately impacted by structural racism, their environmental ecosystems, and social circumstances, which adversely affect their academic achievement and wellbeing. While the COVID-19 pandemic-related lockdowns forced many families and children indoors, the economic and social injustices that have disconnected Black students from nature—overly exposing them to multiple layers of traumatic conditions in their environment—made it virtually impossible for them to focus on school. However, a growing body of evidence is making a compelling case that exposure to nature and biophilic-designed environments provide numerous health, wellbeing, and academic performance benefits (Kellert, 2018).

Biophilic design consists of architectural and health science practices that stem from both Eric Fromm (1964), who coined the term *biophilia*, and E.O. Wilson (1984), who finetuned the theory, which postulates that humans are intricately connected to nature and its natural design systems. For instance, a seminal study by Roger Ulrich (1984) found that randomly sampled patients who had rooms with a window had faster recovery times, needed fewer pain killers, and experienced fewer complications after surgery. Annerstedt and Währborg (2011) reported similar physical, mental, and behavioral benefits in their review of 100 studies on the benefits of exposure to nature.

Low-income urban Black students live in neighborhoods and attend schools with higher levels of environmental pollution, diesel emissions, and contaminated water (Johnson et al.,

2021). Research has linked the effects of environmental pollutants to health disparities, such as high asthma rates, low-birth rates, and mental impairment (Johnson et al., 2021). Asthma impacts low-income Black students at higher rates and are correlated with low academic performance and school attendance (Johnson et al., 2021). In addition, urban schools maintain very little green space, tree cover, vegetation, and color. These asphalt-laden ecosystems limit opportunities for a child's inherent connection with and access to nature and its potential benefits. Research has shown that students in schools that have tree cover, natural lighting and materials in classrooms, and access to outdoor green spaces have better school attendance, higher test scores, and ameliorated motivation to learn (Kellert, 2018). Kuo et al.'s (2018) linear mixed model study found significantly higher math test scores at 318 public schools with green cover in Chicago, with a marginal significance in reading scores. Kellert (2018), in a national study of 1,500 middle schoolers, also found a high correlation between exposing students to nature and augmented learning skills, better self-esteem, improved critical thinking, physical strength, and creativity.

Nature is a public good that provides a myriad of health, wellbeing, and cognitive developmental benefits to children (Kellert et al., 2008; Louv, 2008; Taylor et al., 2021; Ulrich, 2008). White et al. (2019) found that 120 minutes per week of direct exposure to woodlands, parks, and beaches is associated with self-reported "good health and wellbeing" (p. 1). For this study, wellbeing as a subjective construct that is defined and measured by how students feel about themselves, their positive and negative emotions, their relationships with others, and their self-actualization within a school learning context (McLellan & Steward, 2015). However, the benefits of well-being remain difficult for Black students to access (Rowland-Shea et al., 2020). Of the 7.7 million Black students enrolled in pre-K through grade 12 (PK-12) in the United

States, one-third live in impoverished communities that lack the necessary resources to help them succeed. The National Center for Education Statistics (NCES) and Institute of Education Sciences (2021) reported that nearly one-third of Black students in the United States lived in poverty in 2021, compared with only 10% of White students. The NCES report further highlighted that those Black students were disproportionately living in single-parent households with caretakers who had less than a high school education. In addition, Black children in urban settings spend less time outdoors engaging with nature and more time indoors on mobile devices than their White, Asian, and Hispanic counterparts (Kellert et al., 2017).

Background of the Problem

A recent study found that 68% of Black Americans lived in neighborhoods that are deprived of nature (Landau et al., 2020). Another study noted that many neighborhoods have,

> …fewer trees to filter the air and provide shade on a hot day; fewer wetlands and marshes to clean the water and to protect communities from floods and storm surges; there are fewer parks where children can grow their curiosity and fewer trails and public spaces. (Rowland-Shea et al., 2020, para. 6)

The Covid-19 pandemic highlighted the immense disparity in ability to experience nature between Black and non-Black students. While affluent parents were able to find safe and affordable outdoor activities, green spaces, water features and places to learn near them during the pandemic, Black parents did not have this same privilege. It is worth noting that being deprived of nature deprives children who live in these areas from having certain rights, such as clean air and water, after they spend a long time indoors doing online learning (Rowland-Shea et al., 2020).

Many environmental injustices come from a long history of racism and segregation that have shaped our reality today. For example, redlining was a policy practiced by mortgage lenders in which areas with large Black populations were noted on maps using red ink, essentially walling off these neighborhoods from development and investment that were instead focused on neighborhoods filled with their White counterparts (Perry, 2020). Not only did this limit access to homeownership and capital for Black people, but it also meant that Black neighborhoods were not protected from environmental hazards or gentrification. Redlining practices led to the deterioration of public health and safety, particularly in Black and Brown communities. The effects of redlining are still felt today (Rothstein, 2017). People living in areas that were previously redlined experience higher rates of poverty, inadequate housing conditions, and limited access to healthcare services, contributing to a heightened risk of violence in these communities as well as an increased vulnerability to exploitation by gangs and drug traffickers. These disparities are further exacerbated by the fact that Black youth are disproportionately affected by firearm homicides at higher rates than any other group in the United States (Kegler et al., 2022). Ultimately, redlining resulted in deep-seated racial disparities in home ownership, wealth accumulation, and overall quality of life.

Redlining is just one example of the many manifestations that perpetuated housing discrimination and segregated people into neighborhoods that lacked access to nature and green spaces. Understanding these past injustices helps shape and clarify the current ecological circumstances of Black students; such understanding is an important precursor for developing corrective action plans (Noguera et al., 2021). The time spent indoors and lack of access to green spaces, both pre- and post-pandemic, have had the most profound and negative impact on Black students.

Given such significant amount of time spent indoors, the school environment appears to be an ideal environment in which students can gain exposure to and benefit from direct contact with nature (Maller, 2009). Black children, like all children, have a love of and natural affinity with nature. This deep-seated connection is referred to as biophilia. The biophilia hypothesis postulates that the human experience is innately tied and attached to nature and this connection is predicated on biology or evolutionary experiences (Kellert et al., 2008; Kellert & Wilson, 1993; Söderland, 2019; Wilson, 1984).

Biophilia hypothesis asserts that humans are innately drawn to and benefit from regularly engaging with nature as physical settings can play a role in coping with stress. Particular experimental research has found a strong connection between exposure to natural environments and recovery from physiological stress and mental fatigue, lending support to both biophilia and stress recovery theories (Berto, 2014). An innovative nature-based curriculum can help build social, emotional, learning, and educational outcomes (Wilson, 1984).

Biophilic design was developed from this hypothesis on the human connection to nature and provides an applied understanding and direction that urban planners, architects, and developers can use to create biophilia in the built environment. Biophilic design has become popularized by Brown et al.'s (2014) *14 Patterns of Design* (p. 3) toolkit that identifies patterns to consider when creating designs that advance the wellbeing and health of people in urban settings. However, this study will examine in greater detail Kellert et al.'s (2008) seminal and approachable biophilic design in Chapter Two. Given existing evidence that the built environment plays a significant role in educational outcomes, this study will explore ways in which biophilia design in schools can decrease stress and improve learning outcomes for Black students (Determan et al., 2019).

Purpose of the Study

This study aims to understand the ecological influences that hinder Black students from connecting to biophilic environments and how these nature-focused environments affect their wellbeing and academic performance. This study uses a qualitative design to answer the two research questions:

- Research Question 1 (RQ1): What are the ecological influences that affect Black students' connections to natural environments?
- Research Question 2 (RQ2): How do nature-focused environments influence Black students' wellbeing and academic achievement, if at all?

This research examines data and assesses existing research through the lens of Bronfenbrenner's (2005) bioecological theory and considers the potential long-term impacts of environmental and social factors that existed before the COVID-19 pandemic in addition to the historical structural racism that has contributed to many Blacks disconnect, fear, and lack of access to nature in urban settings.

Importance of the Study

Many recent studies have discussed the benefits of biophilia in urban settings, but very few have examined the ways in which historical and current ecological systems have inhibited Black students from the restorative elements of interacting with nature. This study seeks to highlight uncommon solutions to the lack of nature on K–12 school campuses and within the community. The primary and ancillary lines of inquiry in this study may help policymakers, non-governmental organizations (NGOs), and educational leaders address inequities in opportunities for exposure to nature, which research has shown improves people's health and wellbeing. This research integrated current evidence on the benefits of exposing Black students to wildlife,

particularly those who lack access to nature, to create meaningful learning opportunities and public policy applied in practice to prevent the system from returning to its precursor. In this way, the research aims to improve Black mental wellbeing in the educational ecosystem and explore how Black students' exposure to biophilic environments may reduce stress levels and improve academic performance. It also strives to provide more opportunities for Black students to connect with nature, increase their emotional attachment to it, and foster a sense of community around natural places (Tabb, 2021).

Organizational Context

This study included surveys distributed to various regional and national organization such as the Children and Nature Network and the Green School Alliance, which partner with schools and teachers to provide students opportunity to connect with nature. The Children and Nature Network (CNN) is an organization that encourages nature-based experiences for children throughout childhood by mobilizing and supporting stakeholders such as educators, policymakers, and parents. By increasing equitable access to nature, CNN's mission is to ensure that children—and the natural world—can thrive. This national organization supports the idea that equitable access to nature needs to be driven by public policy and programmatic system change. CNN and the National League of Cities launched the Green Schoolyards Technical support through the Cities Connecting Children to Nature Network (CCCN) in 2020 (CNN, n.d.). This initiative provides more than 28 cities with resources to develop strategies to create more green spaces in both schools and neighborhoods.

The Green School Alliance (the Alliance) is a nongovernmental organization that creates connections to support the greening and sustainability efforts of schools around the world. It

provides best practice knowledge, public policy insight, and services to 6,000 schools and organizations (Green School Alliance, n.d.).

Overview of Theoretical Framework and Methodology

Bronfenbrenner's (2005) bioecological model builds from his original ecological systems theory, which contends that children's development is bidirectionally influenced and shaped by five complicated environmental systems: microsystems, mesosystems, exosystems, macrosystems, and chronosystems (see Figure 1). Bioecological theory explores the transactional ways in which a child interacts with the environment and how that environment in turn impacts the child's growth and development over time. The microsystem is composed of the people and settings closest to the child, such as family, peers, teachers, and childcare providers. It can be thought of as *the contact zone* where children interact directly with their physical and social environments. The mesosystem consists of interactions between two or more contexts within a person's microsystem; these could include parent-teacher meetings at school or exchanges between parents on how to best raise their children. The exosystem is composed of larger systems in which individuals do not necessarily participate directly but still influence the environment. Examples of this could be parents' work environments, the media, or the policies and laws of a community. The microsystem encompasses larger cultural values, beliefs, and traditions that influence micro- and mesosystems in a society. And finally, the chronosystem recognizes how changes to any of these systems over time can affect an individual's development. The study aimed to investigate the ecological influences on Black students' ability to access and connect with nature for their wellbeing, using the frameworks of biophilia and bioecological systems. In summary, Bronfenbrenner's bioecological model provides a

comprehensive framework for understanding how multiple systems interact with one another to shape child development.

Incorporating Ecological Theory and Biophilia into One Framework

According to the bioecological model, parents, caregivers, and teachers engage in transactional relationships with children that affect their development. Furthermore, these interactions are influenced by environmental settings, which are consequently affected by cultural norms and public policy. The current study examined how these relationships might interact when incorporating biophilic design and exposure to nature into a child's growth and development. Specifically, it explored how these interdependent systems promote Black students' health, both mental and physical, and their academic performance through biophilia.

Methodology Overview

This qualitative study was done with a transformative worldview that included multiple sources of data, such as surveys, semi-structured interviews, and focus groups. This method of data collection invited more open responses since participants were not bound by pre-determined scales or questionnaires. (Creswell, 2020). The study not only collected qualitative data but also used surveys and structured questions to generate reliable patterns and content. The study interviewed a total of 10 educators who hold various positions across different institutions. The study collected data from focus groups and surveys of 9 participants and 61 K-12 teachers in different cities across the United States.

Limitations

Every research study design has inherent limitations when it comes to data collection, analysis, and findings (Creswell, 2020). One of the limitations to consider with this study is interviewer bias and selection bias. The researcher took precautions to minimize selection bias,

however a question about demographic info still created an error in selecting participants for the data analysis. Respondents who were students filled out the survey but were not included in what was looked at. Because the survey went out to various organizations and individuals through snowballing, there may have been more white educators represented. These individuals work at Black schools but are more likely to be aware of biophilia and environmentally conscious than culturally competent. This could have skewed results that do not accurately reflect the opinions of that outside of this demographic. Additionally, since responses were anonymous, it is possible that respondents exaggerated or minimized their answers depending on their own personal biases.

Finally, there may be other unmeasured factors that have influenced educators' attitudes towards connecting students with nature such as prior experience with environmental education or curricular resources available in the school or district. These factors would need to be controlled for in future research to draw more accurate conclusions. Although this study has presented its findings, it is important to consider the limitations that have been discussed to understand how best to interpret the results and inform future studies (Creswell, 2020).

Definitions

Biophilia is a relatively new theoretical framework, yet many theoretical concepts are closely related to biophilia and biophilic design. In this study, nature and biophilia will often be used interchangeably. Bioecological is another significant concept that will be used throughout the text.

Biophilia

Erich Fromm (1964) coined the term biophilia, which E. O. Wilson later adopted this definition, which posits that humans have an emotional affiliation with other living organisms

that is passed down through generations. In other words, it is innate and part of who we are as people.

Biophilic Design

Biophilic design is an offshoot term of biophilia coined by Stephen Kellert, Roger Ulrich, Bill Browning, and Judith Heerwagen, who advanced the ideas and application of architectural design elements associated with biophilia (Beatley, 2016).

Bioecological Systems

A bioecological system encompasses an individual's personal traits as well as the environmental context they are situated in. Furthermore, to get a comprehensive understanding of both the person and their environment, these two elements must be analyzed simultaneously.

Biophobia

Biophobia is the disconnection and fear of nature that create behaviors unconcerned with or harmful toward the environment.

Biophilia Paradox

A biophilic paradox occurs when a contradictory relationship exists between a person’s innate inclination to connect with nature and his or her ecological realities.

Concentrated Poverty

Concentrated poverty refers to a geographical area with an overrepresentation of high or extremely high rates of poverty, in which at least 40% of the census tract population is below the poverty line.

Ecological

Ecological refers to the study of ways in which living things interconnect in environments.

Structural Racism

Structural racism refers to a pervasive system that reinforces racial inequality through historical and current public policy, organizational practices, and cultural norms, thus maintaining societal advantages and disadvantages associated with skin color.

Organization of the Dissertation

This dissertation is composed of five chapters. The first chapter provided an overview of the research on the current and historical challenges Black children face in systems that do not appear to promote their access to and relationship with nature. This chapter also sets the goals and describes the key terms utilized throughout the study, highlights the research questions, and briefly describes the theoretical framework that will guide the study. Chapter Two synthesizes the relevant research and the conceptual framework connected to the study's scope. It includes a discussion of the historical challenges Blacks have faced in building connectivity to nature and builds an understanding of Black children's biophilia access and acculturation, benefits of biophilia, and the intersections of Black children's experience with nature within a bioecological framework. Chapter Three highlights the qualitative approach used to tackle the two proposed research questions. Chapter Four will describe the data collection process and findings from the surveys and semi-structured interviews. Chapter Five presents a discussion of a proposed community public policy agenda and pedagogical plan based on the research results and literature review.

CHAPTER TWO: REVIEW OF LITERATURE

Today, Black students and their families live in neighborhoods that are impacted by ecosystems that lack natural and economic resources, which is affecting their academic achievement and wellbeing. The literature review discussed historical injustices that have continued to disconnect Black students from nature. Such ongoing exposure exposes individuals to multiple layers of traumatic conditions in their environment. As a result, Black students encounter difficulties when trying to focus on school. This study defined this dynamic as a biophilic paradox—namely, when a contradictory relationship exists between Black children's innate inclination to connect with nature and ecological systems, making it difficult to access nature.

Nature provides children with various health, wellbeing, and cognitive developmental benefits (Kellert et al., 2008; Louv, 2008, Taylor et al., 2021; Ulrich, 2008). However, Black students have challenges in accessing such benefits (Rowland-Shea et al., 2020). As Kellert et al. (2017) explained, Black children in urban settings tend to remain indoors and spend less time outdoors than their non-Black peers. As previously stated, more than twice the number of Black students live in poverty than their White counterparts (NCES & Institute of Education Sciences, 2021) and tend to live in single-parent households in which their caretakers have less than a high school education. To explore the deep-seated connection to nature (i.e., biophilia) and its impacts on Black students' educational outcomes, this study used Kellert et al.'s (2008) biophilic design. This design, which incorporates six design elements and 72 attributes under two dimensions, emphasizes the importance of planners incorporating both naturalistic and place-based dimensions. Naturalistic dimensions include forms and shapes found symbolically, directly, indirectly, and inherently in humans' connection to nature. Place-based dimensions are the

architectural design of buildings and landscape that reflect the ecological and cultural locale of a geographic area. The two dimensions' six design elements are environmental features, natural shapes, natural patterns and processes, light and space, place-based relationships, and evolved human–nature relationships. Within each of the six elements are features that describe the applicable characteristics.

In an effort to understand biophilia in greater depth, this chapter first reviews literature on the history of Black students' relationship with nature, the progressive lack of exposure to biophilic environments, and the impact of this lack of exposure on the wellbeing and academic performance of K–12 Black students within the urban ecological system. The review also explored the characteristics and benefits of biophilia and biophilic design, which asserts that humans are innately connected to nature through their biology. Finally, this chapter connects biophilia theory with Bronfenbrenner's (2005) bioecological model to frame an understanding of the potential impact of natural environments on Black students' wellbeing and academic performance. This chapter ends with a discussion of Bronfenbrenner's bioecological systems theory, the theoretical framework guiding this study. In this way, the literature review informs the two primary research questions guiding this study:

- Research Question 1 (RQ1): What are the ecological influences that affect Black students' connections to natural environments?
- Research Question 2 (RQ2): How do nature-focused environments influence Black students' wellbeing and academic achievement, if at all?

Black Students within an Ecological Systems Context

The historical legacy of exploitation, racism, and discriminatory policies, systems, and practices has excluded Blacks from accessing trees, green spaces, and other natural environments

and in some instances, placed them in toxic environmental conditions. Noguera and Alicea (2021) argued that structural racism is not dependent on an individual's racist actions, but instead on the function of systems and institutions. As an example, structural racism is demonstrated through public policy and institutional structures that permit Black families and their children to be disproportionately exposed to polluted water sources, unwelcome highways, landfills, and limited access to nutritious food options or nature.

Johnson et al. (2021) found that predominately Black communities in Los Angeles County endure higher shares of adverse environmental challenges than wealthier White communities. Consequently, Black students residing in urban areas are more likely to suffer from health concerns such as asthma and obesity. These issues then lead to poor attendance, high dropout rates, chronic absenteeism, and lower grades (Johnson et al., 2021). In urban schools, structural racism operates through school funding policies, which are often based on local property taxes (Darling-Hammond, 2010).

According to DeLuca and Demo (2001), considering ideas related to wilderness in a historical context while analyzing explicit racial connotations enables researchers to encourage mainstream environmental institutions as well as society to consider alternate understandings of and experiences with nature. For instance, Kellert (1984) asserted that human emotional connection to nature predicts their knowledge about nature, their experience with nature, and the kinships they develop to the environment.

A significant body of research has demonstrated that many Black people are disconnected from nature; some even fear it, preferring more urban landscapes (Lewis & Hendricks, 2006). However, prior to the European initiation of the slave trade, most West Africans lived in environments rich with trees, precious metals, animals, and water elements. Even when forcibly

transported through the Middle Passage as part of the slave trade, Africans brought with them spiritual customs and beliefs that an interconnectedness exists among the spiritual, human, and environmental realms, where harm to one would indelibly impact the others (Glave, 2010). The research of various environmentalists leads one to believe that Black people are naturally estranged from nature and less likely than other groups to have an attachment to environmental issues. However, this portrayal of history is inaccurate (Anifowoshe, 2020). Through a bioecological lens, examining the phenomenon of Black individuals' fragmentation from nature—or biophobia—has more to do with the interplay between historical and current macro systems; it influences the behaviors and attitudes of the individual and cultural groups on both a micro- and exosystem level throughout history (Bronfenbrenner & Morris, 2007). Throughout the past 400 years, many Black people were forced to leave their native lands. Despite this, they were still able to hang on to a lot of their physical, spiritual and nature-inspired customs (Anifowoshe, 2020). Dunning (2021) noted:

> To be a slave was to be an unwilling party to multiple violations of the natural world; it was to participate in a system of extraction that was also extracting humanity out of you; it was a compulsory victimization that exploited both the land and yourself (p. 14).

Dunning argued that such forced servitude invoked a fear that was further exacerbated by forced labor; it also racialized the landscape until an individual's beliefs about his or her own freedom and engagement with nature became dependent upon the individual's bondage. Such bondage prevented individuals' freedom of movement and restricted them from walking outdoors, unsupervised, for pleasure.

This reality is in stark contrast to narratives in which some West Africans describe their relationships with nature prior to slavery (Dunning, 2021). Equiano (1789) described his

experience as a free man in Benin as a place where "land [was] uncommonly rich and fruitful" and human labor was applied mostly to give back to the abundant blessings nature provided (e.g., palm trees, vegetables, fruit, and animals) (p.16). Such narratives suggest that, prior to slavery, Blacks had a more synergistic relationship with nature as a result of this unrestrained access. Yet the many fears about nature that have since changed and become more nuanced appear to be more connected to the access granted through one's social and ecological circumstances (Kellert et al., 2017; Rowland-Shea et al., 2020; Taylor, 2018, 2019).

Black Student Biophilia and Biophobia

A plethora of earlier biophilia-related research has linked Blacks to unfavorable attitudes toward the environment and nature (Kellert, 1984; Lewis & Hendricks, 2006; Schroeder, 1989). Johnson et al.'s (2004) research, based on the 2000 National Survey on Recreation and the Environment found that Blacks are less likely than Whites to visit wilderness areas or engage in wildland-related recreational activities—with fishing being the exception. For instance, Schroeder (1989) and Kellert (1984) postulated that Blacks who live in urban areas are less informed about environmental issues than White suburbanites and rural residents. However, many of these early studies focused heavily on racial differences without considering variables within students' ecosystems. In a study of college students' views of nature, Taylor et al. (2021) found that Black (52.5%), Latinx (55%), and Asian (51.6%) students were more likely than White (35%) students to think about their "disconnections from nature" (p. 30). The study further examined the notion of a "sense of connection to nature" and found that 93.3% of Blacks, 94.7% of Latinx/other, 81% of Asians, and 96.1% of Whites "felt neutral/somewhat/very connected to nature" (p. 30). As previously indicated, the notion that Black people inherently do not care

about the environment does not provide an accurate historical picture of the Black experience of connection with nature (Taylor, 2018).

Although Black individuals' disengagement from nature is not an intrinsic characteristic, numerous studies have highlighted Black people's biophobia, or fear of nature. For example, Taylor (2019) found that minority students were more likely than White students to be fearful of and think about the dangers of nature and, thus, be disconnected from nature. Indeed, when contemplating engaging nature, almost 64% of Black students reported being concerned about predators in nature, such as wild animals, compared to 33% of White students (Taylor, 2019). However, Taylor (2018) rejected the notion that Black individuals' fear of nature is inherent or biologically based, as such a conclusion fails to consider other factors. Many Black students and their families have phobias and are disconnected from nature due to racialized public policies and practices implemented during the slavery and Jim Crow eras, which robbed them of opportunities to enjoy public parks, beaches, wetlands, and woods, thereby excluding them from experiencing nature on their own terms (Finney, 2014).

Johnson (1998) found that Blacks are generally less attracted to wildlands than whites. He suggested that this may be due to an intergenerational memory of violence and oppression associated with Blacks' connections to the woods. As a result, Johnson concluded that Whites are more likely than Blacks to have strong attachments to wildlands. Johnson (1998) argued that environmentalism was primarily associated with White people, and because of racism, the environmental movement has often been neglectful or even hostile toward Black individuals. It is essential to shift negative perceptions about wildlands before they become ingrained in social attitudes over time (Johnson, 1998). Ultimately, Johnson (1998) argued that environmentalism and outdoor recreation should be more inclusive of different cultural perspectives if we are to

create a more equitable and environmentally just world. By addressing the historical legacies of racism in outdoor spaces, we can create opportunities for Black people to access and enjoy nature on their own terms (Johnson, 1998).

Decline of Green Spaces

Green spaces such as tree cover, community gardens, nature conservation areas, streams, green rooftops, and forests are essential ecosystems in communities that help maintain the balance between pollutants and urban congestion (Wolch et al., 2014). However low-income Black communities are disproportionately losing this natural land and vegetation at rates higher than White communities in the western United States (Landau et al., 2020). Landau et al. (2020) examined the U.S. Census 2017 Human Modification (HM) data, which have a metrics between 0 and 1 that measures human land use on a pixelated map. More specifically, the data revealed that Blacks experienced 6.8% higher HM or loss of natural land than the average American, whereas Whites experienced 11.7% less nature loss in their communities (Landau et al., 2020). This decline can, in part, be directly linked to racism, White flight (the act of Whites leaving a community en masse because of Blacks moving in), and the Great Northern Migration of six million Black people that took place between 1916 and 1917 (Taylor, 2019). This migration juxtaposed the inhumane plantations of the South, with their lush green spaces and animals, against the free urban areas in the North, with limited green spaces in cities such as Chicago, New York, Detroit, and Baltimore (Lewis & Hendricks, 2006).

Academic Barriers Within a Concrete Jungle

Black students and their family members are disproportionately living in neighborhoods that lack clean air, water, healthy food options, green space, and quality health services. As a result, Black students face numerous barriers to academic success due to the conditions of their

environment. Studies have found that living in poverty and environmental stress can lead to more disruption in school, lower cognitive scores, and increased absenteeism (Smith et al., 2020). Moreover, economic and social injustices, coupled with ongoing exposure to police brutality and violent acts, expose Black students to multiple layers of traumatic conditions that impede their ability to learn.

The lack of educational resources available in many neighborhoods inhabited by Black families leads to inequitable learning opportunities for these students. Children living in poverty attend schools with fewer teachers and inadequate curricular materials (Noguera et al., 2019). Furthermore, educational policies are often crafted without consideration for the various needs of Black students and families, leaving them at a disadvantage.

The educational disparities faced by Black students are further exacerbated by structural racism within schools. Studies have found that Black students face greater discipline than their White peers, with suspensions being disproportionately higher for African American and Latino youth (Noguera et al., 2019). Furthermore, lack of diversity in school staff often leads to lower academic expectations for these students and can lead to feelings of alienation and disconnection from the school environment.

COVID-19 Pandemic

The 2020 pandemic further exacerbated this situation. In the fall of 2020, Curriculum Associates, LLC (2020) conducted a study involving students from eight states—namely, 109,066 students for reading analysis and 148,868 students for math analysis—to compare the historical placement average with the 2020–2021 school year. The purpose of the study was to determine the level of potential learning loss faced by students in schools in the United States. The study found that, although all students experienced learning loss, schools with a higher

percentage of Black, Indigenous, and people of color (BIPOC) students saw higher numbers of students below grade level in both reading and math (Curriculum Associates, LLC, 2020).

UNESCO (2021) noted that approximately 100 million more children worldwide will not reach the minimum proficiency level in reading due to educational disruptions caused by the health crisis. Furthermore, these students will continue to face difficulties accessing their education as a result of full or partial school closures. For Black students living in large cities built mostly from pavement and man-made structures—often referred to as a concrete jungle—this pandemic meant they did not have access to quiet outdoor areas where they could focus on their studies, learn new things, or even get some exercise.

The Harvard Center for Education Policy Research study conducted by Goldhaber et al. (2022) surveyed 2.1 million students from across 49 states and Washington D.C., finding that the shift to remote learning during the pandemic had widened achievement gaps along racial and socioeconomic lines. Black and Hispanic students were faced with more adverse effects, such as diminished math achievement, incompletion of courses, and higher failure rates in their studies (Goldhaber et al., 2022). The study also noted that low-income students were more likely to suffer from worsened academic performance due to the lack of access to suitable technology for remote learning.

The wide disparity in outcomes between White and minority students underscore the need for equitable access to quality learning resources for all students during times of pandemic-induced schooling. The authors concluded that there was an urgent need for more targeted interventions to help close existing gaps in educational outcomes and ensure that all students have access to high-quality education regardless of their race or socioeconomic status (Goldhaber et al., 2022) Furthermore, the authors contended that policy makers should

contemplate policies to reduce the differences in remote learning achievements across student demographics (Goldhaber et al., 2022).

Experimental research has found a strong connection between exposure to natural-like environments and recovery from physiological stress and mental fatigue, lending support to both biophilia and stress recovery theories (Berto, 2014). Martin (2006) reviewed literature on children's experience in the classroom and found that the classroom environment impacts both teaching and the learning environment through room organization, noise interferences, lighting, temperature and air quality, color, and density. For example, colors in a room can decrease or increase blood pressure and room temperature can inhibit or escalate student frustrations (Martin, 2006). The research noted that there are connections between physical attributes of school structures and educational performance. Ecosystems that fail to support student wellbeing create challenges for students to perform at their highest potential academically.

Mental Health & Wellbeing

As previously discussed, the COVID-19 pandemic significantly affected students, negatively impacting the "7.7 million Black students" in nearly 100,000 United States public schools disproportionately, when compared to other racial groups (Horsford et al., 2021, p. 6). A study by the Black Education Research Collective conducted by Horsford et al. (2021) found that close to 60% of their survey respondents noted that their mental health and wellbeing had been either extremely impacted (32.7%) or quite impacted (26.5%) by the COVID-19 pandemic. The national study collected surveys from 440 participants and 82 interviews in six cities across the country (Horsford et al., 2021). A Gallup (2020) survey of parents also found that nearly 30% said their child experienced challenges in their emotional and mental wellbeing because of social distancing and school closures.

The school closures, coupled with the 24-hour highlights on mass media of the George Floyd and Breonna Taylor murders, created a double-pandemic of trauma and mental health challenges for Black students and their families (Horsford et al., 2021). Indeed, questionable responses to police brutality and COVID-19 further eroded many Black families' and their students' trust in public systems (Horsford et al., 2021). The U.S. Department of Education (2021) pointed out how pre-existing disparities in resources, opportunities, and outcomes for students of color created additional race-based disparities in education as a result of the pandemic. Prior to the pandemic, Black students experienced multiple layers of violent images, which they viewed and experienced within their homes, at school, in their communities, and on social media (U.S. Department of Education, 2021). Since the pandemic these challenges have become more pronounced.

Biophilia

In Latin, *bio* means life, and *philia* means attraction to or love of (Fromm, 1964, cited in Söderlund, 2015, p. xi; Söderlund, 2019). Identifying and understanding the characteristics of biophilia, including the biophilia hypothesis, biophilic design, and biophilia urbanism, play an important role in conceptually understanding the empirical relationships and connections between nature and human health and wellbeing. Wilson (1984) was responsible for making the term biophilia widely known. His theory argues that humans have a natural inclination to connect with aspects of nature that imitate our environment (as cited in Kellert et al., 2008). However, the term biophilia was first created by psychologist Eric Fromm in 1964 to explain human psychological inclinations and the love of life and living things. Fromm believed that human biophilia cannot be achieved in a society absent of freedom, justice, and security.

Fromm (1964) argued that people's awareness of their existence and impending mortality creates anxiousness and internal conflict, thereby disconnecting them from nature. Urban environments devoid of nature and green spaces exacerbate this cognitive dissonance, causing individuals to regress to their violent primitive behaviors, which Fromm (1964) referred to as "the syndrome of decay" (p. 114).

There are three pathways to combating regressive tendencies that build one's human tranquility and balance: "freedom and independence, love for the neighborhood, and love of life or biophilia" (Fromm, 1964, as cited in Söderlund, 2019, p. 3). Biophilia, utilitarianism, and other virtue-based value systems provide a framework within which nature can heal us, give us a sense of freedom, and inspire creativity (Louv, 2008). When individuals have a love of nature and are connected to a place, they exhibit healthier altruist behaviors within their communities. Fromm (1964, as cited in Söderlund, 2015, p. 25) highlighted the needed characteristics for fostering biophilic realization:

- Warm, affectionate contact with others during infancy
- Freedom and the absence of threats
- Teaching by example (not preaching) the principles of inner harmony and strength
- Guidance in the "art of living"
- Stimulating influence of and response to others
- A way of life that is generally interesting

Wilson (1984) further described biophilia as an inborn inclination to gravitate toward life and lifelike processes. Individuals follow deeply established ways for dealing with and expressing their emotions as well as thinking critically, solving problems, and processing information. In his

Pulitzer award-winning book, Wilson (1984) hypothesized that humans have an intrinsic bond with nature.

Biophilia Hypothesis

The biophilia hypothesis postulates that the human experience is innately tied and attached to nature and that connection is predicated on biology or evolutionary experiences (Kellert et al., 2008; Kellert & Wilson, 1993; Söderland, 2015; Wilson, 1984). Kellert and Wilson's (1993) seminal theoretical work explored nature's impact on human value systems, nature's connection to human physical and mental well-being, human responses to landscape aesthetics, and cognitive development. They concluded that these connections are learned and systematically fall along an emotional continuum ranging from tranquility to fear-based anxiety and from wonder to apathy. They further explained that the biophilia hypothesis asserts that our human desire is (p. 21):

- Inherent (i.e., biologically based);
- Part of our species' evolutionary heritage;
- Associated with human competitive advantage and genetics fitness;
- Likely to increase the possibility for achieving individual meaning and personal fulfillment; and
- The self-interested basis for human ethic of care and conservation of nature, most especially the diversity of life.

Based on these assertions, providing a Black student with access to direct nature or mimicry of nature's designs will help build connection to nature which will result in improving well-being and academic performance.

Biophilic Design and Biophilic Urbanism

Concepts associated with biophilia and biophilic design, such as the importance of green space and sustainability, are not new. However, there is an increasingly rich body of evidence associated with biophilic design and its benefits. Biophilic design draws on the belief that humans have a need for connection with nature, and it is a growing architectural design approach that focuses on fostering human connectedness to nature, green building, and sustainability to the built environment while improving the intellectual, physiological, and mental wellbeing of urban populations. A burgeoning body of work connects biophilic design with the reduction of stress, enriched creativity, and improved learning outcomes (Browning et al., 2014; Determan et al., 2019; Kellert et al., 2008; Lee & Park, 2021; Salingaros, 2015). In Determan et al.'s (2019) study, researchers theorized and combined various neuroscience studies to come to the discovery that patterns found in nature are not only appealing to look at but were also easily processed by our brains. Furthermore, these sorts of patterns have a calming effect, which increases focus for individuals trying to learn something new. Biophilic design planning has evolved and now has frameworks for design concepts that reflect those found in nature and biology (Browning et al., 2014).

Connecting Nature with Structural Designs

Salingaros (2015) proposed that the environment and our innate biology should be incorporated into structural designs to help encourage healing in our built environment. The biophilic design process should incorporate a bottom-up, inclusive, and innovative approach. Several factors may impact design scale and patterns, such as demographics and climate connected to biophilia design application, for practitioners to improve health outcomes and wellbeing (Browning et al., 2014). Browning et al. (2014) created 14 biophilic patterns within

three design elements, “nature in space, nature analogues, and nature of the space,” that help provide a clearer framework for thoughtful biophilic design (p. 9). Nature in space focuses on the direct visual and contextual connection people have to/with nature, including contact with trees, water, animals, sounds, and other environmental elements. Nature analogues indirectly connect people to nature through biomorphic forms, patterns, and materials designed in the built environment. Conversely, the nature of space is the way in which people emotionally and psychologically respond to various spatial patterns, such as views, protected spaces, winding paths, and obscured features.

Lee and Park’s (2021) research explored biophilic design and the Green New Deal, a public policy measure aimed at reducing greenhouse gases and creating environmental resilience and sustainability in building a community’s inherent connections with nature. The results of their case study provided relevant applications for developing Green New Deal policies—addressing climate and social and economic inequality—that advance biophilic design projects. Schools within a child’s microecosystem may be one of the most significant places for implementing biophilic attributes so that children can experience and connect with nature. Miller (2018) research explored the impact of biophilic attributes (plants, water, animals, light, color, etc.) in fourth- and fifth-grade classrooms in 1,845 North Carolina public elementary (PK–8) schools. The research added to the growing literature based on biophilic attributes and student understanding in elementary schools and provided insights on low-cost ways to implement the biophilic design (Miller, 2018). In light of this understanding, the current study will use Kellert et al.’s (2008) biophilic design, as previously explained in Chapter 1, which is depicted in Figure 1.

Figure 1. Kellert et al. (2008) biophilic design: dimensions, elements, and attributes

Note: Biophilic design asserts that planners and designers should include both naturalistic and place-based dimensions. Naturalist dimensions include shapes found directly and indirectly in humans' connection to nature. Place-based dimensions are the architectural design of buildings and landscape that associate with ecological and cultural locale of a geographic area. Within the two dimensions are six design elements: environmental features, natural shape, natural patterns and processes, light and space, place-based relationships, and evolved human nature relationships (Kellert et al., 2008, p. 5).

Given existing evidence that the built environment plays a significant role in educational outcomes, the next section explores ways in which biophilia design can decrease stress and improve learning outcomes for Black students (Determan et al., 2019). Particular experimental research has found a strong connection between exposure to natural environments and recovery from physiological stress and mental fatigue, lending support to both biophilia and stress recovery theories (Berto, 2014).

Benefits of Biophilia Design on Student Wellbeing

In addition to academic benefits, research has identified the benefits of nature exposure on an individual's mental and physical wellbeing and performance (Kellert et al., 2018). The following subsections discuss these benefits in detail.

Stress Reduction

Contact with natural environments can reduce stress and mental exhaustion (Berto, 2014). Exposure to biophilic environments minimizes the negative impacts of traumatic stressors and provides vital psychological and emotional shields associated with urban circumstances. Heerwagen's (2000) seminal research on biophilia in the workplace revealed that individuals' productivity increased by 22%, worker motivation and satisfaction increased significantly, stress and absenteeism decreased, and a sense of well-being rose 20%. Wellbeing, as a subjective concept, is often used interchangeably with the term happiness that generally describe an individual's positive emotions and feelings (McLellan & Steward, 2015).

Many Black schools are asphalt-rich environments devoid of wellbeing-enriched elements such as natural lighting, interior/exterior plants, water features, landscaping, trails, and elements of refuge and exploration. Biophilic ecosystems provide more effective calming opportunities than urban settings, enabling people to recover from the loss of intellectual performance attributed to trauma and stress. An extensive laboratory study conducted by van den Berg et al. (2015) showed 46 participants stress-inducing scenery in a laboratory and discovered that participants' nervous systems had greater recovery time after viewing green-built space. The Capaldi et al. (2014) meta-analysis of 30 samples found that those who had a stronger connection to nature generally experienced more positive affect, vitality, and life satisfaction. Out of the three variables, vitality showed the strongest relationship to nature connectedness, followed by

positive affect and then life satisfaction. In terms of different measures of nature connectedness, the happiest people were those who saw themselves as part of nature.

These findings support those of other studies that found viewing green space can provide vital elements to the parasympathetic nervous system. In the realm of nature in space, Kaminski et al. (2002), Thomas et al. (2014), and Tomažič (2011) found that consistent interaction with animals can be extremely therapeutic for students to address stress and reduce emotional and behavioral challenges. In the realm of nature in space, Kesner and Pritzker (2008) determined that children in foster care were able to address emotional disturbances through therapeutic horseback riding when they were unable to do so in traditional counseling.

In summary, the literature indicates that students and young adults who are struggling emotionally can benefit from interacting with animals. These benefits can include improved mood and emotional well-being (London-Nuñez, 2015). Moreover, animals play an essential role in a child's world, and children who play with different types of animals foster positive feelings, attitudes, and greater understanding for children (London-Nuñez, 2015). Although there are still many unanswered questions regarding the psychological effects of animal-assisted interventions, animals can have a significant positive impact on emotional well-being. Therefore, animal-assisted interventions should be explored further as an effective therapeutic tool for facilitating mental health and emotional regulation among young people.

Cognitive Performance

An expanding body of literature in the international community suggests that outdoor education and green space on school campuses improve academic performance (Khan et al., 2020; Lieberman & Hoody, 1998; Lieberman et al., 2000, 2005). In their Bangladeshi study, Khan et al. (2020) found that students with outdoor leaning opportunities realized higher math

and science exam scores than those students who were taught inside. Their study included many biophilic design elements and reflected the same results found in earlier research conducted in the United States (Lieberman & Hoody, 1998; Liberman et al., 2000, 2005).

Figure 2 illustrates how the Bangladesh school's outdoor space included a natural, water, loose materials, vegetation, an amphitheater, gardens, plants, and huts in the learning environment. The school's redesign also included a mural and bright colors on the outdoor walls.

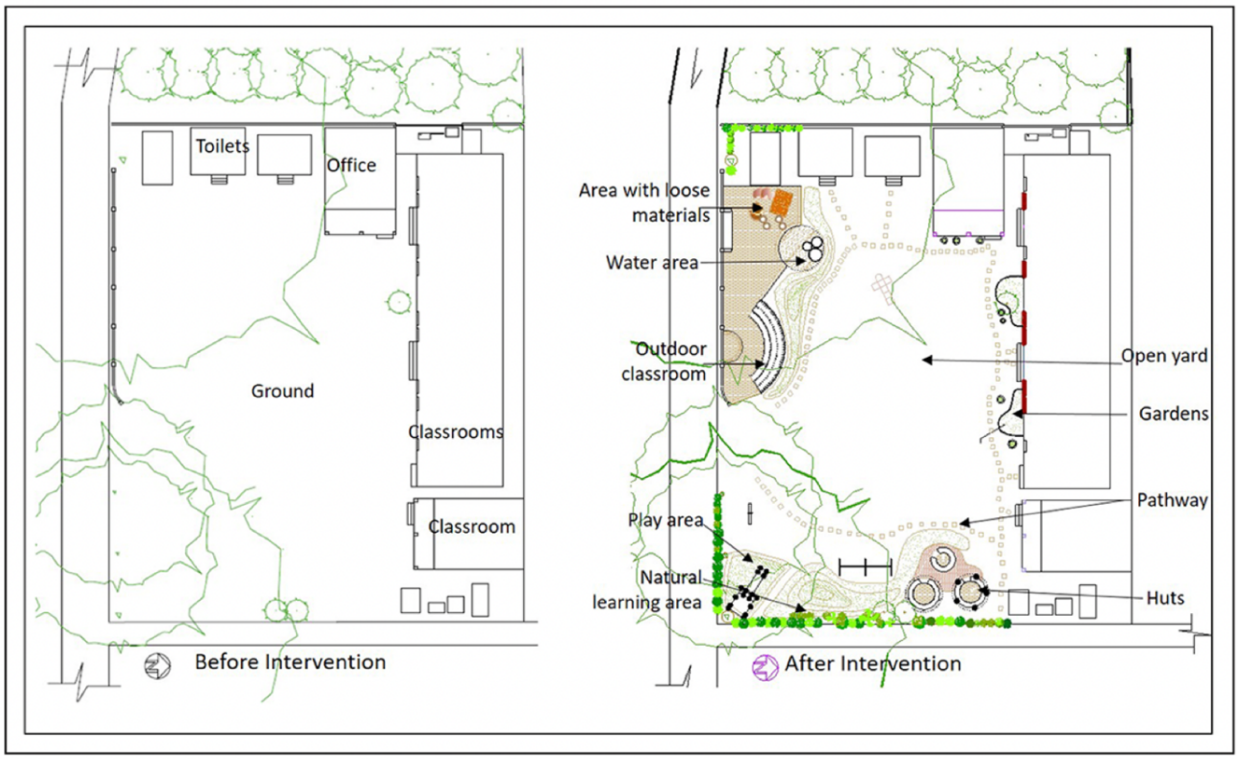


Figure 2. Bangladesh school grounds' biophilic design intervention (Khan et al., 2020)

In assessing the literature, the most promising research on green space and academic outcomes seems to be connected to tree cover (Kuo et al., 2018; Kweon et al., 2017; Li, 2019). Kuo et al.'s (2018) mixed linear model research studied 318 Chicago public schools and found that green cover, specifically trees, were positively linked to higher academic achievement even after controlling for classroom size and other factors. Determan et al. (2019) examined collinear, curvilinear, and radial visual contours and patterns based on existing neuroscience theory to

determine how straight and curved lines and other patterns found in nature can provide a calming effect that would improve academic performance. The authors reviewed literature highlighting that biophilic design reduced middle school students' stress and improved their math academic outcomes. Meanwhile, Tanner (2009) compared three biophilic school design elements—movement and circulation, daylighting, and views—to understand student achievement at 71 schools. The results indicated a significant positive impact on language arts, science, and math academic outcomes. In addition, Wu et al. (2014) linked student performance in elementary schools in Massachusetts with the greenness of school surroundings using remote sensing. Their study's results demonstrated a significant positive relationship between the green space of the school area and Massachusetts students' academic performance in both math and English.

The University of Georgia's School Design and Planning Laboratory (SDPL) research has been on the cutting edge of researching and measuring the impact of a school's-built environment on student learning and behaviors. A SDPL pilot study found that students who were in biophilic-designed classrooms reported feeling less stressed than those who were in non-biophilic designed control group classrooms (Determan et al., 2019). Those in the biophilic-designed classrooms also felt more positive, relaxed, and focused while being motivated to learn and enjoy math lessons. According to teachers, student focus and calmness improved when they were in classrooms with windows that let in natural light and views of nature, and when the classroom was free of clutter (Determan et al., 2019). The study also noted that the peacefulness of the biophilic-designed space reduced anxiety and aggressive behavior from the students. There were also positive learning outcomes—specifically, math test scores increased more than three times over seven months in the biophilic classrooms. In addition, "7.2% more students tested at grade level than the control group" (p. 23).

Emotional and Social Resilience

When confronted with a disaster or trauma, people and communities immediately need to engage biophilia to build resilience (Tidball, 2012). This need denotes an innate response to vulnerability, while nature provides an outlet for building resilience and peace. MacNaughton et al. (2017) conducted a study on chronic absenteeism and green space in 1,772 Massachusetts public schools serving one million students. They noted that students with poor academic outcomes usually have higher rates of absenteeism, which is associated with low graduation rates, poor adult socio-economic consequences, and the school-to-prison pipeline. The authors used the Normalized Difference Vegetation Index (NDVI) to examine the greenness of schools and air pollution (PM2.5) of Massachusetts public schools to measure the rate of chronic absenteeism (MacNaughton et al., 2017). They found that an increase of surrounding green space and reduction of air pollutants in and around schools could mean a reduction in absenteeism rates (MacNaughton et al., 2017).

Such findings on the benefits of biophilia design provide practical implications when building new schools and improving current schools by incorporating biophilic design and architecture to improve learning outcomes. Educators can utilize these findings to analyze the potential impacts of biophilic design on school facilities. Planners and policymakers can help guide the prioritization of new construction or improvements to current educational facilities.

Approaches to Exposing Biophilic Design to Black Students

Green space or the greening of schoolyards incorporates visual elements that improve social, emotional, and physical health outcomes for children. Two research studies found that the greening of schools significantly improves girls' time engaging in physical activity during recess (Raney et al., 2019; Van Dijk-Wesselius et al., 2018, as cited in Bikomeye et al., 2021).

Specifically, Raney et al. (2019) found that exposing kids to nature by replacing asphalt-covered schoolyards with green space promotes more creative and free play. In their experimental study, girls in open space areas increased their play from 16% to 28.2%; boys increased play as well, from 10% to 17.1% (Raney et al., 2019). These results suggest that greening open play spaces may invite more children to engage in physical activities and free play, which can minimize their boredom within the school setting, especially for girls not inclined to play sports.

Exposure to Nature Through Outdoor Activities

Black people are less likely than other racial groups to access parks and outdoor recreational spaces (Byrne et al., 2009; KangJae et al., 2020). As previously discussed, this tendency is more a reflection of a long legacy of racism and current equity issues than an inherent dislike of national parks and nature. In addition, Black people's communities often lack adequate green space, parks, and recreational space. Landau et al. (2020), in the Disappearing West Project, found significant disparities in the loss of and access to nature in communities of color. Shaffer (2017) through narrative inquiry to learn more about the effect of biophilic profiles at a 21-day outdoor post-secondary school orientation program.

The interview results showed a high correlation with participants' biophilia connection after providing pedagogical lessons (Shaffer, 2017). Furthermore, Stavrianos (2016) found linkages between environmental pedagogy and diversity and inclusion, demonstrating that outdoor learning environments can promote self-esteem, improve socialization skills, and enhance student–teacher relationships.

Biophilia-based Pedagogy

Incorporating biophilic principles into pedagogy is a way to change the beliefs that nature is a transactional commodity for humans. Educators must ensure that Black students understand

the importance of respecting, healing, and responding to their environment to achieve sustainable interactions with nature (Tabb, 2021). This understanding is essential for developing renewable technologies that will sustain our planet. Biophilic-designed schoolyards and classrooms also provide a multitude of opportunities for teachers to incorporate nature-friendly pedagogical methods that create fruitful learning environments. For example, sensory gardens designed to engage all five senses – smell, touch, taste, sound, and sight – through colorful plants with appealing smells or textures, as well as features like running water provide students with opportunities to actively explore their surroundings. Rosa Parks Elementary School in Berkeley, California, and Coombes School have incorporated such design elements into their pedagogy (Danks, 2010). Visual art lessons using natural materials such as wood, stone, and dirt taken from the schoolyard is another way to inspire students and provide more access to nature (Danks, 2010). Through biophilic-designed programs, teachers can help Black students learn about the biophysical world within their ecological systems; these programs also provide opportunities to critically examine the different levels of understanding that individual students and teachers have of the structure and the "permanence of racism" (Miller, 2017, p. 848).

Theoretical Framework: Bronfenbrenner's Bioecological Systems Theory

Bronfenbrenner's (2005) bioecological model builds from his original ecological systems theory, which contends that child development is bidirectionally influenced and shaped by five environmental systems: microsystems, mesosystems, exosystems, macrosystems, and chronosystems. These systems all influence children's development (see Figure 3).

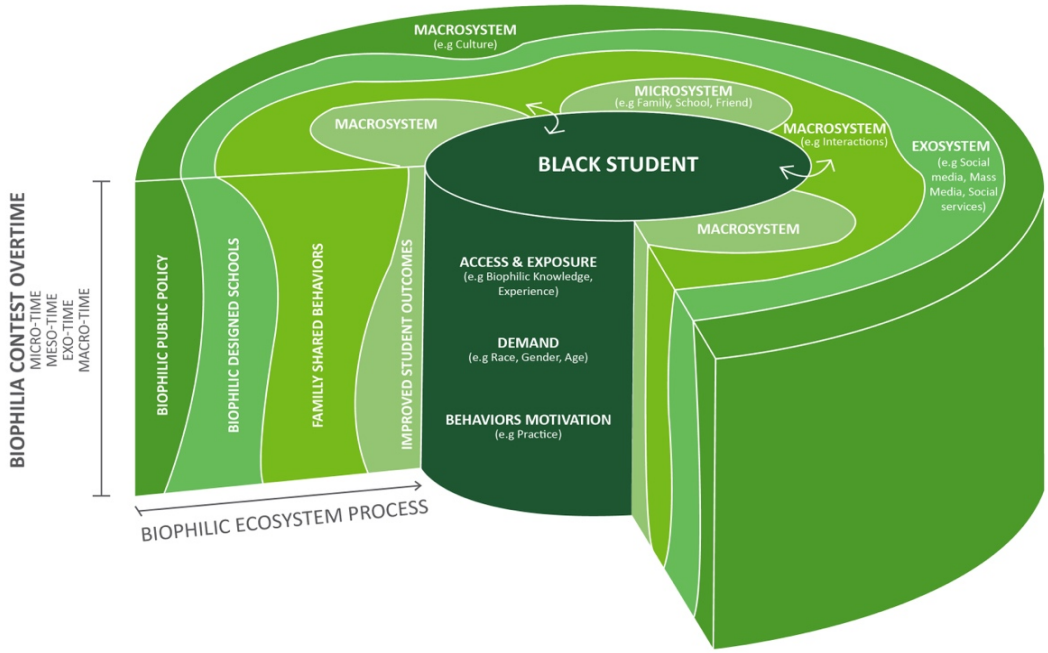


Figure 3. Biophilia and bioeclogical systems theories

Figure 3. Biophilia and bioecological systems theories

Note: Adapted from Bronfenbrenner's (2009) biophilia hypothesis theories. A person's access, exposure, knowledge, demand, behavior, and motivation to connect with nature are influenced by biophilic ecosystems, which include microsystems, mesosystems, exosystems, and macrosystems.

Bioecological theory explores the transactional ways in which a child interacts with the environment and how that environment in turn impacts their growth and development over time. This dissertation research explores the relationships, influences, and how bioecological systems work together through the lens of biophilia hypothesis. The following subsections describe the systems and subsystems within Bronfenbrenner's ecological theory and biophilia.

Incorporating Ecological Theory and Biophilia into One Framework

The bioecological model is based on the notion that transactional relationships that parents, caregivers, and teachers have with children affect the children's development.

Furthermore, these interactions are influenced by environmental settings, which are consequently affected by cultural norms and public policy. This study examines how these relationships interact when incorporating biophilic design and biophilia exposure into a child's growth and development. Specifically, it explores how these interdependent systems promote Black students' mental and physical health and academic performance through biophilia.

Biophilic Microsystem

The theoretical framework and research indicated that direct exposure to both nature and nature in a built environment can improve a child's wellbeing and cognitive and academic performance. The microsystem is the first ring that reflects the closest environmental influences to the child. In addition, parents/caretakers and teachers play a significant role within a child's microsystem by exposing students to biophilic opportunities through field trips to national parks, pedagogy, exposure to plants and trees, better lighting, and nature walks. In many cases, such exposure is challenging due to limited resources. Thus, neighborhood community organizations can provide additional support systems to help create further opportunities for biophilic engagement through meso- and exo-ecological systems.

Biophilic Meso- and Exosystems

As existing research demonstrates, the lack of green space leads to different kinds of adversities (such as social inequity, crime, economic status, and pollution) in neighborhoods and communities; these factors also affect children's wellbeing (Jennings, 2017). The meso- and exosystems are the second and third rings that will help this research put into context the linkages between family/caretakers, schools, and community centers across settings and how those systems influence Black students' access and connection to nature. Specifically, in urban communities, the school environment is an important place for youth to become exposed to

nature, as it might be absent in their home and neighborhood environments. Therefore, the findings of the current study can be translated into culturally informed programs and resources co-created with communities experiencing inequity and adversity.

Biophilic Macrosystem

The biophilic macrosystem is the outer ring that impacts all other systems within Bronfenbrenner's (2009) model. It represents public policies, laws, norms, and culture that set the stage for environmental influences that can either accelerate or impede Black students' biophilia or biophilic-designed schools. This system helped contextualize racism's impact on ecological paradox and the complexities of Blacks' connection with nature.

Conclusion

The existing body of literature contextualized the implications that historical racial injustice and its associated systems have had on the Black biophilic consciousness. Furthermore, the lack of full self-actualization is limiting Black individuals' ability to have a healthy relationship with nature as well as their physical, psychological, and intellectual self-actualization within their bioecological systems.

CHAPTER THREE: METHODOLOGY

Schools that serve low-income Black students in the United States are often located in urban, nature-deprived areas and are some of the lowest-performing schools in the country (Rowland-Shea et al., 2020). This study has documented the ways in which the historical legacy of structural racism and ongoing discriminatory policies, systems excluded urban communities of color from accessing trees, green spaces, and other natural environments while wealthier neighborhoods in predominantly White communities are more likely to have such access along with healthy educational outcomes (Leahy & Serkez, 2021). A significant body of research has demonstrated that many Black communities are disconnected from nature and even fear it, preferring more urban landscapes (Lewis & Hendricks, 2006). Researchers have contended that humans' emotional connection to nature predicts their knowledge about nature, their experience with nature, and the kinships they develop to the environment (Kellert, 1984). Thus, the purpose of this qualitative study is to examine the ecological influences that affect Black students' connections to natural environments and explore how nature-focused environments may influence their wellbeing and academic achievement.

Research Design Features and Methods

To explore the ecological influences of structural racism, such as the possible effect on Black students' ability to connect with nature in under-resourced urban schools, I used a qualitative research approach to the collection and analysis of data. Qualitative research done with a transformative perspective strives to investigate how inequality affects individuals (Creswell, 2021). Creswell (2020) identified four significant worldview paradigms and their dimensions: positivism/postpositivism, constructivism, pragmatic, and transformative. A postpositive paradigm follows a more traditional research approach that Creswell concluded is

the “absolute truth of knowledge” (p. 25). Using this worldview, researchers usually implement experimental or quasi-experimental research designs to explore cause-and-effect relationships (Duke & Martin, 2011). Postpositivist and positivists firmly adhere to the belief that phenomena come into being as a result of certain laws of natural cause and effect which are consistent, reliable, and capable of generalization (Aliyu et al., 2015).

The constructivist worldview holds that individuals attempt to understand the world around them (Creswell, 2020). A qualitative research design usually matches well with this worldview. The pragmatic worldview focuses on problem solving and actions organizations need to implement to solve problems. Finally, a transformative worldview posits that research and political change are interdependent; both are necessary to fight social oppression (Mertens, 2010, as cited in Creswell, 2020). This philosophical lens places structural racism, inequities, and oppression at the front and center (Creswell, 2020).

I recently experienced a paradigm shift that brought about a transition in my worldview from postpositivist to transformative. This shift led to the further inquiries into the worldviews of my dissertation topic and its associated research questions. I agree that postpositivist assumptions may not be entirely accurate when applied to individuals who do not have much power. For this reason, I chose a mix of the transformative and pragmatic worldviews for my research so that I could explore how different systems throughout history up until now, plus teaching methods and public policy, might contribute to making it more possible for Black students to connect with nature in their immediate environment as well as outside of it. The process of inquiry does not simply entail the identification of philosophical principles. As researchers we must also consider scientific inquiry. As this study explores which political, social, and economic factors propagate inequities in our educational systems as well as how

these inequities are experienced and can be eradicated in part through connectivity to nature. This qualitative design approach utilized multiple data sources such as surveys, interviews, and focus groups.

To answer my research questions, I will utilize a survey and semi-structured interviews. Teachers and principals will complete a survey to share their perspectives on the influences on students' connectivity with nature. Surveys ensure the inclusion of consistent descriptive analyses while providing more flexibility in gathering more detailed information.

I have developed the following two research questions to guide this study:

- Research Question 1 (RQ1): What are the ecological influences that affect Black students' connections to natural environments?
- Research Question 2 (RQ2): How do nature-focused environments influence Black students' wellbeing and academic achievement, if at all?

Organization Overview

As previously mentioned in Chapter One, this study gathered data from CNN, the Alliance, and similar regional or national organizations that include a wide network of partner organizations and schools located in urban areas with predominately Black populations. In addition, many of their partners have implemented or plan to implement numerous biophilic-designed principles outlined in Kellert's (2016) design principles. CNN is a nonprofit organization based in St. Paul, Minnesota, that promotes nature-based childhood by supporting stakeholders (e.g., educators, policymakers, parents). In coordination with the CCCN, CNN supports more than 27 cities with Green Schoolyards Technical support, providing cities with resources to develop strategies to create more green spaces both within schools and neighborhoods. For this study, CNN agreed to share the survey to its network of 100 schools and

partner organizations (i.e., Learning Landscapes, Spark School Park Program, OutTeach, and Education Outside).

Meanwhile, the Alliance—a global nongovernmental organization and movement—focuses on building connections to support schools' greening and sustainability efforts. It supports more than 6,000 schools and organizations in 49 states in the United States and 91 countries, representing more than four million students and 604 million square feet of building space (Green School Alliance, n.d., para. 2). Its mission "is to connect and empower schools worldwide to lead the transformation to sustainable, equitable and climate-resilient future" (para. 1). The Alliance aims to build a shared best practice model at the school district level, contribute to partner programs, influence public policy at all levels, and leverage collective buying power to increase access and create green and sustainable schools. The Alliance administrators did not send out the survey but many of its members sent it out to their colleagues within the organization. The survey was also distributed to the Black Teachers Association, who agreed to distribute the survey link and information sheet to its members.

Finally, this study worked with the YMCA and other similar organizations that engage in outdoor activities with young people (18–24 years old) to convene a focus group of former Y members. The YMCA is one of the oldest globally recognized organizations that provides youth development, healthy living, and social responsibility services to communities (YMCA, n.d.). It provides outdoor camp services to thousands of youths each year.

The organizational partners received an initial email explaining the purpose of the study and eliciting support to help to gain access to members. I requested a meeting to discuss the survey and interview process and intent with the executive directors at each organization and secure an agreement for their support. However, most communication took place over the phone

and via email. I provided information on the methods of distributing the survey and what their role will be in the process. Once the organization partners agreed to participate in this study, I provided them with the important timelines, survey tools, and communications (e.g., emails, recruitment, and survey links).

To find survey and interview participants, I reached out to potential stakeholders in schools and districts through LinkedIn and other social media platforms. Additionally, I utilized snowball sampling to build upon the number of referrals from initial participating influencers (Merriam & Tisdell, 2016). Through these efforts, I was able to identify and recruit more participants.

Population and Sample

The two primary populations being studied are teachers and principals who work at schools. Principals and teachers who work in K-12 schools that predominantly teach Black students from low-income urban communities in the United States will participate in this study to answer research questions one and two. In addition, YMCA members and camp goers who have never experienced nature, now between 18 and 24 years of age, participated in focus groups.

Survey Sampling Criteria and Rationale

Given the large population of teachers and principals within both networks, I asked that the survey be distributed to everyone in their network and use the three demographic questions to verify the inclusion criteria (i.e., role of principal, teacher, or school board member; school district location; and whether they worked at a predominately Black school). The survey ended if respondents did not meet these criteria. Even though a criteria question was asked, students may have completed surveys if they responded in error. However, student data were excluded from survey analysis.

For those who do not meet the criteria, I added a note thanking them for their participation. Those who met the criteria moved forward with answering the remaining questions. The criteria for participation in the survey are that individuals must be principals, teachers, or school board members, and must lead schools in predetermined districts with a predominately Black student population. The survey took 15 minutes to complete.

Interview Sampling Criteria and Rationale

I conducted interviews with 9 teachers, principals, an executive director and a in urban districts who respond to the survey, meet the participation criteria, and agree to an interview by responding "yes" to the last question on the survey. In addition, one YMCA camp learning recovery teacher was also interviewed. Interviews with this population helped shape the story of what barriers and opportunities exist for Black students in gaining access and connecting to nature and, consequently, in developing biophilia. These interviews helped contextualize both the survey results and the effect of ecological systems on Black students' wellbeing and academic performance.

The participants who met the interview participation criteria were sent an invitation letter that explained the research and provides background information about the researcher. To be eligible to participate in the interview, participants must be principals or teachers who are a member of the CCCN and the National League of Cities and who lead schools with a Black majority student population of at least 60% or more. After they received the information, a call was made to relevant schedulers or staffers to set up a 30- to 60-minute interview.

Focus Group Sampling Rationale and Criteria

The use of focus groups in this study allowed me to understand and gather insights about interaction with nature from Black youth, including their experiences and attitudes. To reduce

distortions in the data, purposeful sampling was used to select participants in the focus group. This study screened and engaged two groups of a total of 9 older youth, which is considered an ideal size for focus groups (Krueger & Casey, 2015). A focus group participant must be a Black person (criterion 1), from a low-income urban community (criterion 2), between 18 and 24 (criterion 3), and who participated or did not participate in YMCA camp (criterion 4). Given the complexity of the topic, a smaller focus groups online yielded more in-depth information about the participant's experiences than larger groups would (Krueger & Casey, 2015; and Stewart & Williams, 2005).

I sent a recruitment letter and Information Sheet two weeks in advance of the scheduled focus groups and made follow-up phone calls to two YMCA LA branches. I used snowball sampling to ask respondents if they know of others like them who may be willing to participate in a focus group. The focus groups were conducted online. No monetary incentives were provided for participation in this study.

Instrumentation

Interview

This study employed semi-structured interviews to learn more details about how much community stakeholders understood the impact of the biophilic hypothesis, similar concepts, and designs on students as well as determine whether they are prioritizing or would prioritize such issues. These interviews helped identify new and insightful information (Merriam & Tisdell, 2016) in terms of whether such efforts have been previously implemented and how they would prioritize such initiatives.

The semi-structured format were used and involved a mixture of structured and open-ended questions. This structure allowed for more flexibility with the goal of garnering more

detailed information than would be acquired from surveys. As part of the semi-structured interview process and to address RQ2, participants were shown pictures, which is a qualitative method called photo elicitation, in which participants are presented images of the topic of relevance to encourage dialogue on the topic (Tinkler, 2013, as cited in Merriam & Tisdell, 2016). The first photo elicitation included a question about outdoor spaces. Two images were presented; one image included a schoolyard with just asphalt while the other image incorporated many of Kellert's (2018) biophilic design elements. The second photo elicitation focused on the indoor classroom space, which showed two images: a classroom with minimal biophilic design features and a classroom incorporating several design elements. The teachers and principals were asked to pick which designs look more like their existing school environment.

Due to the Covid-19, pandemic all interviews were conducted over web-based video software, Zoom. The interviews investigated various topics such as nature values, how much exposure to nature Black students have both in and out of the classroom, perceived benefits and drawbacks, challenges educators face when trying to provide students with access to nature-based learning experiences, environmental racism, structural racism, and biophilic design features. The interviews, which contained both structured and unstructured questions, lasted anywhere from 30 minutes to an hour. The goal was to learn more about the external factors that play a role in Black students' connection to nature.

Survey

The survey instrument was designed from the biophilia hypothesis that humans have an intrinsic bond with nature and, when that connection is disrupted or nonexistent, it can have a detrimental impact on humans' physical and mental wellbeing (Wilson, 1984). Lochmiller and Lester (2017) noted that it is important for surveys not to be random questions, but rather

questions rooted in theoretical framework. The rationale for developing a survey tool is to gather descriptive information from educators on their perspective on what they believe "is happening," "will happen," or "has happened" in the school system (p. 133).

The survey included demographic questions and other questions to explore whether a school has a biophilic design structure. My research question was based on Kellert et al. (2017) survey for educators. This survey has questions about the educator's views on how nature has influenced students' actions and learning journeys. The rationale for these types of questions comes from the summarized concepts of Kellert et al. (2008) six biophilic design principles. Survey questions were clear and concise to ensure that the participants were not unclear about the questions (Lochmiller & Lester, 2017). The survey participants received information about me as the researcher, the purpose of the survey, and how long the survey is expected to take. The survey instrument included "closed-ended questions" (p. 134). Lochmiller and Lester (2017) noted that these types of questions force participants to select from a sequence of pre-determined alternatives, which will help ensure that the results remain uniform rather than receiving a series of unique responses.

Focus Groups

The focus groups, like the surveys and interviews, incorporated the biophilia and Bronfenbrenner's conceptual frameworks in the protocol. It further explored ways in which Black students experienced structural racism in their urbanized ecological settings, which may hinder them from positively experiencing nature. In addition, the focus groups also explored "counter storytelling" (Miller, 2017, p. 848), which challenges the dominant White cultural narrative that Black people are inherently uninterested in the environment and nature. According to Merriam and Tisdell (2016), a focus group is an interactive discussion about a particular topic

with multiple individuals. However, Hennink (2014) noted that, unlike interviews, focus groups are engaging discussions in which participants have opportunities to share, hear, and learn within the research setting and process.

As the moderator of the focus groups, I crafted questions to elicit the thoughts of both former camp-goers and YMCA members who have never experienced nature and are now between 18 and 24 years of age. I utilized McLellan and Steward's (2015) well-being instrument, which considers both "hedonic and eudemonic elements" (p. 311), to develop a complete understanding of an individual's wellbeing. Hedonic wellbeing is based on personal opinion and usually relates to the idea of happiness or contentment. It primarily examines what brings joy in life and creates a feeling of gratification for individuals (Kahnerman et al., 1999; McLellan & Steward, 2015). Eudemonic wellbeing emphasizes accomplishing individual potential and meeting fundamental needs on Maslow's hierarchy of necessities, moving beyond mere pleasure or distress. It looks at how content a person is with their achievements to develop maximum capabilities—not just in the present but also for the future (McLellan & Steward, 2015).

The focus group sessions were captured by field notes, pictures, audio recordings, and Zoom video recordings. Since I did not have a research assistant present, I took notes to facilitate discussion. I leaned heavily on recordings to create transcripts that were used to sort and code the discussion themes. I prioritized the theme clusters by examining their frequency, extensiveness, intensity, specificity, internal consistency, and participant perception of importance to analyze the data (Krueger & Casey, 2015).

Data Collection

The American Psychological Association's (2016) Code of Ethics notes that interview participants should be informed of the research purpose, their right to withdraw or decline from

the research at any time, how the research benefits society, the confidentiality limitations, and who participants can contact if they have questions. To maintain a high ethical standard and protect the research participants, I took specific steps in both the selection process as well as during the study itself (Samkian, n.d). First, I provided information sheets to teachers, and service providers, and former YMCA member (18 to 24) depending on time restrictions and Institutional Review Board (IRB) approvals. These information sheets (see Appendix D), described the purpose of the biophilia study and its possible benefits and explain how the data will be used (Samkian, n.d.). I explained that participation in the study is voluntary and that a small incentive would be provided to participants. The form further informed the participants that they have the right to leave the study at any point, without penalty. I maintained the participants' confidentiality by storing all information in password-protected and secure computer systems and not allowing their information to be used by others (American Educational Research Association, 2011). I explained to participants how their confidential information would be maintained. Finally, asked participants for permission to record the interviews. All three principles of the Belmont Report guided the structures and systems I put in place to ensure ethical conduct throughout the research process (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1976).

Data Analysis

This qualitative design had three vital parts. The survey data were inputted and coded within MAXQDA and Excel. Then, the descriptive statistical results from the surveys were analyzed in SurveyMonkey and Excel. Lastly, upon completion of the interviews, transcribed interviews and field notes ensured that I understood the participants' intended meanings. Data from both interviews and focus groups produced a large volume of information. Thus, the

strategy was to first examine, categorize, and sort and then tabulate the participant responses by using both QSR-type software and "long table" approaches to manage the information (Rabiee, 2004, p. 658). Finally, the contents of the three datasets were triangulated and merged (Creswell, 2020). Merriam and Tisdell (2016) found that data consolidation, reduction, and interpretation is an important process for researchers to make sense of their findings. This includes understanding what people have said as well as what the researcher has observed or read. During the final step, the data and coded themes were merged into graphs and tables (Creswell, 2020). Figure 4 illustrates how I collected, analyzed, and coded both the data by breaking them down into identified themes.

Qualitative Analysis

A qualitative analysis is a dynamic process that requires the researcher to constantly remember the study's purpose while also thinking about the theoretical framework (Merriam & Tisdell, 2016). This study used Creswell's (2020) four-step qualitative data analysis process: sort and categorize data in preparation for analysis, review all data, code all data, and describe themes generated from interviews. The limitation of a qualitative analysis is that my presence in the interview as a Black woman may have biased participants' responses. Another limitation is that some participants had challenges answering questions effectively, and it was at times challenging to read through all the interview data to analyze coded themes.

Ethics

As the researcher, it was my ethical duty to act in a fair and reasonable way that also protects and considers the needs and interests of current and future participants (Lochmiller & Lester, 2017). This study was guided by the American Educational Research Association's (AERA) (2011) set of rules, norms, and ethical standards, which noted that:

> It is of paramount importance that educational researchers respect the rights, privacy, dignity, and sensitivities of their research populations and also the integrity of the institutions within which the research occurs. Educational researchers should be especially careful in working with children and other vulnerable populations. (p. 3)

To this aim, ensured that credibility and trustworthiness are seamlessly integrated with my moral and ethical responsibilities, as highlighted in Figure 4.

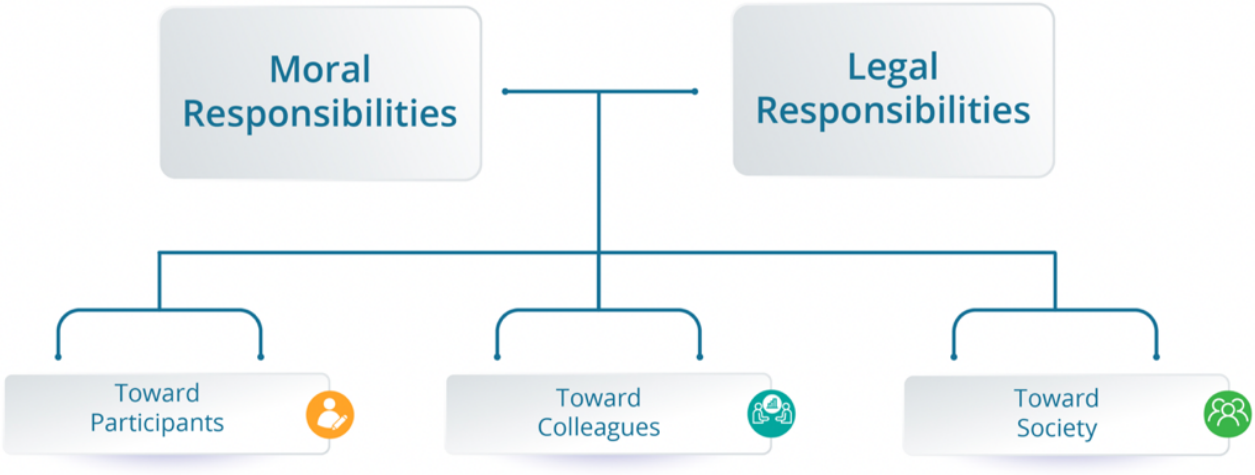


Figure 4. Researcher's ethical and moral responsibilities

Note: A researcher is expected to uphold both moral and ethical responsibilities when conducting research. These responsibilities are aimed at protecting research participants, colleagues, and society (Creswell, 2020).

The AERA (2011) developed numerous ethical principles that help guide researchers' moral imperative to conduct research in a rational, fair, and objective manner. Samkian (n.d.) noted that the integration of ethical principles into dissertations not only shields research participants from potential harm, but also makes the study more meaningful. Three key principles of ethical research, based on the Belmont Report's (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1976) principles for

engaging human research subjects, are respect for persons, beneficence, and justice. All three principles of the Belmont Report guided the system and structures I put in place to ensure ethical conduct throughout the research process.

Respect for persons is a principle that values the protection of an individual's autonomy and ensures their fair treatment through informed consent, which I previously explained related to the current study. The beneficence principle means that researchers should ensure participants' physical and psychological wellbeing by doing them no harm and maximizing their benefits (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1976). To gain the participants' trust in the research project, I highlighted the purpose of the study in the Information Sheet (see Appendix D) and the possible public benefits that may result from it, including improvements to educational and community environments. Finally, justice is concerned with ensuring the fair and equitable distribution of and access to research, taking steps to ensure that the researcher is not consciously or unconsciously discriminatory, and providing fair participation and benefits for the public good. Although I believe my intent was not to overburden my research participants and the institutions in which they are working, certain types of individuals often participate in studies because of the minority populations with whom they work, resulting in being overly researched. Consequently, I kept the survey and interview questions short to respect participants' available time.

Credibility and Trustworthiness

The credibility of this research study rests on the methodological approach, analytical rigor, and ethical practices (Merriam & Tisdell, 2016). Although ethical predicaments are commonplace throughout the research process, in my role as a researcher, it was imperative that I ensured that the individuals who participated in my study were treated with respect, were not

harmed, and treated equitably (Glesne, 2011). All researchers have implicit biases; thus, my study was reviewed and guided by the strict guidelines and procedures of the University of Southern California IRB, which served as an additional layer to protect the participants' rights and welfare.

As a researcher of color, I am particularly thoughtful of the long-lasting repercussions that unethical research practices can have. I witnessed Blacks' apprehension related to being tested for and vaccinated against COVID-19 because of the odious Tuskegee study, in which 600 Black men were used as test subjects to study untreated syphilis between 1932 and 1972. In order to counter unethical research methods, the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1976) established three core ethical principles that guide researchers when conducting studies with human participants: Respect, Beneficence, and Justice (Glesne, 2011). Accordingly, I was transparent with the teachers, principals, and superintendents I interviewed and survey, so I do not prejudice their thoughts and opinions. Lastly, I am a former Executive Director at a Los Angeles YMCA, but no youth that I work with engaged in this study.

Conclusion

My experiences as a (mixed-race) Black woman in America have shaped my positionality in my research. I have remained conscious of this bias as I follow a moral imperative of providing the public with research grounded in ethical principles. For ethical transparency purposes, I acknowledge my biases, being clear that my transformative positionality is rooted in my personal experiences with racist systems and inequities and has helped shape my research questions and approach.

CHAPTER FOUR: FINDINGS AND MAJOR THEMES

The purpose of this study was to discover factors that improve or hinder Black students' chances to access to and connect with biophilia in order to support their wellbeing. Two questions guided the research: (1) What are the ecological circumstances that affect Black students' connections to natural environments? (2) In what ways do nature-focused surroundings influence Black students' wellbeing and academic achievement, if at all?

This chapter presents an overview of the data collected as well as the findings and themes that emerged from the data. This chapter includes a description of each participant before exploring how the data pertains to the research questions.

Participant Demographics

To explore Black students' access to biophilia and wellbeing, 61 surveys from K–12 teachers, principals, and superintendents were collected. In addition, 10 semi-structured interviews were conducted with educators and nine older youth participated in focus groups. Through these different forms of data collection, the study was able to provide further insights into Black students' experience regarding their access to nature and how it impacted their overall wellbeing.

Survey Participants

The study received 247 responses, but of those, only 61 (n = 61) survey responses met the three criteria discussed in Chapter Three. The responses were received from throughout the United States, including Atlanta, Baltimore, Chicago, Fresno, Los Angeles, Philadelphia, New Orleans, New York, and Tennessee. The number of years worked in education ranged from less than 1 year to 30 years. Only respondents who answered "yes" to the question of whether they taught at a predominately Black school were included in this study.

Of the 61 participants who completed the survey, 31 (51%) identified as White, 15 (25%) as Black/African American, 9 (15%) as Hispanic, two (8%) as Asia/Pacific Islander, and one (1%) as American Indian or Alaskan Native. No participants said they belonged to multiple races (Table 1). Of the 60 participants who indicated their gender, 32 (53%) identified as male, 26 (44%) identified as female, and 2 (3%) identified as non-binary (Table 1).

Table 1

Race and Gender of Survey Participants (n = 61)

Variable	Number	Percentage
Race		
American Indian or Alaskan Native	1	1%
Asian/Pacific Islander	5	8%
Black/African American	15	25%
Hispanic	9	15%
White/Caucasian	31	51%
Multiple/Other	0	0%
Gender *(n = 60; one participant skipped this question)*		
Male	32	53%
Female	26	44%
Non-binary	2	3%
Prefer to Self-Describe	0	0%

Of the 61 survey respondents, 28 (46%) said they were teachers, 13 (21%) identified as principals, and 20 (33%) were school board members (see Table 2).

Table 2

Educational Role by Type (n = 61)

Educational Role	Number	Percentage
Teacher	28	46%
Principal	13	21%
School Board Member	20	33%

Interview Participants

Of the 61 survey participants, 10 agreed to participate in a 30-minute interview for this study. The semi-structured interviews were conducted using the Microsoft Teams and Zoom platforms. Interview responses were coded using the MaxQDA data analysis tool and analyzed to identify central themes related to ecological influencers on Black students' ability to connect to nature.

Five of the 10 interview participants were principals, four were teachers (including a YMCA camp teacher), and one was the executive director of a private charter school (see Table 3). One served as a YMCA camp teacher in Richmond, Virginia, and designed programs to provide more access for students of color to outdoor camping environments. Ninety percent of interview participants worked at predominately Black schools or districts in urban communities of color. Three of the 10 interviewees worked at schools that have engaged some form of biophilic design improvements at their school site.

Table 3

Interview Participant Demographics (n = 10)

Alias	Role	School District	Biophilic Design Improvements	Race
Mr. Onyx	Teacher/Coach	District of Columbia	In progress	Black

Ms. Ruby	ED Charter School	Los Angeles	No	Black
Ms. Pearl	Principal	Los Angeles	Yes	Black
Mr. Blue	Principal	Los Angeles	Yes	Black
Ms. Jade	Principal	Los Angeles	No	Black
Mr. Jasper	Teacher	Los Angeles	No	Black
Mr. Linden	YMCA Camp Teacher	Richmond	N/A	Black
Mr. Oakley	Assistant Principal	Los Angeles	No	Black
Ms. Willow	Teacher	New Orleans	Yes	Black
Ms. Hazel	Principal	Los Angeles	Yes	White

Youth Focus Groups

Nine older youth YMCA members between the ages of 18 and 24 participated in the focus groups. Four noted that they attended outdoor camp; there remaining five had not participated in camp. Table 4 presents their demographics.

Table 4

Focus Group Participant Demographics (n = 9)

Participant	**Gender**	**Participated in Camp**	**Camp Type**	**State**
Eric	Male	Yes	Boy Scouts	California
Chris	Male	Yes	Family Camping	California
Jackson	Male	Yes	YMCA	California
Zennith	Male	No	N/A	California
Nathan	Male	No	N/A	California
Elijah	Male	No	N/A	California
Alba	Male	No	N/A	California
Taylor	Female	No	N/A	California
Lisa	Female	Yes	School	California

Emerging Themes

The data collected from participants came from interviews, focus groups, and surveys. The research questions were addressed by analyzing the data to see what common themes emerged. When analyzing participants' responses, four themes emerged: biophilic exposure,

learning, and design in schools; access and connection to nature at home and in the neighborhood; student biophilia or biphobia; and policy, systems, and funding. The findings also include six subthemes: exposure and learning, design elements and practices, parent/caretaker setting, neighborhood setting, COVID-19 Cares Act and ESSER Funds, and state and local funding.

Theme 1: Biophilic Exposure, Learning, and Design in School

In-depth interviews and surveys conducted as part of this study found that educators are focused on finding innovative ways to stop future learning loss. This issue has been ongoing in schools, but it has been exacerbated due to the pandemic. These crises usually have a greater impact on low-income students of color. Some participants indicated that biophilic design (using elements of nature) could be helpful in making schools more equitable places for students while they recover from any academic setbacks caused by being out of school during the pandemic. As a result, schools are increasing access to biophilic design, natural patterns, light and space, animal engagement, outdoor learning opportunities, and field trips for Black students. For example, participants discussed how providing features like school gardens or water features that connect students with nature may encourage better mental health outcomes among all students.

Exposure and Learning

The survey participants who were educators noted that they were beginning to plant more trees and create more green spaces, gardens, colorful play areas, and outdoor nature-focused engagement opportunities at school through federal and state COVID relief dollars. Black students' limited exposure to biophilic elements, such as green spaces, natural lighting, and natural shapes and forms within classrooms, was a recurring theme within the surveys and interviews. Of the 61 survey participants, 12 (20%) stated they only provide their students with

at least 30 minutes of nature-focused time once or twice per week, 19 (31%) said three times a week, 21 (34%) said four to five times per week, and 9 (15%) answered “not applicable” (see Figure 5).

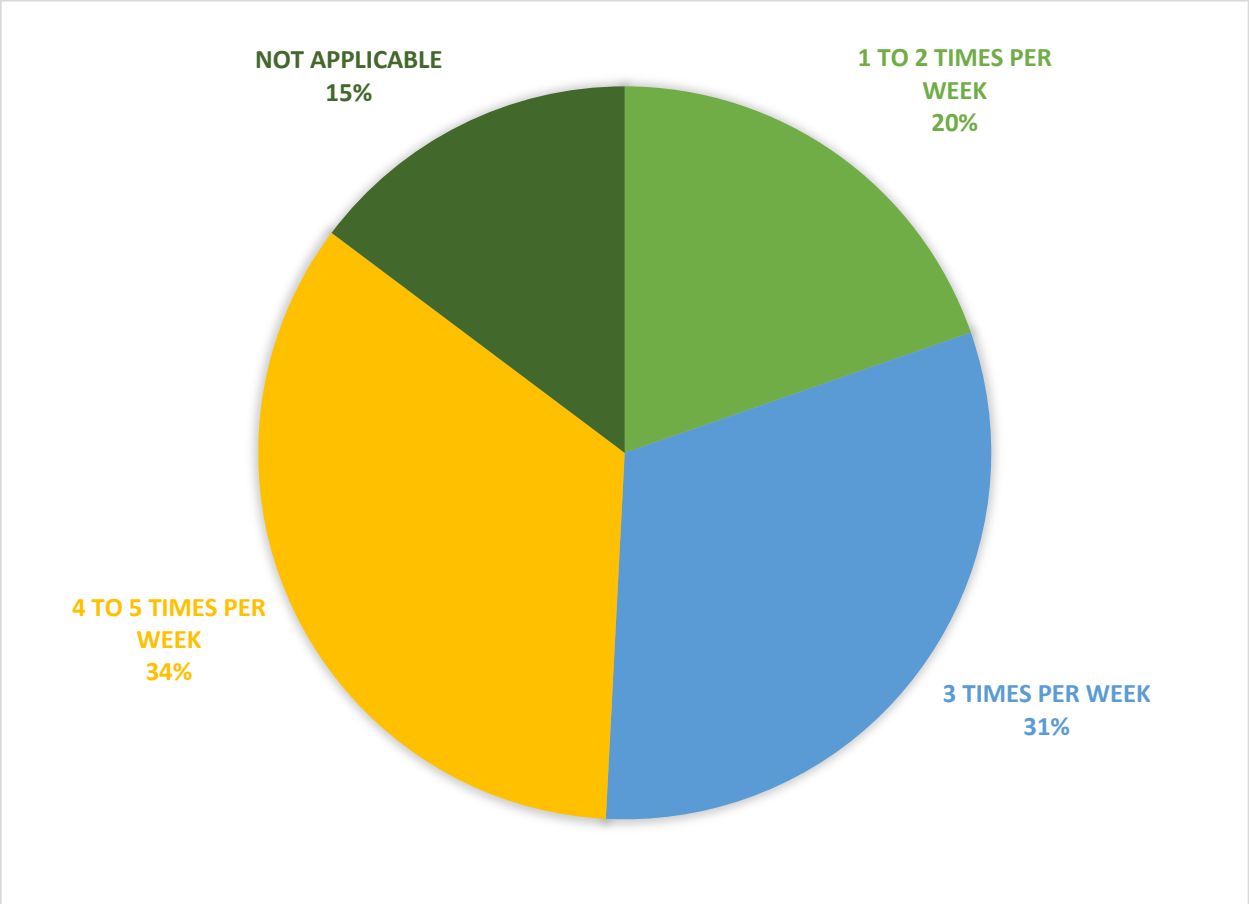


Figure 5. Number of times in an average week participants engaged in 30 minutes of outdoor nature-focused activity with students (e.g., playing in grassy fields, and planting gardens).

Three principals noted that teachers are increasingly working on nature-focused pedagogy. One principal highlighted that it is not just teachers engaging in such discussions. Ms. Pearl stated:

> One of my occupational therapists, part of her therapy with two of the classes is gardening for those students. These are students with special needs. And so as part of her engagement for their occupational needs, they go out a couple times a week and

> water plants, they talk about, you know, the plants they're growing and things of that nature for my general ed class—there is no […] curriculum. We don't have a curriculum. The teacher just does, you know, seeks information out on the internet and that's what they do. One class in particular, they grew sweet potatoes and the teacher just brought 'em in and they, you know, got the glass jar and put the water in, but that's something that he found on his own through the internet. So there's no set curriculum that they're following. They're just finding information and activities that they can do on their own, through the internet. And that's what they do with their students.

Ms. Hazel shared:

> I think the best way we connect them is probably through the field trips, which we will resume more. That also was a casualty of COVID, where we didn't want to get them close on a bus, so we just started taking them places the end of last year and will continue to do more this year.
>
> The teachers can go once every about 6 weeks, but they don't always take advantage of that, but some classes do. Yeah, we prioritize them being able to get out and do things, it's just that sometimes the push of everything they have to cover. Then it's a lot of responsibility to take kids out in the world, so sometimes teachers [go on field trips] maybe four and five [times] a year instead of seven or eight a year. Every class will at least go probably four times during the year somewhere.

The word cloud in Figure 6 visually depicts the frequency of responses from teachers and principals on how they viewed nature. Of the 25 words associated with nature, eight participants identified most with elements found within nature, such as animals, trees, gardens, and plants.

Only three interviewed educators identified the benefits associated with nature: tranquility, serenity, and calmness. According to the frequency in data, educators think of nature more for its aesthetics than for calming, and they see themselves apart from it. Overall, these responses emphasize how important it is to understand how educators perceive their interactions with nature to better understand their motivation to teach their students about it.

Figure 6. Educators' perceived identification with nature.

Interviews with the educators indicated that Black students are connected to nature through school gardens (4), some green spaces (3), and colorful play spaces and murals (3). Furthermore, schools are establishing more school gardens, trees, murals, and colorful spaces on school campuses. Mr. Blue noted that at his school campus:

> We are starting phase one of what we're going to call our wellness outdoor wellness space. And it's basically a garden area where the intent is to have benches and places for students to be able to connect, you know, with peace and practice some of their

> mindfulness techniques that they've been learning. And in one of our programs the goal is some yoga pop, potentially things of that nature.

In addition, Ms. Pearl and Ms. Hazel both highlighted that their schools had recently established community gardens on campus.

When assessing how much time students spend on nature-focused activities outdoors, interviewed participants stated that students mostly engaged in gardening. Six of the 10 survey respondents shared that some of their students work with the school gardens as a nature-focused activity. Ms. Hazel shared:

> It's part of the gardening class. There is a class, part of it where they learn about things. Then the science curriculum, I think, is pretty good about the earth science part, having them engage and do hands-on stuff related to that. I would say, probably, it's not until we take the field trip where we do the hike with the ranger and the ranger's talking about all the natural elements—we do a 3-day trip for our older kids—when they're outside in a pretty environment and they [engage in] nature.

During her interview, Ms. Hazel revealed that students learn about nature by engaging in gardening classes, as part of the science curriculum, and during field trips to natural areas. She also noted that gardening is a key part of the school experience for many students, as it provides an opportunity to care for plants and practically explore nature.

In addition, Ms. Pearl highlighted gardening activities as well. She stated that students are:

> really into caring for the plants and things. So we have, like, strawberries, corn is a new thing that they planted, as well as carrots. And so the classes really take ownership of

> those gardening beds and the food they take home. So once they harvest it, each student gets to take some of it home so that they can enjoy it with their families.

She expressed that such experiences provide hands-on learning opportunities that develop empathy for nature and the environment while also teaching important gardening skills. From gardening classes to science curriculum and field trips, there are many ways that students are starting to explore and learn through nature exposure in activities like gardening at school.

Design Elements and Practices

Outdoors. The interviewed educators shared how they have incorporated more greenery into the classrooms. Ms. Ruby, who now serves as an executive director at a private charter school in Los Angeles, shared her experiences as a former principal:

> We were partnering with a landscaper in the community who was trying to work on […] a grant to add more green space to our site. So, while we were waiting for that process to start, he was adding greenery to the spaces that were already available, but we had a design that we were hopefully getting funded.

Ms. Ruby also said that the area had lush green shrubbery, flowers, and plants. Many students used this space to hang out and enjoy the green space. Similar findings were found among survey respondents (see Figure 7).

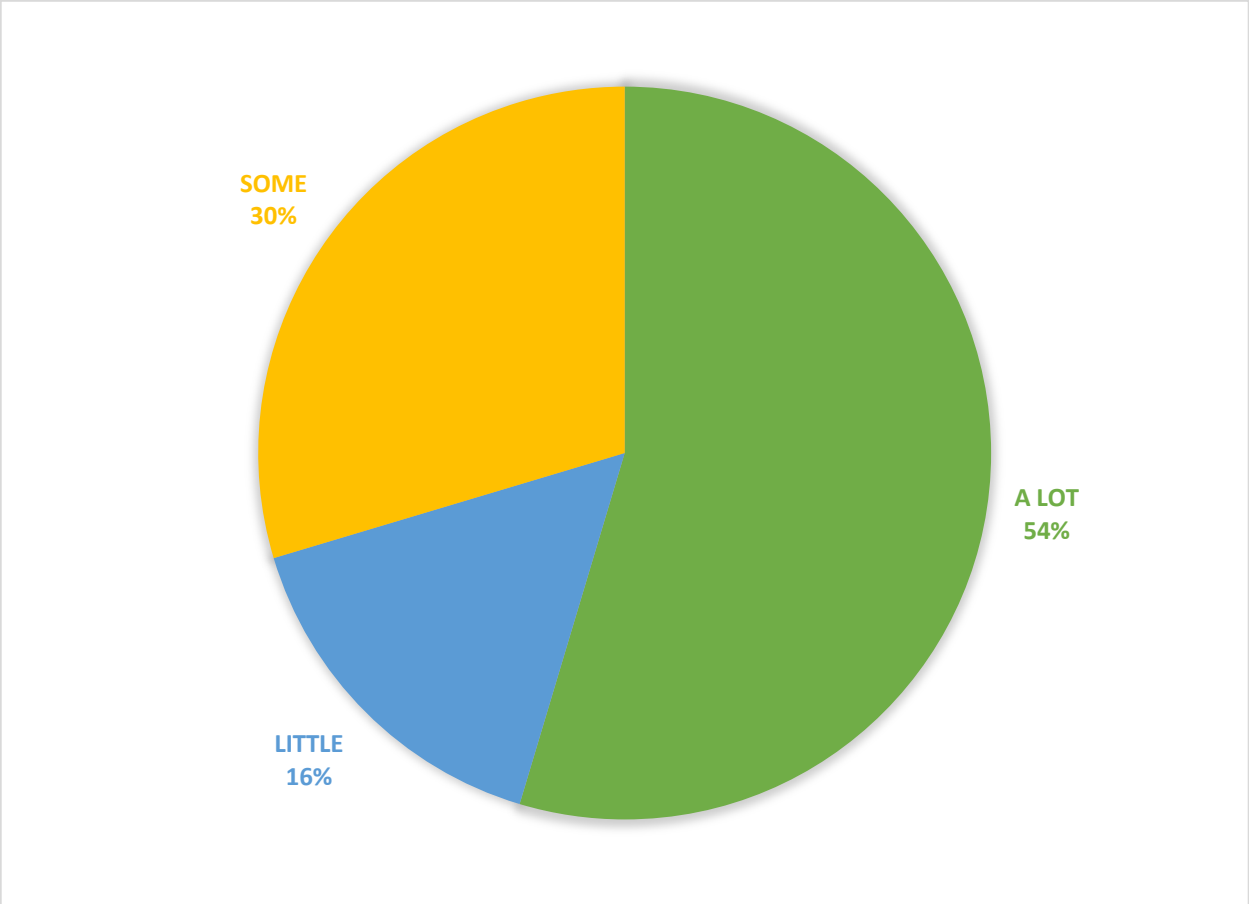


Figure 7. Amount of outdoor green space (trees, grass, garden, or hedges) at school site.

Note: The scale ranged from 1 (very little) to 5 (a lot); responses were combined into three categories, merging rankings 1 and 2 and rankings 4 and 5.

Of the 61 teachers, principals, and school board members who responded to the survey, 51% stated they have a lot of green space at their school sites, 32% indicated some green space, and 17% responded that there is little green space. In addition, 75% of these respondents (n = 59) stated that their school has incorporated trees, shrubbery, water features, and/or colorful play spaces into the schoolyard space while 22% said their school had not done so; 3% were not sure (Figure 8).

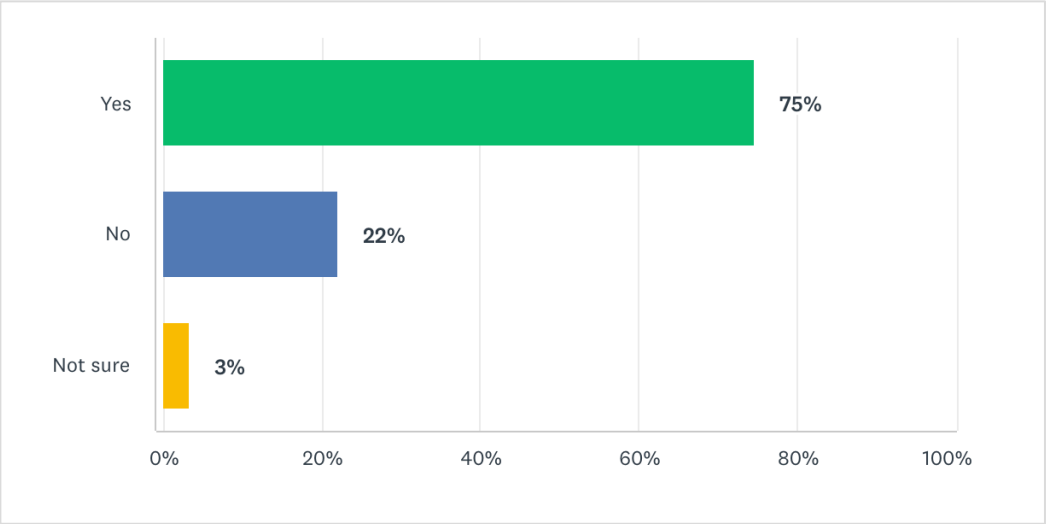


Figure 8. School-incorporated trees, shrubbery, water features, and color in schoolyard.

Among teacher and principal interview participants, when asked which of the two photos best represents their outdoor schoolyard, five (50%) said picture A and five (50%) said B. The five who said B shared that their schoolyards used to look like A but there had been recent improvements or they are improving the schoolyards now. Those who said their schoolyards look more like A stated that there are plans in the works to add more trees and colorful outdoor space (see Figure 9).

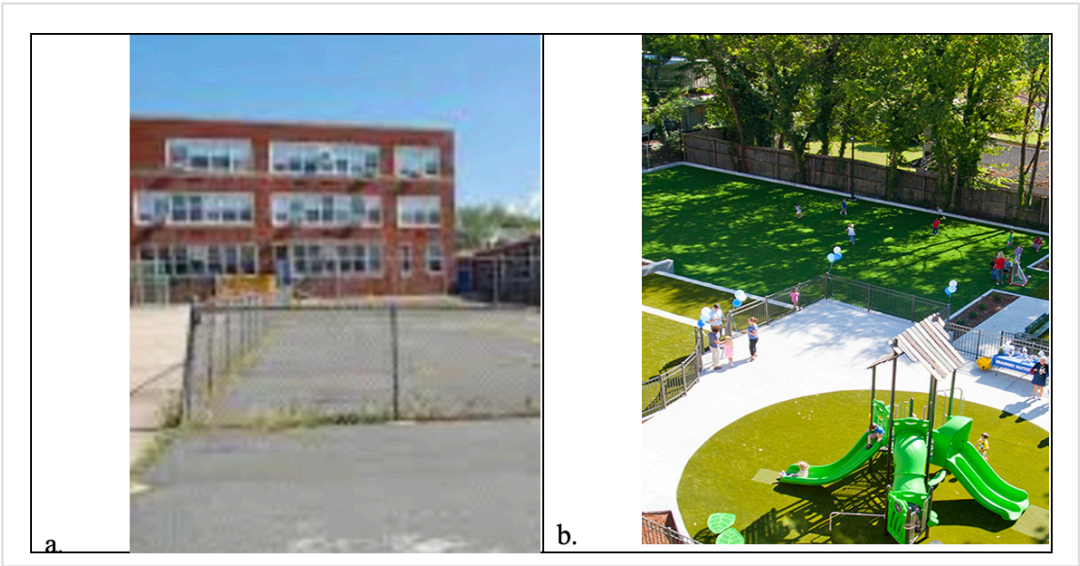


Figure 9. Participants indicated which photo most resembled features of their schoolyards.

Based on interviews with teachers and principals and survey data, some basic biophilic design elements and practices were clearly present in the school environment. However, the perceived amount of biophilic design elements differed depending on the participant's race. Three interviewed teachers and principals highlighted efforts by the school to incorporate murals, LED lighting, indoor–outdoor learning spaces, and animals related to colorful elements in indoor spaces. Two interviewed teachers and principals stated that have access to natural materials such as wood, stone, and plants. Three interviewed teachers and principals stated there were plans to update and modernize their lighting systems. Mr. Blue noted:

> So we're one of the oldest charters […] I just recently painted [the school] with two [types] of greens and eggshell and gray to give it more of a peaceful appearance because the original colors were gray and burgundy. And I said it looked very penitentiary-like, so that was one of the improvements that we made just to kind of give it a feeling of being in an academic space.

Among survey participants, 47% stated that their schools had a lot of natural materials (e.g., wood, stone, plants) indoors, compared to some (29%) or little (24%). Survey participants had mixed responses in terms of the amount of natural light, breeze, and color in predominately Black schools in urban communities (Tables 5, 6, and 7). Black educators were more likely than White, Hispanic, and Asian educators to say there was "little" to "only some" views of nature from the classroom. In addition, 60% of survey participants said Black students did not have a pet in the classroom (Table 6), and 40% said there was a lot of natural light (Table 7).

Table 5

Views of Nature in Classroom by Race

Participant's Race	Little	Some	A lot	N/A
Asian/Pacific Islander	0%	25%	75%	0%
Black/African American	47%	20%	33%	0%
Hispanic	33%	11%	45%	11%
White	13%	32%	65%	0%
All Races	23%	25%	50%	2%

Table 6

Animals or Pets (e.g., Rabbit, Gerbil, Hamster, Fish, Lizard) in Classroom by Race

Participant's Race	Yes	No	N/A
American Indian	100%		
Asian/Pacific Islander	40%	40%	20%
Black/African American	27%	60%	13%
Hispanic	56%	33%	11%
White	71%	26%	3%
All Races	56%	36%	8%

Note: Only one American Indian responded

Table 7

Natural Light, Breeze, and Color Found in Multipurpose Space by Race

Participant's Race	Little	Some	A lot	N/A
Asian/Pacific Islander	0%	40%	60%	0%
Black/African American	20%	27%	40%	13%
Hispanic	11%	45%	33%	11%
White	10%	29%	61%	0%
All Races	14%	31%	53%	2%

Indoors. Among teacher and principal interview participants, when asked which of the two photos in Figure 10 best represents their indoor classroom, eight (80%) said picture B. Those

who said B stated their buildings are old and were built to pack as many students into the buildings as possible; there was also less of a focus on aesthetics.

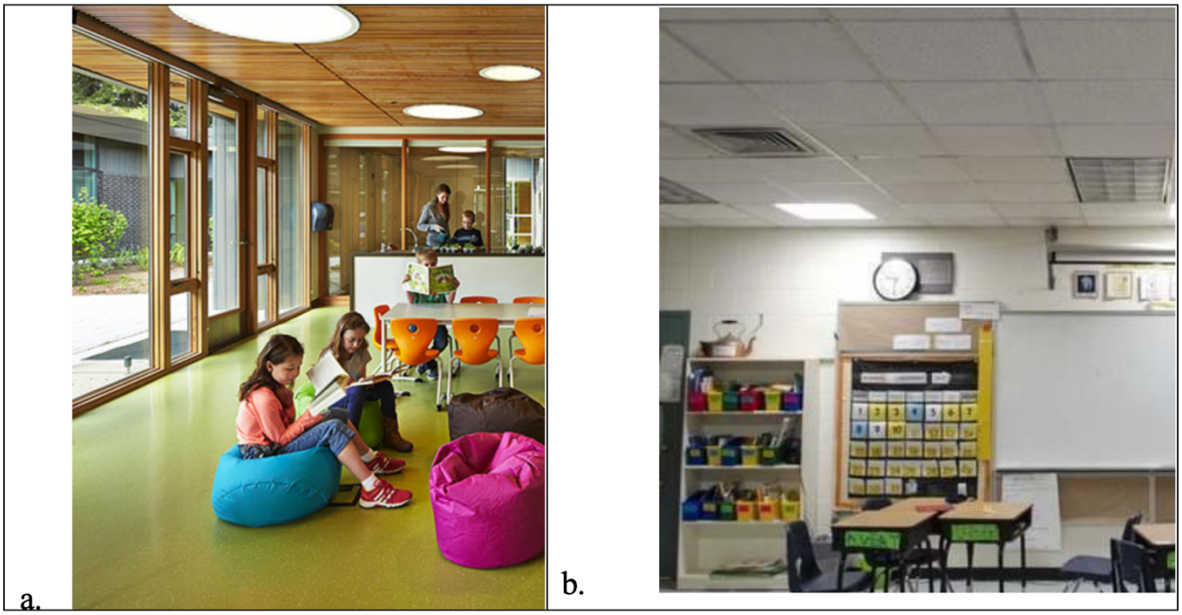


Figure 10. Participants indicated which photo most resembled classrooms at their schools.

Mr. Jasper noted that his school was nearly a century old. He said, "I don't think it's really been modernized to take on I guess the strategy that you're mentioning. So, it all kind of goes into a[n] older model of learning. So, yeah, it's an older school." Mr. Blue echoed this sentiment in his response:

> We do have rooms with windows that don't open. So that's one of the things that I didn't really like. The way that the building is designed, all the classrooms that face [Crenshaw] Boulevard—and I know it's done for noise— [their windows do not] open at all. But as far as like print rich and colorful, I think our classrooms fit the mold of more like the B picture.

According to Ms. Hazel, the school has some areas with flexible and alternative seating that resemble picture B more closely than picture A. Ms. Hazel noted that these areas are often

without natural lighting or soft lamps, and the windows have bars on them—an eyesore in her opinion.

Overall, participants noted that biophilic elements such as green spaces, natural lighting, and nature-focused activities have been integrated into the school environment through building design improvements, pedagogical practices, and outdoor nature-focused engagement opportunities. The use of federal and state COVID relief dollars has enabled educators to introduce biophilia into their classrooms, according to teachers and principals. As more biophilic design improvements are made and pedagogy is adjusted to incorporate biophilic elements more deeply into the curriculum, schools will continue providing a more holistic educational experience for all students. By incorporating biophilic elements into school design, pedagogy, and outdoor engagement opportunities, educators are creating a holistic learning experience for all students that promotes wellbeing and positive student outcomes.

Theme 2: Access and Connection to Nature at Home and in the Neighborhood

The findings indicated that Black students are less likely to have access to nature for several reasons, such as a lack of financial resources and transportation. Other potential obstacles that focus group and interview participants noted included student reluctance, technology overuse, social injustices, parental influences, and economic barriers and housing circumstances.

The most significant barriers to student access to nature, according to weighted average survey data from teachers, principals, and superintendents, are parents' lack of money (4) as well as the lack of school funding (4), public policy (4), transportation (3), and exposure. The lack of student interest (3), lack of teacher priority (3), and lack of caretaker priority (3) were viewed as slightly less important (see Figure 11).

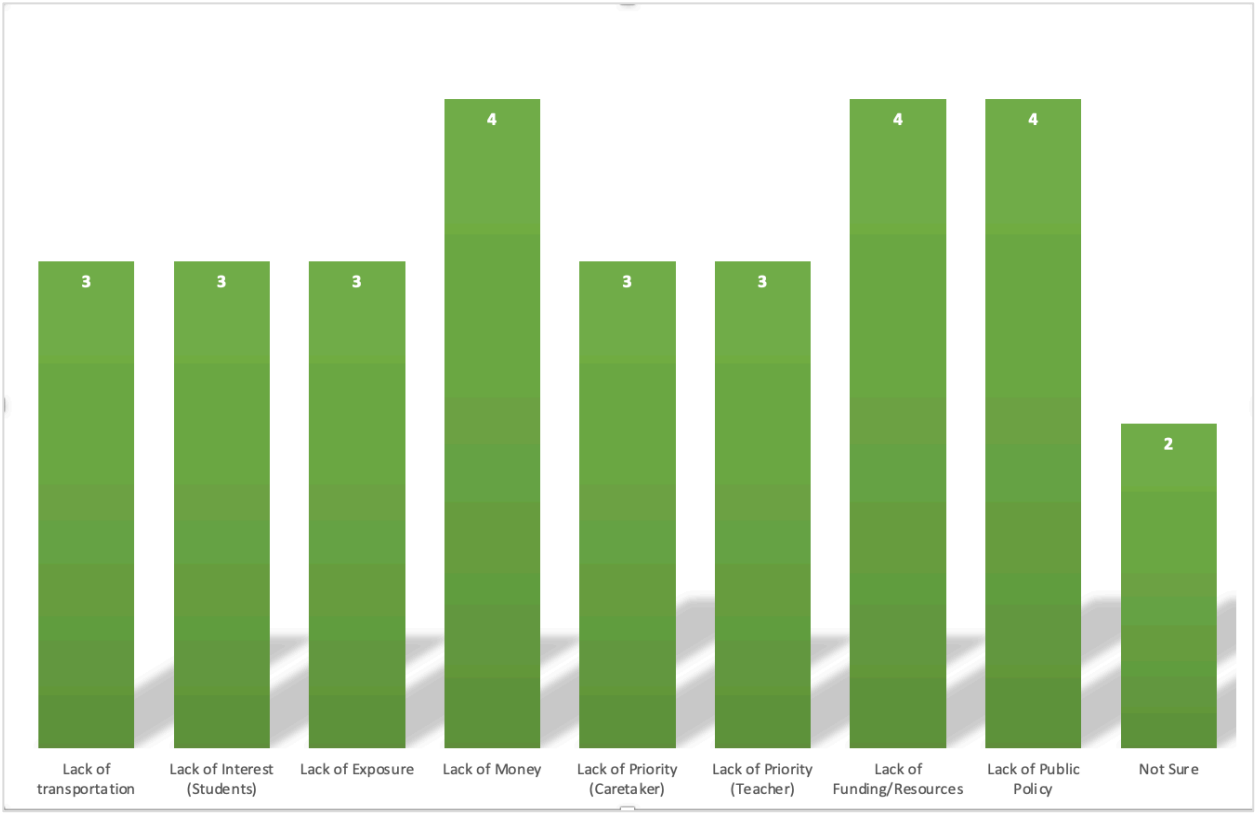


Figure 11. Significance of each potential barrier to Black students' access to nature.

All interview participants stated that Black students have limited opportunities to engage in nature in their neighborhoods. Five participants said there were some pocket parks and trees, but not much. Educators based in in Los Angeles said that there were beaches, hiking trails, camping sites, and nature reserves nearby, but things like transportation, interest, or money can be a challenge for the families or caretakers of Black youth.

Parental/Caretaker Influence and Resources

Data from this study revealed that a small number of parents and caretakers take their kids on hikes to the wilderness, have animals, live in a neighborhood with plenty of green spaces, and take trips to the beach. Even for those who do, they still face challenges, like most Black families and caretakers in inner city environments.

When asked what challenges families/caretakers face that may hinder them from accessing nature and biophilic design, four of the seven interview participants discussed the trauma and major challenges facing their students within their familial structure. For example, Mr. Jasper noted:

> I think a lot of them live in apartments and [there's] just not a lot of connection to anything that's organically grown or no, I don't think so. […] Their families just [are] locked into the inner city, lot of just buildings and cars and roads, not a whole lot of scenery, as far as, you know, trees or grass. People don't have their own individual places […] to prepare nature. So I wouldn't think too much, […] not a lot of opportunities for students in the inner city […] to tap into the NA to nature part.

Ms. Pearl highlighted trauma as the main challenge affecting student motivation and success in school. The trauma students experience can be both emotional and mental, which profoundly affects their ability to learn. As trauma is generational in nature, it is important to develop helpful strategies that address trauma and provide support for students who are struggling. Such strategies could help reduce trauma-induced challenges to student motivation and enable them to reach their full potential in the classroom. According to Ms. Pearl:

> I would say the main one is trauma that causes the motivation to be in school and do well [to] not [be] there. Some of that also has to do with generational issues where, you know, their parents didn't do well in school and don't see school as a[n] institution that is against them or [is more] so than for them. [They] don't have good experiences with school. But I really feel like the number one thing […] is trauma and coming to school with, you know, whatever they left and had to deal with the night before, or, you know, just emotionally and motivationally. They're not […] there to really be at school, to do

> well. School is more of a place to act up and have fun versus learn and get good grades, you know.

Mr. Johnson stated that one of the reasons why students and their families find it difficult to connect with nature is because they are living in housing situations and environments that are not particularly natural. A lot of buildings, cars, and roads surround them, without much opportunity to see trees or grass. Therefore, for students coming from these areas, there is very little opportunity to explore nature on their own.

These parental/caretaker circumstances and lack of access to nature may contribute to the challenges that Black students face, such as trauma and difficulty finding motivation in school. Interviewees pointed out how inner-city environments often limit parental/caretaker influence and resources, resulting in a lack of access to nature. This lack of access can contribute to Black students' struggles with trauma and low motivation in school. As Ms. Hazel explained:

> I would say the parks are close enough they can walk and get to them, but for the percentage of our families without transportation, or that they just have one vehicle and then dad or mom's using it on the weekend to go to work, they can't get to the ocean. They can't get to the mountains. They can't get to the hiking trails.

Ms. Ruby echoed these ideas:

> Some families […] may not have transportation so they don't have access to get to the beach or get to the woods or woods to go hiking. But, you know, the park is accessible. 'Cause you know, the way that the community or development planning or city planning worked was they tried to make more parks in LA so they do have access to parts.

Several focus group participants mentioned challenges their families face that create barriers to accessing and connecting to nature. Alba said that he sometimes felt like there were

not many opportunities to go explore nature because his peers might judge him. However, in his community, there was only a regular park. Elijah said that his family was not as in-tune with nature because of where they live and how busy his parents are. Chris agreed and added that he would say his mom and grandmother did not have a lot of time, especially as his mom had been working more recently. His grandmother had not been feeling well so he was spending more time with her.

Two of the other focus group participants had slightly different experiences, noting that their neighborhoods provided opportunities to access nature and their caretakers exposed them to nature. Zennith shared that his grandmother, who loves nature—particularly trees—often drove him out of the inner city to the woods.

Neighborhood Settings

Two interview participants noted that several parks are within a 5-mile radius of their schools, but they were not sure if students accessed them because of gang violence. Yet even with the presence of pocket parks, interview participants did not think the neighborhoods provide a lot of opportunity to access nature. Focus group participant Elijah stated that:

> I feel like it would have to do with the environment, […] as in new buildings are being made and natures, nature areas are being, uh, removed to make more space for housing and more buildings. And, with, uh, the technology as it's being more advanced, more people are having, are being forced into learning about technology as the future, uh, continues to grow.

This section's findings give greater emphasis to the requirement of crafting better community and economic assistance networks, including mental health services, job opportunities, afterschool activities, and summer camps. Such emphasis will provide inner-city

Black learners with easier access to outdoor spaces as a way to overcome any parental/caretaker problems they may have or any emotional trauma that prevents them from finding motivation in school. By providing these students with equitable opportunities to explore nature, schools can create more positive experiences that will ultimately lead to better academic performance.

The findings from this section further demonstrate the importance of creating better community and economic support systems for families to help families access to nature for all students, especially inner-city Black students, to help them overcome their parental/caretaker circumstances, trauma, and difficulty finding motivation in school. By providing these students with equitable opportunities to explore nature, schools can create more positive experiences that will ultimately lead to better academic performance.

Theme 3: Student Biophilia and Biophobia

Of the nine students who participated in the focus group, four said they felt engaged and connected with nature while three said they did not have such positive experiences. Two participants chose not to answer the question. Fear was one of the reasons they cited as to why they did not engage with nature according to two students who shared their stories. These negative feelings toward nature may be due to past experiences or what they see on social media platforms. One older participant mentioned that some Black youth have to manage extra anxieties from things such as stress in their everyday lives or overuse of technology. Because of these issues, relief is often unattainable for them while spending time outside in an urban environment. The four focus group members who frequently go camping and engage with nature all highlighted the benefits of being in nature. They felt more peaceful and happier while in natural environments. These participants also said that they had fears before going into nature for the first time, but overcame them.

Mr. Linden has been working with Black youth for more than 25 years. He stated that Black camp youth usually have a negative attitude toward nature due to their fears; however, this does not need to be permanent. With the right environment and encouragement, these kids can eventually explore nature without succumbing to failure. He commented that Black camp students initially feel uncomfortable while at camp, but they eventually begin to see it as a place where they can succeed. He stated that being in nature allows them to not only try new things and challenge themselves, but also take what they learned back home with them. In this way, even when they are no longer at camp, they can still benefit from the lessons learned here. Mr. Linden stated:

> What we've learned is that, by disconnecting and immersing them in nature, with opportunities to unplug and reset, we can bring some of those moments back into their lives. Like similar to the stars piece of it, it's just like the unknowns, or like you didn't know you could just like sit and watch the sky and be entertained by that, um, you didn't know that you could, you know, be eating with a bunch of kids from all over the country and like, you know, have similar things in common. And so, a lot of times what we see from a like developmental standpoint is the kids letting their guards down and truly […] learning who they are in those spaces. And so, one of the things we talk about is, you know, a lot of people use the phrase "getting out of your comfort zone," but we also have to acknowledge that there are other zones.

Ms. Pearl believes that having an awareness of the outside world goes hand-in-hand with cultivating a deeper understanding of one's own identity, which helps Black students gain greater knowledge of their own culture as well as other cultures, thereby helping them develop a stronger sense of self and a broader understanding of the global community. In addition, being

able to grow fruits and vegetables provides Black students with opportunities to develop practical skills and be involved in production-based activities that can help foster resilience and problem-solving skills. Growing food also serves as an experience in personal growth, allowing individuals the chance to create something tangible from scratch while connecting with nature in their day-to-day lives. All these factors combined led Ms. Pearl to believe that Black students can benefit greatly from growing their own produce. As Ms. Pearl stated:

> You can see it in their eyes—when children feel a sense of connection and ownership over something, they take pride in it. With the garden bed, for example, we've had a few instances where students wanted to pick the food before it was ready or damage the bed. However, mostly, they understand that respectful actions toward others' property bring about good consequences, so they leave it alone until harvest time.

In addition, Mr. Blue stated:

> Recently, our school has been focusing on wellness and mind health. Our "embrace the mind" program specifically works to improve social emotional health by incorporating time outside in nature. Though we don't have any specific questions about nature itself, being outdoors is part of the larger goal of improving wellness for students.

Meanwhile, Mr. Jasper explained that being in nature can expand students' perspectives because it:

> can kind of get them thinking out of the box—not have them in the same patterns that they've been in over the course of their learning experience, just I guess be more inspirational than looking at walls […] and buildings and just get, I guess, inspiration and also just getting them to think outside of the box.

The data gathered showed that Black students who participate in nature-based activities, especially structured learning environments and camp, build confidence in not only themselves, but also their abilities. According to participants, these types of experiences usually take place in predominately White settings, like the YMCA and Boys and Girls camps. Because of this cultural gap, it is crucial for educators and counselors to be aware of the different cultural experiences among participants.

Mr. Linden highlighted several points regarding safety, saying that people who do not identify as Black or a person of color might not be aware of such issues:

> It's essential to find a balance between being challenged and feeling like you're not good enough. That's why kids usually establish some protective boundaries on the first day, to show how far they're willing to go. On the second day, we begin by dipping our toes in the water. Then on the third day, we challenge campers to see if they can make it back to their room without a flashlight by walking across an empty meadow. It's all about understanding where each person is at when they come to camp and then taking appropriate next steps. The goal isn't to get them to stop being afraid entirely, as that's impossible. Instead, it's about making sure they are comfortable with taking risks so that the journey is less daunting.

Chris, a focus group participant who had nature experiences, said that he felt calm when he went fishing with his dad. He added that the water and simply sitting in nature, waiting, was peaceful. Chris was grinning ear-to-ear as he recalled his own childhood camping trips with enthusiasm: "It was fun. I learned how to skip rocks and we used to just go around skipping rocks and like mess with plants and stuff… It was just, it was fun!"

During her interview, Ms. Pearl noted that, with both parents working multiple jobs and students being loaded down with schoolwork, it is now more important than ever to spend quality time together at home for safety reasons: “I would say certainly the garden […] got kids excited and motivated. Any time they’re excited about learning it helps everything, I think.” Therefore, parents and caretakers must be discerning about which activities they take part in. Ms. Pearl also pointed out that time is a crucial element, and unfortunately there is not enough of it set aside to relax. She mentioned how, nowadays, everything is moving faster than ever, which creates many diversions.

Elijah, a focus group participant who did not attend camp, said that he believed Black students are less interested in nature because his generation has grown up with more technology. He believes that, as we become increasingly reliant on technology, our species is moving away from nature. It is tough to argue that young people today have shorter attention spans than in the past. With social media at our fingertips and new phone games coming out all the time, why would Black youth want to go play outside? In the past, people found pleasure in activities like kicking a can around; now it seems like everything fun happens on screens. Chris concurred, saying:

> If I am being completely honest, I feel like I would be reluctant to [enjoy nature] at first because technology has become so [integrated] into my life. However, with more exposure and understanding of all the different activities that can be done in nature, I may eventually enjoy it.

Jordan, another focus group participant who did not attend camp, agreed with this sentiment, although he added that he has never been a fan of nature because he grew up watching a lot of TV. He knows from research that animals usually do not want to hurt humans, yet they probably

would attack in self-defense if they got the chance. He emphatically declared: “I don’t really like animals like that! Because of what they’re known for. I don’t really like certain types of animals that are like in the woods and forest and things like that. […] And I hate insects.” Four focus group participants agreed with this statement. When asked what influenced their reluctance to be around animals and nature, Jordan further explained that “the dangers we see animals in on the internet make [me] reluctant to approach them in real life. It’s safer for [me] to just avoid those situations altogether.”

Alba said that Black people have not had good experiences in nature, based on what he has seen in movies and heard about in history. When asked to elaborate, he noted, “When I talk about nature, I’m talking about the trees out here. We’ve been given bad memories generationally by being hung from trees and lynched.” Two of the focus group participants expressed the same feeling while two others disagreed. Lisa stated that, before coming to camp, she had the same fears due to family attitudes and TV. However, after attending camp, she no longer has those concerns. As a result of camping as a child, Lisa is now an experienced hiker who frequently goes to national parks.

This section has examined Black students’ biophilia and phobias with engaging nature as well as how these factors affect their connection to nature. The participants indicated that students who participate in nature-based activities often gain confidence in themselves and their abilities. While discussing safety and cultural competency, participants also noted the importance of considering how Black students engage with nature when outdoors. Some students find peace in nature; others discussed their fears and how media and family attitudes have affected their perceptions. It was clear that enthusiasm for learning can be increased by providing access to outdoor experiences such as gardening. Such findings emphasize the need for educators to be

aware of different cultural experiences among participants when engaging them in outdoor activities. With this information, educational professionals can better serve Black students by recognizing these unique barriers and supporting them on their journey to engage with nature in meaningful ways.

Theme 4: Policy, Systems, and Funding

As previously discussed, public policy and funding are significant barriers for Black students seeking to access nature. Of the 10 educators interviewed, five said they are using ESSER COVID relief funds to make school improvements. The $54.3 billion allotted to states can be used for local school districts' expenses, which are additional due to costs of reopening, learning loss from the pandemic, and increased operating costs. This is the first time that the law has specified allowable uses for facility funds (Green Schoolyards America, 2022). Mr. Onyx commented that, without policy and resources, including COVID relief funds, it is harder to get access to outdoor activities or programs related to nature—something that directly impacts underserved communities. However, those interviewed also said they have used these relief funds for other things, such as grants or community initiatives that would bring underserved people closer to nature. In addition, participants highlighted that Los Angeles Unified School District has plans to plant trees at schools and build and maintain gardens.

Mr. Blue explained that the monetary differences between charter schools and public schools are substantial. Public school systems have more resources to draw from than charter schools do, which must often make do with less. To further complicate matters, Mr. Blue noted that many students attending charter schools come from broken or non-existent family units, which can present significant academic challenges in and of itself.

When asked about this issue, Ms. Ruby said that she believes it is deeply rooted in systemic racial issues that people have turned a blind eye to for years. She discussed how parks are a great example of this: They were created as somewhere safe for families to go, but now they are often seen as unsafe spaces. Such systemic problems are complex and will take time and effort to fix properly. She concluded by saying that it is important for people to be aware of the issue and work together to come up with creative solutions.

Mr. Blue and Ms. Ruby shed light on the importance of supporting charter schools and public systems to ensure that every student has access to quality education and nature regardless of their background or financial situation. Ms. Pearl added to the conversation about systems and structural racism by adding that, "if we wanna get deep with it, we can talk about the school-to-prison pipeline and schools being built to resemble prisons." As Ms. Pearl explained, her school is located on the West Coast, which means it has more of an outdoor focus than other schools in the United States. However, some classrooms do not get a lot of natural light because they have either no windows or small windows.

The findings from the survey and interviews with educators suggested that public policy and funding are two significant barriers for Black students to access nature. The ESSER COVID relief funds provide an opportunity to make school improvements, which could include providing access to green spaces and investing in outdoor learning environments. The lack of family support, as well as systemic issues such as the school-to-prison pipeline, further exacerbates this issue. The findings suggest that, with the right investments through public policy and funding initiatives, these goals can be achieved.

Conclusion

The data collected in this study points to the fact that Black students who have access to nature are more likely to feel connected to something bigger than what they have experienced on their own. According to the findings, Black students have less access to nature for several reasons, such as the lack of financial resources, community violence, transportation, and public policy. Other potential obstacles brought up by participants in focus groups and interviews included students' reluctance, technology, social injustice, parental influences, and economic and housing circumstances. Racial injustice, familial attitudes, and peer pressure all lead to limited engagement with nature. Black campers interviewed stated that being in nature allows them to relax and think things through clearly. When they venture outside their comfort zone, it becomes a learning experience with limitless potential. With increased confidence from pushing themselves, students become more willing to try again and succeed instead of giving up at the first sign of failure. Being exposed to nature has a calming effect on Black students, making them more compassionate and present.

CHAPTER FIVE: DISCUSSION AND RECOMMENDATIONS FOR PRACTICE

The findings from the literature review, surveys, interviews with educators, and focus groups with older youth showed that there are indeed ecological barriers that prevent Black students from accessing and connecting with biophilic environments. These barriers include factors such as a lack of nature in urban areas, fear of nature passed on through generations, community violence, and historical racism that has led to a feeling of being disconnected from nature. However, the study also found that, when Black students are given access to nature-based environments, they show increased levels of wellbeing, suggesting that there is great potential for using nature-based environments to improve the lives of Black students. Yet more research is needed to understand how best to create and implement these solutions.

In light of these findings, this chapter will present four recommendations for increasing Black students' opportunities to connect with nature by using Bronfenbrenner (2005) ecological systems theory. First, it is important to create more nature-based environments in urban areas, which can be done by planting trees and vegetation, creating hiking trails, and developing parks and playgrounds that are safe and accessible for all. Second, it is important to address the fear of nature that some Black students may have, which can be done by providing education about the benefits of nature-based environments and by working with community organizations to create programs that help Black students feel comfortable and safe in nature. Third, it is important to address the historical racism that has led to feelings of disconnect from nature among some Black people, which can be done by creating educational materials and programming that focus on the history and contributions of Black people to the conservation movement. Finally, it is important to conduct more research on this topic; such research should focus on understanding how best to create and implement nature-based solutions for Black students.

Discussion of Findings

Black students often have to struggle harder to find academic success due to the conditions of their environment. Living in poverty and constantly feeling stressed can lead them to act out more in school, score lower on tests, and play hooky more frequently (Noguera et al., 2019). In addition, Black students and their family members are much more likely than other demographics to live without clean air or water, healthy food options nearby, any sort of outdoor green space like a park, and quality health services (Noguera et al., 2019). Biophilia and stress recovery theories are supported by experiential research suggesting that exposure to natural environments correlates with physiological stress relief and mental fatigue reduction (Berto, 2014). In the current study, the surveys, interviews, and focus group findings revealed four primary themes: biophilic exposure, learning, and design in schools; access and connection to nature at home or in the neighborhood; student biophilia or biphobia; and policy systems funding.

Responding to the Research Questions

This paper discusses the benefits of exposing Black students to nature, particularly those who lack access to it. Two research questions were explored in the study: What are the ecological influences that affect Black students' connections to natural environments, and how do nature-focused environments influence Black students' wellbeing and academic achievement? These questions were motivated by Kellert et al.'s (2017) six principles of biophilic design. This study has presented evidence from the literature as well as interviews and focus groups on how such access can create meaningful learning opportunities and prevent the return to a suboptimal educational system. In addition, it has explored how exposure to biophilic environments may reduce stress levels and improve academic performance for Black students. Salingaros (2015)

argued that both the environment and our biology should be considered when designing structures. The goal is to create buildings that help encourage healing. Biophilic ecosystems, for example, have been shown to provide more effective opportunities for calming than urban settings, which in turn helps people recover from stress and trauma-related losses in intellectual performance.

Bioecological Model

Bronfenbrenner's (2005) bioecological model supports biophilic-focused recommendations. To improve mental wellbeing in the school environment, these biophilic systems should be developed to encourage access to nature, connections with peers and community members, a sense of belongingness, and physical safety. These systems would help reduce stress levels in students overall. If we want to see Black students succeed academically, it is important that biophilic resources be provided in their schools and homes. Biophilia should also be incorporated into public policy to support its implementation in the educational system. In this way, we can create healing and learning opportunities for Black students that will lead to improved academic performance. All these systems influence a child's development (see Figure 12).

The bioecological model (Bronfenbrenner, 2005) recommends that biophilic microsystems, mesosystems, ecosystems, and macrosystems be developed to provide students with access to nature and connections with peers/community members; a sense of belongingness would help reduce stress levels and improve academic performance in Black students. Black students need to have access to biophilic resources in their schools and homes so they can benefit from a healthy environment. Incorporating biophilia into public policy would also support its implementation in the educational system, creating healing and learning opportunities that lead

to improved academic success. Providing biophilic resources to aid in the development of Black students can thus lead to improved academic performance.

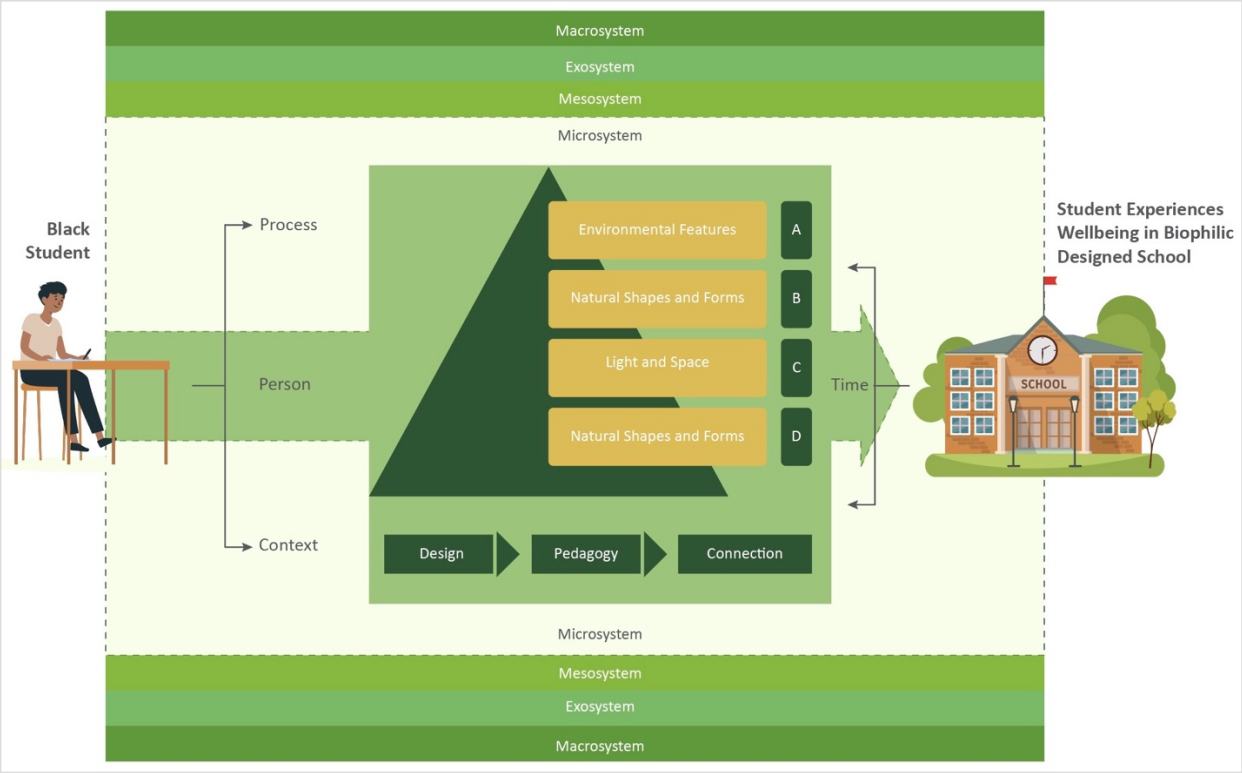


Figure 12. Black students' biophilia implementation through bioecological systems.

Recommendations for Practice

Chapter Three discussed how different levels of biophilic influence (i.e., micro-, meso-, and exosystems) impact Black students the most (see Figure 12). Within a child's microsystem, parents and teachers can create biophilic opportunities through design, pedagogy, home exposure, field trips to national parks, plant and tree exposure, better lighting fixtures, and nature walks. Yet such opportunities are often absent due to a scarcity of resources. Consequently, community organizations can give more assistance to assist in the creation of additional opportunities for biophilic involvement through meso- and exo-ecological systems. As existing research has shown, a lack of green space leads to different types of negative experiences (e.g.,

social inequality, crime, economic status, and pollution) in neighborhoods and communities; these factors also affect children's wellbeing (Jennings et al., 2017). The meso- and exosystems are the second and third rings of context that help explain the relationships among family/caretakers, schools, and community centers across various settings and how those systems impact Black students' ability to connect with nature. For example, in inner cities, the school is often one of the few places where youth have access to nature, which might be lacking at home or in neighborhoods. The recommendations provided herein, based on the current study's findings, can be applied to culture-sensitive programs and materials created along with groups suffering from inequality and hardship.

Recommendation 1: Parents, Teachers, Principals, and Policymakers Should Remove Barriers to Access and Connection

Shift Thinking

According to recent studies, many Blacks feel alienated from nature and prefer developed landscapes over natural environments (Taylor, 2018). The dominant story for too long has been that Black people are disconnected from nature and do not care about environmental issues. However, this is not true, and such thinking needs to shift. Black people have a long history of interacting with and caring for the natural world. Historically, Black people have always had a stewardship mindset when it comes to the land, although that changed when they were enslaved and subjected to racist social policies. Today, parents need to shift their thinking back to those roots. There is a wide disparity in racial and ethnic use of the national forests according to a recent study based on U.S. Department of Agriculture data (Cooke et al., 2018):

> Blacks or African Americans, who make up about 13 percent of the U.S. population, accounted for about 1 percent of national forest visits in 2010. Hispanics or Latinos, who

> make up about 17 percent of the U.S. population, accounted for less than 7 percent. Non-Hispanic whites, who make up about 63 percent of the U.S. population, accounted for more than 80 percent of national forest visits in 2010. Asians or Pacific Islanders, who make up about 5 percent of the U.S. population, accounted for less than 3 percent of national forest visits in 2010. (p. 2)

Nine of the teachers and principals interviewed in the current study said that their students never visit national parks or other natural areas. Three of the focus group students stated outright that they do not like nature and are afraid of animals and insects. Results from the survey showed that Black teachers were less likely than others to have a class pet.

Parents and educators should talk frequently to develop a stronger understanding of the idea that we are all part of nature, not separate from it. There is a need for a new story about Black people and nature—one without old racist ideas controlling Black experiences with nature and the woods.

Create Free or Reduced-cost Transportation Options that Allow Access to Nature

Black students face many transportation challenges when trying to access nature. This study found that such challenges are a significant ecological issue based on the survey and interview data. Several transportation options are available, including public transportation, carpooling, biking, and walking. However, it can be difficult to take advantage of these options due to the barriers that Black students face.

One way to overcome these barriers is by working together to find creative solutions. For example, carpooling or biking with a large group of friends can be a great way to save money and get outside. Walking or hiking in groups can also be a safe and enjoyable way to experience nature. By coming together and sharing resources, Black students can have greater success in

accessing nature. School districts should provide low-income urban families with free or reduced-cost transportation passes to nature-focused destinations by partnering with local transportation companies, such as SMS Transportation, Uber, Lyft, buses, and charters. School districts and schools could also apply for grants. An example of the type of innovative program concept is AccessNature, a free transportation program that provides families with access to nature. The program could be designed to reduce barriers to entry for Black students who often face disparities in access to quality education and learning opportunities. AccessNature could provide safe and reliable transportation to and from school as well as to and from after-school and summer programs. It could also provide families with access to resources and information about nature-based education and programming, especially as the program is committed to providing Black students with the opportunity to experience the benefits of nature-based learning.

Invest in More Field Trips with a Focus on Nature

Organizations like the YMCA are based on the idea that it is essential for educators and parents to expose students to nature through hikes, trips to the beach, and/or camping trips on nature reserves. However, most interviewees noted that Black families rarely take their children on such outings. The participants who did take their students on these trips observed significant benefits and changes in many of the youth who attended.

The challenge is that these activities cost money—something most school districts and families do not have. However, there are a few ways around this barrier. One way is for school districts to budget for these types of field trips. Another is for the state government to provide funding for these types of outings. Either way, to create well-rounded, knowledgeable citizens, schools and community-based organizations should invest in more field trips with a focus on

nature. Practical experience is essential for learning about the world around us, and what better way to learn than through first-hand interactions in nature?

Find Scholarships for Free or Reduced-cost Outdoor Camps

Many families are unaware of the readily available resources to send their children to these types of camps. Organizations like the YMCA and Boys and Girls Club continually offer such opportunities. In addition, biophilia-based learning recovery and after-school programs are becoming more popular; these initiatives focus on providing academic instruction as well as supervised recreational activities in natural settings. Scholarships are often available to help make these camps accessible for families in need of financial assistance. It is important to do research into the specific camp and its resources. Parents should contact the staff personally, as they may know of grants or other forms of financial aid that could help make attendance possible. As an example, YMCA executive directors and their boards often fundraise solely to fund such programs. In addition, many local education foundations offer grants for biophilia-based learning recovery and after-school programs. These opportunities provide a great way to access funding assistance for children who would otherwise be unable to attend due to financial constraints. It is also important to explore other options with the camp directly, as they may offer discounts or deals if a child enrolls in multiple sessions at once or if a family refers other families to the program. Some camps even waive fees for lower-income families.

Overall, many scholarships and grants are available for biophilia-based learning recovery and after-school programs. With a bit of research, families can find ways to make these camps more financially accessible.

Recommendation 2: Develop Culturally Competent Pedagogy Rooted in Biophilia

Although the survey respondents stated that they teach nature more than three times a week on average, Black educators were found to be less likely than other racial groups to have a classroom pet or teach their students about nature. These educators require more professional development to build their confidence in teaching nature. With this extra support, teachers may be less hesitant to incorporate biophilia into their lesson plans. In addition, biophilia-focused curriculum tools are necessary to create an abundance of Black tree huggers. Culturally relevant and relatable biophilic-based pedagogy can inspire a new generation to see themselves as part of nature, meaning they need not just protect the environment, but also themselves.

This type of educational approach can help students develop critical thinking, literacy, math, and science skills (Kim et al., 2020). Some interviewees who said they developed gardens also saw their students' social-emotional development and critical thinking skills improve. Kim et al.'s (2020) cotton garden study found that children learn more effectively from hands-on experiences, active play, and spontaneous discovery in nature than from passively receiving knowledge. In other words, learning by doing is more effective than learning by listening or watching. There are many benefits to this approach for Black students. It can help them connect to their cultural values, develop critical thinking skills, improve their literacy and numeracy skills, appreciate the natural world and learn to take care of the environment, and develop social and emotional skills such as cooperation, communication, and empathy.

Recommendation 3: Link Biophilic School Design with Community Needs

Establish School Farms and Gardens to Build Food Security

As previously noted, green spaces such as tree cover, community gardens, nature conservation areas, streams, green rooftops, and forests are essential ecosystems in communities that help maintain the balance between pollutants and urban congestion (Wolch et al., 2014).

Providing physical and mental health benefits improves quality of life and makes communities more resilient to climate change. School farms and gardens are one way to reduce food insecurity and help students develop healthy eating habits. In this study, many educators shared that they have either installed a community garden or plan to do so soon. There are many ways to create a school farm or garden, but some common features include the following:

- Using unused or underutilized school property
- Partnering with local farmers, community gardens, or other agricultural organizations
- Creating raised beds or planters for gardening
- Including a diversity of fruits and vegetables
- Educating students about farm-to-table practices, food security, and nutrition

School farms and gardens can provide fresh, nutritious produce for school cafeterias and families in need while also teaching students where their food comes from and how to grow their own. With careful planning and community support, school farms and gardens can be an important part of building food security.

Create Green Rooftops

Green rooftops help reduce air pollution and can make a community more attractive. They also help reduce the heat island effect, in which urban areas are significantly warmer than rural areas because of all the concrete and asphalt. Black students and families disproportionately live in urban areas, so greening up rooftops could have a significant impact on their health and wellbeing. This is just one strategy school administrators can use to address the disparities between Black and White students in educational systems.

Incorporate Plants, Gardens, Animals, Color/Art, Natural Materials, Space for Refuge, and Visual Connections to Nature

The literature noted that several health disparities, like high asthma rates and low birth rates, have been linked by research to the effects of environmental pollution (Johnson et al., 2021). The literature also suggested that "greening interventions or the presence of community gardens," "vegetated streets and walkways," and "tree and ground cover" reduce or influence crime (Shepley et al., 2019, p. 6). Crime rates are often lower in areas where neighbors watch out for each other; by getting to know the people in the community, community members can make everyone feel more comfortable being outdoors. Black students from low-income backgrounds are especially impacted by asthma at higher rates, which is then correlated with lower academic performance and attendance in school (Johnson et al., 2021). Many interview and focus group participants noted that many students live in apartments in single-family households that lack any connection to nature.

Parents, educators, policymakers, and community agents (e.g., nonprofit leaders and housing developers) can help promising young Black scholars feel more connected to nature by adding indoor/outdoor plants and animals, using natural colors and materials, creating a safe space for them, and having visual reminders of the outdoors. Indoor/outdoor plants can help purify the air and provide a sense of calm. Animals can also be a source of comfort and companionship. Finally, having visual reminders of nature, such as rocks, shells, or wood-based furniture, will help children feel connected to the natural world. For instance, the Crenshaw YMCA is a powerful example of the positive effects of biophilic design and sustainable community partnerships. Through its leadership's partnership with Jordan Brand and Russell Westbrook Foundation, the group was able to secure one million dollars in investments that enabled a comprehensive renovation of the building. These investments incorporated elements of biophilic design such as LED lighting throughout the building, vibrant indoor and outdoor

culturally relevant and inspirational murals, and open and bright learning spaces with color and nature-focused elements. Furthermore, this investment included an outdoor green space designated for learning opportunities. During these difficult times of the pandemic, the Crenshaw YMCA's renovations were more important than ever, providing an oasis of green space and light-filled learning spaces that helped sustain users' physical and mental well-being during this period of great uncertainty (see Figure 13). Afterschool and summer camp participants had the opportunity to be physically active, explore yoga in an outdoor green setting, experiment with robotics amidst nature's beauty, play various sports in a vibrant gymnasium - not to mention sample freshly picked fruits and vegetables outside alongside a mural that sparks curiosity for engaging with Mother Nature. Moreover, through a partnership with USC, a sustainable community garden will be created to help promote healthy living within the local community. Finally, through its partnership with Michelson Found Animals, Crenshaw YMCA has been able to engage volunteers in helping care for animals in the community.

Figure 13. Crenshaw YMCA biophilic renovations in partnership with Jordan Brand.

During the COVID-19 pandemic, Crenshaw YMCA has continued to demonstrate its commitment to biophilic design and sustainable partnerships by helping foster an environment of health and wellbeing for those in the local community. As this example demonstrates, biophilic design, sustainable partnerships, and investment can help create a healthier and more vibrant environment—an important message of hope for communities struggling to make positive changes in their environment. By continuing to invest in biophilic design elements, maintaining strong partnerships with other organizations, and expanding access to green spaces, we can ensure that our communities are healthy now and into the future. The Crenshaw YMCA serves as an inspiring case study demonstrating how these initiatives can work together to benefit all involved.

Recommendation 4. Increase Targeted Funding and Public Policy Initiatives for Biophilic Design in Low-income Urban Schools and Surrounding Neighborhoods

The biophilic macrosystem is the outer level that impacts all other systems within Bronfenbrenner's (2009) model; it includes public policies, laws, norms, and culture that set the stage for ecological influences. These can either accelerate or impede Black students' biophilia and their ability to connect with nature in a positive way. This recommendation considers the impact of structural racism on the ecological paradox and the complexities of Blacks' connection with nature.

The most significant barriers for students accessing nature, according to the survey responses, are the lack of public policy and funding. Public policy and funding are essential for addressing the issue of unequal access to nature for Black students. The ESSER COVID relief funds provide a platform from which to begin making improvements within public schools, such as providing access to green spaces and investing in outdoor learning environments. To ensure

equitable access to nature for all students, public policymakers should implement concrete measures that make use of these funds. For instance, The Living Schoolyards Act, a bill proposed by U.S. Senator Martin Heinrich from New Mexico, is a remarkable example of how the federal government can directly assist our children and schools. This act grants schools access to crucial funds that will help reimagine schoolyards for more outdoor learning opportunities that prioritize ecology preservation and give kids the chance to learn and play in nature (Heinrich, 2022). The two-phase planning and implementation grants present a unique opportunity to benefit both students and the surrounding community by creating outdoor learning experiences that bolster local environmental systems. In addition to supporting efforts to grow healthy produce, save water, and observe wildlife, these initiatives can lead to improved mental health in participants, greater physical fitness levels, and enhanced academic performance. Such benefits are especially important for underserved communities that may not have access to resources like parks or gardens. Not only will these activities provide children with an immersive learning environment, but they may also help build bonds between students and their local community as well as foster environmental stewardship (Heinrich, 2022).

To encourage students to spend more time outdoors, this study recommends creating policies that favor outdoor activities, increasing funding for outdoor educational initiatives, and providing support and resources for school administrators who want to create outdoor learning opportunities. In addition, public policymakers need to understand the systemic issues contributing to this inequity, such as the school-to-prison pipeline and lack of family support, so they can take action to address them.

If public policymakers and other stakeholders act, it will help ensure that all students have equal access to nature, regardless of socioeconomic status or racial background. By taking

this crucial step in promoting educational and environmental equity for Black students, public policymakers can improve outdoor education opportunities for all students in public schools. Educators and policymakers can work together to address this problem. One way to do so is by providing tax breaks or other financial incentives for developers who incorporate biophilic design into their projects. Another way would be to create special funding programs specifically for biophilic design in schools and neighborhoods.

Public policy can also play a role in promoting biophilic design. For example, local zoning ordinances could give preference to developments that include biophilic features. Building codes could be amended to require or encourage biophilic design elements in new construction. Such targeted initiatives will help ensure that the benefits of biophilic design are not just reserved for the wealthy, but are also accessible to all members of society. As noted, places like Singapore have already taken steps in this direction, becoming one of the first biophilic cities; the efforts have yielded positive results. The Singapore Green plan has turned the city into a garden. City policy and regional plans have incorporated continuous street canopies, park connectors, community gardens, and biophilic designs into building facades, green walls, and green hospitals and schools.

The Children & Nature Network, in partnership with the National League of Cities, developed 12 principles for creating a biophilic design in urban cities and communities that policymakers can adopt:

1. Every child has the right to a positive connection to the natural world.
2. Want to envision a better future? View your city or region through the lens of the natural world.
3. Nature-rich communities are healthier for children and other living things.

4. Conservation is no longer enough. Now it's time to create nature.
5. Don't cut down the trees, build up the kids.
6. The more high-tech our schools become, the more nature they need.
7. Natural history is as important as human history to a regions sense of identity.
8. Different culture and people of different abilities experience nature differently. That's a good thing.
9. Build a bigger boat.
10. The future will belong to the nature smart.
11. Recognition, collaboration, and competition build nature-rich communities.
12. Hope is contagious. (Louv, 2016, para 3–13)

Another way would be to create special funding programs specifically for biophilic design in schools and neighborhoods. Many educators mentioned that they are using various federal and state coronavirus-related funding sources. A couple of educators mentioned applying for grants from foundations. State and federal agencies should earmark funds specifically for biophilic design projects in schools and neighborhoods, which would send a strong signal that these investments are a priority and would make it easier for educators and community members to access the resources they need. If educators are going to create a future that is sustainable, equitable, and prosperous for all, a biophilic design must be a central part of the equation. By working together, they can make sure that it is accessible to everyone, not just the privileged few.

Limitations

Although this study has several strengths, including the use of multiple data sources such as one-on-one interviews, surveys, and a focus group, Creswell (2020) argued that all research

studies have research limitations. This study has three key limitations. First, the survey did not ask whether participant schools' nature-related improvement has had wellbeing or educational improvements and, if so, what types of improvements. This information would have paired well with and strengthened the qualitative information gathered from the one-on-one interviews. The second limitation is that most interviewees had only recently implemented nature-focused improvements or none at all, so they could not fully articulate their results. Moreover, because of the pandemic, much of the learning recovery they may have been realized was lost, making it hard to assess how the improvement has impacted students' academic performance. The final limitation is that the interview and focus group participants were mostly from western regions of the United States, so the results may not be generalizable to other regions or countries. However, this was not the case for those who responded to the survey.

Although this study is not without limitations, it still sheds light on how ecological factors can affect students' wellbeing through nature as well as the attempts of school administrators to make their schools better through nature-based solutions. It has also highlighted some of the challenges faced when trying to do so. These findings can contribute to the further research on biophilia and help inform future policy and practice.

Recommendations for Future Research

This study has provided a starting point for understanding the potential of incorporating nature into remote learning environments and the benefits it can have for educational equity. Additional research is needed in order to fully understand the implications of biophilic design. It may be helpful for policymakers to understand how biophilic design principles might work within remote learning environments—something that has become increasingly relevant lately. Conducting a national study on funding availability for schools looking to implement biophilic

design principles would also be interesting. Such research could provide insights into what the barriers to implementation may be and which educational organizations are succeeding in this area. Future studies could also interview youth and observe them in classrooms implementing biophilic design, thereby providing further insights into how to effectively leverage biophilic design principles for improved educational outcomes.

By understanding the elements of biophilic design, educators and policymakers can develop more effective strategies. Thus, additional research should explore how other racial and ethnic groups experience access to wildlands and nature-based activities. Such studies could provide a deeper understanding of the social dynamics that shape people's decisions about engaging with natural environments.

Conclusion

The data gathered from interviews, focus groups, and surveys revealed barriers in the micro-, exo-, and macro-systems that discourage students from accessing nature, such as a lack of transportation, family prioritization, and awareness of the importance of nature. Another barrier is the historical violence psychologically tied to the woods and nature, including law enforcement officials engaging in systematic hangings of Black people from trees and dogs being used to attack Black people during Jim Crow-era segregationist practices. Such violence against Black people continues even today in marginalized communities. To bridge the access to nature and exposure disparities educators identified in this study, teachers have started making biophilic exposure available to Black students. The teachers in this study who incorporated biophilic activities like gardening and outdoor play in green spaces into their classrooms observed how their students formed a sense of responsibility toward nature. These biophilic experiences not only nurtured positive social-emotional skills, but also cultivated a sense of

peace and tranquility, which can lead to developing greater academic success over time. However, much more work in this area is needed.

Although the literature review and focus group findings underscore that Black youths remain reluctant to engage in outdoor activities, participants in this study reported that camping trips and outdoor field trips enabled them to experience a dramatic shift in their misperceptions and fears while also building their self-confidence. The findings underscored the need to link Black children with nature via summer camps, YMCAs, Boys and Girls Clubs, and Boy/Girl Scouts. All four focus group participants who engaged in nature noted feeling more confident when venturing outdoors after the camp experience. Indeed, those same participants are now actively engaging in outdoor activities such as hiking, fishing, and camping.

The pandemic has also allowed us to rethink the design of our educational spaces, with biophilia playing an important role in creating healthier learning environments. As demonstrated in this study, many schools are seeking to embrace the benefits of biophilic pedagogy by slowly making physical improvements on their campuses to be more nature-based; they are already noticing some social-emotional wellbeing effects on their students. With additional funding, schools can implement nature-based systems and green infrastructure that will not only foster better mental health outcomes, but also bolster academic performance.

Ultimately, this research underscores how Black educators in urban settings have divergent outlooks concerning the level of green space available for their classrooms and highlight the lack of integration regarding biophilic elements and pedagogy related to nature. Based on the findings, parents, educators, community leaders, and state- and national-level stakeholders can collaborate to provide activities and experiences in nature to help Black youth build self-confidence, develop a connection with the outdoors, and increase their self-efficacy.

These activities will help young people become more informed about the restorative benefits of spending time in nature. Furthermore, this research suggests that these restorative benefits may be uniquely beneficial to Black youth. With such initiatives in place, Black teachers will have the opportunity to support youth in building meaningful relationships with green spaces in their school districts and benefitting from increased engagement with the natural world.

Much progress remains to be made before all students have equal opportunities to engage with nature. Further research is necessary to better understand Black teachers' attitudes toward nature and the potential obstacles that may be preventing them from engaging with it. With this knowledge, we can create opportunities for Black teachers to engage more deeply with nature, thereby creating a more equitable learning environment for all students and providing more meaningful learning experiences. More research is also needed to understand how social barriers result in Blacks having poorer mental health and academic performance outcomes than other groups. Teachers, administrators, policymakers, and parents must all comprehend the obstacles students of color encounter when it comes to connecting with nature; only then can they take the necessary steps to dismantle the systems that have been preventing access to these opportunities.

References

Aliyu, A. A., Singhry, I. M., Adamu, H. A. R. U. N. A., & AbuBakar, M. A. M. (2015). Ontology, epistemology, and axiology in quantitative and qualitative research: Elucidation of the research philosophical misconception. In *Proceedings of the Academic Conference: Mediterranean Publications & Research International on New Direction and Uncommon* (Vol. 2, No. 1).

American Educational Research Association. (2011). Code of ethics. *Educational Researcher, 40*(3), 145–156. https://journals.sagepub.com/doi/10.3102/0013189X11410403

American Psychological Association. (2016). Guidelines for the undergraduate psychology major: Version 2.0. *The American Psychologist*, *71*(2), 102–111.

Anifowoshe, S. (2020, October 16). Environmental racism has 'ripped' Black people away from nature. *Euro News*.

Annerstedt, M., & Währborg, P. (2011). Nature-assisted therapy: systematic review of controlled and observational studies. *Scandinavian Journal of Public Health*, *39*(4), 371–388. https://doi.org/10.1177/1403494810396400

Beatley, T. (2017). *Handbook of biophilic city planning and design*. Island Press. https://doi.org/10.5822/978-1-61091-621-9

Berto, R. (2014). The role of nature in coping with psycho-physiological stress: A literature review on restorativeness. *Behavioral Sciences, 4*(4), 394–409. https://doi.org/10.3390/bs4040394

Bikomeye, J. C., Balza, J., & Beyer, K. M. (2021). The impact of schoolyard greening on children's physical activity and socioemotional health: A systematic review of

experimental studies. *International Journal of Environmental Research and Public Health*, *18*(2), 1–20. https://doi.org/10.3390/ijerph18020535

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design.* Harvard University Press.

Bronfenbrenner, U. (2005). *Making human beings human: bioecological perspectives on human development*. Sage Publications.

Bronfenbrenner, U., & Morris, P. A. (2007). The bioecological model of human development. In W. Damon, R. M. Lerner, & R. M. Lerner (Eds.), *Handbook of child psychology*. Wiley. https://doi.org/10.1002/9780470147658.chpsy0114

Browning, M., Kuo, F., Sachdeva, S., Lee, K., & Westphal, L. (2018). Greenness and school-wide test scores are not always positively associated—A replication of "linking student performance in Massachusetts elementary schools with the 'greenness of school surroundings using remote sensing." *Landscape and Urban Planning, 178*, 69–72.

Browning, M. H. E. M., & Rigolon, A. (2019). School green space and its impact on academic performance: A systematic literature review. *International Journal of Environmental Research and Public Health*, *16*(3), 429. https://doi.org/10.3390/ijerph16030429

Browning, W. D., Ryan, C. O., & Clancy, J. O. (2014). *14 patterns of biophilic design*. Terrapin Bright Green LLC.

Byrne, J., Wolch, J., & Zhang, J. (2009). Planning for environmental justice in an urban national park. *Journal of Environmental Planning and Management, 52*(3), 365–392.

Capaldi, A., Dopko, L. R., & Zelenski, J. M. (2014). The relationship between nature connectedness and happiness: A meta-analysis. *Frontiers in Psychology*, *5*, 976. https://doi.org/10.3389/fpsyg.2014.00976

Children and Nature Network. (n.d.). *Our work*. https://www.childrenandnature.org/about/

Cooke, B., Edmondson, D., Flores, D., Valenzuela, F., Roberts, N. S., & Falco, G. (2018). Recreating in color: Promoting ethnic diversity in public lands. *Science You Can Use Bulletin, 30*.

Creswell, J. (2020). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.

Curriculum Associates, LLC. (2020). *Understanding student needs: Early results from fall assessments*. https://www.curriculumassociates.com/-/media/mainsite/files/i-ready/iready-diagnostic-results-understanding-student-needs-paper-2020.pdf

Danks, S. G. (2010). *Asphalt to ecosystems: Design ideas for schoolyard transformation*. New Village Press.

Darling-Hammond, L. (2010). The flat world and education: How America's commitment to equity will determine our future. *Journal of Educational Change, 11*, 291–295. https://doi.org/10.1007/s10833-010-9137-7

DeLuca, K., & Demo, A. (2001). Imagining nature and erasing class and race: Carleton Watkins, John Muir, and the construction of the wilderness. *Environmental History, 6*(4), 541–560.

Determan, J., Akers, M. A., Albright, T., Browning, B., Martin-Dunlop, C., Archibald, P., & Caruolo, V. (2019). *The impact of biophilic learning spaces on students' success.* https://cgdarch.com/wp-content/uploads/2019/12/The-Impact-of-Biophilic-Learning-Spaces-on-Student-Success.pdf

Duke, N. K., & Martin, N. M. (2011). 10 things every literacy educator should know about research. *The Reading Teacher, 65*(1), 9–22. doi:10.1598/RT.65.1.2

Dunning, S. K. (2021). *Black to nature: Pastoral return and African American culture*. University Press of Mississippi.

EPA. (n.d.). *Heat islands and equity*. https://www.epa.gov/heatislands/heat-islands-and-equity

Equiano, O. (1789). *The interesting narrative of the life of Olaudah Equiano, or Gustavus Vassa, the African*. Prabhat Prakashan.

Finney, C. (2014). *Black faces, White spaces: Reimagining the relationship of African Americans to the great outdoors*. The University of North Carolina Press.

Fromm, E. (1964). *The heart of a man*. American Mental Health Foundation, Inc.

Gallup. (2020). *U.S. parent say COVID-19 harming child's mental health*. https://news.gallup.com/poll/312605/parents-say-covid-harming-child-mental-health.aspx

Glave, D. D. (2010). *Rooted in the earth: Reclaiming the African American environmental heritage*. Lawrence Hill Books.

Glesne, C. (2011). *Becoming qualitative researchers: An introduction* (4th ed.). Pearson.

Green Schoolyards America. (2022). *Federal funding to provide covid-19 relief.* https://www.greenschoolyards.org/covid-funding

Green School Alliance. (n.d.). *Sustainability leadership commitments.* https://www.greenschoolsalliance.org/home

Heerwagen, J. (2000). Do green buildings enhance the well-being of workers?. *Environmental Design+Construction*, *3*(4), 24–30.

Heinrich, M. (2022). *Heinrich introduces living schoolyards act to create unique, healthy learning opportunities* [Press release]. https://www.heinrich.senate.gov/newsroom/press-releases/heinrich-introduces-living-schoolyards-act-to-create-unique-healthy-learning-opportunities

Hennink, M. M. (2014). *Focus group discussions*. Oxford University Press.

Horsford, S. D., Cabral, L., Touloukian, C., Parks, S., Smith, P. A., McGhee, C., Qadir, F., Lester, D., & Jacobs, J. (2021). *Black education in the wake of COVID-19 and systemic racism: Toward a theory of change and action.* Black Education Research Collective, Teachers College, Columbia University.

Jennings, V., Baptiste, A. K., Osborne Jelks, N., & Skeete, R. (2017). Urban green space and the pursuit of health equity in parts of the United States. *International Journal of Environmental Research and Public Health*, *14*(11), 1432. https://doi.org/10.3390/ijerph14111432

Johnson, C. Y. (1998). A consideration of collective memory in African American attachment to wildland recreation places. *Human Ecology Review*, 5–15.

Johnson, C. Y., Bowker, J. M., Bergstrom, J. C., & Ken Cordell, H. (2004). Wilderness values in America: Does immigrant status or ethnicity matter? *Society & Natural Resources*, *17*(7), 611–628. https://doi.org/10.1080/08941920490466585

Johnson, Jr., S. L., Bishop, J. P., Howard, T. C., James, A., Rivera, E., & Noguera, P. A. (2021). *Beyond the schoolhouse, digging deeper: COVID-19 & reopening schools for black students in Los Angeles*. Center for the Transformation of Schools, School of Education & Information Studies, University of California, Los Angeles.

Kahnerman, D., Diener, E., & Schwarz, N. (1999). *Wellbeing: The foundation of hedonic psychology*. Russell Sage Foundation.

Kaminski, M., Pellino, T., & Wish, J. (2002). Play and pets: the physical and emotional impact of child-life and pet therapy and hospitalized children. *Children's Health Care*, *31*(4), 321–335.

Kegler, S. R., Simon, T. R., Zwald, M. L., Chen, M. S., Mercy, J. A., Jones, C. M., Mercado-Crespo, M. C., Blair, J. M., Stone, D. M., Ottley, P. G., & Dills, J. (2022). Vital signs: Changes in firearm homicide and suicide rates—United States, 2019–2020. *Morbidity and Mortality Weekly Report, 71*(19), 656–663. https://doi.org/10.15585/mmwr.mm7119e1

Kellert, S., Case, J., Escher, D., Witter, D. J., Mikel-Carrasco, J., & Seng, P. T. (2017). *The nature of Americans: Disconnection and recommendations for reconnection.* https://natureofamericans.org/sites/default/files/reports/Nature-of-Americans_National_Report_1.3_4-26-17.pdf

Kellert, S. R. (1984). Urban American perceptions of animals and the natural environment. *Urban Ecology*, *8*(3), 209–228.

Kellert, S. R. (2018). *Nature by design: The practice of biophilic design*. Yale University Press.

Kellert, S. R., Heerwagen, J., & Mador, M. (2008). *Biophilic design: The theory, science, and practice of bringing buildings to life.* Wiley.

Kellert, S. R., & Wilson, E. O. (1993). *The biophilia hypothesis.* Shearwater Press.

Kesner, A., & Pritzker, S. R. (2008). Therapeutic horseback riding with children placed in the foster care system. *ReVision 30*(1/2), 77–87.

Khan, M., McGeown, S., & Bell, S. (2020). Can an outdoor learning environment improve children's academic attainment? A quasi-experimental mixed methods study in Bangladesh. *Environment and Behavior*, *52*(10), 1079–1104. https://doi.org/10.1177/0013916519860868

Kim, J. K., Jung, E., Han, M., & Sohn, J. (2020). The power of garden-based curriculum to promote scientific and nature-friendly attitudes in children through cotton project.

Journal of Research in Childhood Education, 34(4), 538–550. doi:10.1080/02568543.2020.1718251

Krueger, R. A. (2014). *Focus groups: A practical guide for applied research*. Sage Publications.

Kuo, M., Browning, M. H. E., Sachdeva, S., Lee, K., & Westphal, L. (2018). Might school performance grow on trees? Examining the link between "greenness" and academic achievement in urban, high-poverty schools. *Frontiers in Psychology*, *9*, 1669. https://doi.org/10.3389/fpsyg.2018.01669

Kweon, B., Ellis, C. D., Lee, J., & Jacobs, K. (2017). The link between school environments and student academic performance. *Urban Forestry & Urban Greening, 23*(April), 35–43.

Landau, V. A., McClure, M. L., & Dickson, B. G. (2020). *Analysis of the disparities in nature loss and access to nature.* Conservation Science Partners.

Leahy, I., & Serkez, Y. (2021, June 30). Since when have trees existed only for rich Americans?. *New York Times*. https://www.nytimes.com/interactive/2021/06/30/opinion/environmental-inequity-trees-critical-infrastructure.html

Lee, E. J., & Park, S. J. (2021). Toward the biophilic residential regeneration for the Green New Deal. *International Journal of Environmental Research and Public Health*, *18*(5), 1–21. https://doi.org/10.3390/ijerph18052523

Lewis, J. G., & Hendricks, R. (2006). *A brief history of African Americans and forests.* Forest History Society and USDA Forest Service. https://www.fs.fed.us/people/aasg/PDFs/African_Americans_and_forests_March21%202006.pdf

Li, D., Chiang, Y. C., Sang, H., & Sullivan, W. C. (2019). Beyond the school grounds: Links between density of tree cover in school surroundings and high school academic performance. *Urban Forestry & Urban Greening, 38*(February), 42–53.

Lieberman, G. A., & Hoody, L. L. (1998). *Closing the achievement gap: Using the environment as an integrating context for learning. Results of a nationwide study*. State Education and Environment Roundtable.

Lieberman, G. A., Hoody, L. L., & Lieberman, G. M. (2000). *California student assessment project—The effects of environment-based education on student achievement*. State Education and Environment Roundtable.

Lieberman, G. A., Hoody, L. L., & Lieberman, G. M. (2005). *California student assessment project phase two: The effects of environment-based education on student achievement*. State Education and Environment Roundtable.

Lochmiller, C. R., & Lester, J. N. (2017). *An introduction to educational research: Connecting methods to practice*. Sage Publications.

London-Nuñez, B. (2015). *Psychosocial-behavioral experiences of human–animal interactions for 18- to 25-year-old young adults* (Order No. 3729767) [Doctoral dissertation, Capella University]. ProQuest Dissertations & Theses Global.

Louv, R. (2008). *Last child in the woods: Saving our children from nature-deficit disorder*. Algonquin Books.

Louv, R. (2016). *12 principles for a nature-rich city.* https://www.childrenandnature.org/resources/12-principles-for-a-nature-rich-city/

MacNaughton, P., Eitland, E., Kloog, I., Schwartz, J., & Allen, J. (2017). Impact of particulate matter exposure and surrounding greenness on chronic absenteeism in Massachusetts

public schools. *International Journal of Environmental Research and Public Health, 14*(2), 207.

Maller, C. J. (2009). Promoting children's mental, emotional and social health through contact with nature: A model. *Health Education*, *109*(6), 522–543. https://doi.org/10.1108/09654280911001185

Martin, S. H. (2006). The classroom environment and children's performance—is there a relationship? In *Children and their environments* (pp. 91–107). Cambridge University Press. https://doi.org/10.1017/CBO9780511521232.007

McLellan, R., & Steward, S. (2015). Measuring children and young people's wellbeing in the school context. *Cambridge Journal of Education*, *45*(3), 307–332.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.

Miller, E. (2018). *Implementing biophilic attributes in elementary schools* [Master's thesis, University of North Carolina at Greensboro]. ProQuest Dissertations Publishing.

Miller, H. K. (2018). Developing a critical consciousness of race in place-based environmental education: Franco's story. *Environmental Education Research*, *24*(6), 845–858.

National Center for Education for Statistics & Institute of Education Sciences. (2021). *The condition of education*. US Department of Education Research and Improvement.

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1976). *The Belmont report: Ethical principles and guidelines for the protection of human subjects of research.* https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/index.html

National Research Council. (2002). *Scientific research in education.* The National Academies Press. https://www.nap.edu/catalog/10236/scientific-research-in-education

Noguera, P. A., & Alicea, J. A. (2021). The role of education in reducing racial inequality: Possibilities for change. In *Handbook of urban education* (pp. 26–49). Routledge.

Noguera, P. A., Bishop, J., Howard, T., & Johnson, S. (2019). *Beyond the schoolhouse: Overcoming challenges & expanding opportunities for Black youth in Los Angeles County.* Center for the Transformation of Schools, Black Male Institute, Graduate School of Education & Information Studies, University of California, Los Angeles.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (4th ed.). Sage.

Perry, A. M. (2020). *Know your price: Valuing Black lives and property in America's Black cities*. Brooking Institution Press.

Rabie, F. (2004). Focus-group interview and data analysis. *Proceedings of the Nutrition Society, 63*, 655–660.

Raney, M. A., Hendry, C. F., & Yee, S. A. (2019). Physical activity and social behaviors of urban children in green playgrounds. *American Journal of Preventative Medicine, 56*, 522–529.

Rothstein. (2017). *The color of law: A forgotten history of how our government segregated America*. Liveright Publishing Corporation, a division of W.W. Norton & Company.

Rowland-Shea, J., Doshi, S., Edberg, S., & Fanger, R. (2020). *The nature gap: Confronting racial and economic disparities in the destruction and protection of nature in America.* American Progress.

Salingaros, N. A. (2015). *Biophilia and healing environments: Healthy principles for designing the built world.* Terrapin Bright Green, LLC.

Samkian, A. (n.d.). *Using ethical principles in research* [Video]. Vimeo. https://player.vimeo.com/video/454170630

Schroeder, H. W. (1989). Esthetic perceptions of the urban forest: A utility perspective. *Journal of Arboriculture*, *15*(12), 292–294. https://www.semanticscholar.org/paper/ESTHETIC-PERCEPTIONS-OF-THE-URBAN-FOREST%3A-A-UTILITY-Schroeder/f11dee1c88a3 66979bc35bcdddd7a8e10858f38b#paper-header

Shaffer, D. K. (2017). *A biophilic approach to post-secondary learning strategies: Facilitating learning through intentional time in nature* [Doctoral dissertation, University of Toronto]. ProQuest Dissertations Publishing.

Shepley, M., Sachs, N., Fournier, C., & Pitto, K. (2019). The impact of green space on violent crime in the urban environments: An evidence synthesis. *International Journal of Environmental Research and Public Health, 16*(24), 5119. https://doi.org/10.3390/ijerph16245119

Shukla, S. (2020). *Racial disparities in access to public green space*. Chicago Policy Review. https://chicagopolicyreview.org/2020/09/23/racial-disparity-in-access-to-public-green-space/

Smith, K. E., & Pollak, S. D. (2020). Early life stress and development: Potential mechanisms for adverse outcomes. *Journal of Neurodevelopmental Disorders, 12*, 34. https://doi.org/10.1186/s11689-020-09337-y

Söderlund, J. (2019). *The emergence of biophilic design.* Springer.

Söderlund, J. C. (2015). *Biophilic design: A social movement journey*. Curtin University.

Stavrianos, A. (2016). Green inclusion: biophilia as a necessity. *British Journal of Special Education*, *43*(4), 416–429. https://doi.org/10.1111/1467-8578.12155

Stewart, K., & Williams, M. (2005). Researching online populations: The use of online focus groups for social research. *Qualitive Research, 5*(4), 395–416.

Tabb, P. J. (2021). *Biophilic urbanism: Designing resilient communities for the future.* Routledge.

Tanner, C. K. (2009). Effects of school design on student outcomes. *Journal of Educational Administration*, *47*(3), 381–399. https://doi.org/10.1108/09578230910955809

Taylor, D. E. (2018). Racial and ethnic differences in connectedness to nature and landscape preferences among college students. *Environmental Justice, 11*(3), 118–136.

Taylor, D. E. (2019). College students and nature: Differing thoughts of fear, danger, disconnection, and loathing. *Environmental Management*, *64*(1), 79–96.

Taylor, K. D., González, J. G., & Razani, N. (2021). Justice in access to the outdoors. *Parks Stewardship Forum*, *37*(1), 23–34. https://doi.org/10.5070/P537151705

Thomas, A. J. Barrie, R., Brunner, J., Clawson, A., Hewitt, A., Jeremie-Brink, G., & Rowe-Johnson, M. (2014). Assessing critical consciousness in youth and young adults. *Journal of Research on Adolescence*, *24*(3), 485–496. https://doi.org/10.1111/jora.12132

Tidball, K. G. (2012). Urgent biophilia: Human–nature interactions and biological attractions in disaster resilience. *Ecology and Society*, *17*(2), 5. https://doi.org/10.5751/ES-04596-170205

Tomažič, I. (2011). Seventh graders' direct experience with, and feelings toward, amphibians and some other nonhuman animals. *Society & Animals*, *19*(3), 225–247. https://doi.org/10.1163/156853011X578901

Ulrich, R. (2008). Biophilic theory and research for healthcare design. In S. R. Kellert, J. H. Heerwagen, & M. L. Mador (Eds.), *Biophilic design: Theory, science, and practice of bringing buildings to life* (pp. 87–106). John Wiley.

UNESCO. (2021). *Education: From disruption to recovery*. https://en.unesco.org/covid19/educationresponse

UNICEF. (2021). *COVID-19: Schools for more than 168 million children globally have been completely closed for almost a full year, says UNICEF* [Press release]. https://www.unicef.org/press-releases/schools-more-168-million-children-globally-have-been-completely-closed

U.S. Department of Education. (2021). *Education in a pandemic: The disparate impacts of COVID-19 on America's students*. https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.pdf

van den Berg, M. M., Maas, J., Muller, R., Braun, A., Kaandorp, W., van Lien, R., van Poppel, M. N., van Mechelen, W., & van den Berg, A. E. (2015). Autonomic nervous system responses to viewing green and built settings: Differentiating between sympathetic and parasympathetic activity. *International Journal of Environmental Research and Public Health*, *12*(12), 15860–15874. https://doi.org/10.3390/ijerph121215026

Van Dijk-Wesselius, J. E., Maas, J., Hovinga, D., van Vugt, M., & van den Berg, A. E. (2018). The impact of greening schoolyards on the appreciation, and physical, cognitive and social-emotional well-being of schoolchildren: A prospective intervention study. *Landscape and Urban Planning, 180*, 15–26.

White, M. P., Alcock, I., Grellier, J., Wheeler, B. W., Hartig, T., Warber, S. L., Bone, A., Depledge, M. H., & Fleming, L. E. (2019). Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Scientific Reports*, *9*(1), 1–11.

Wilson, E. (1984). *Biophilia* (4th ed.). Harvard University Press.

Wolch, J. R., Byrne, J., & Newell, J. (2014). Urban green space, public health, and environmental justice: The challenge of making cities "just green enough." *Landscape and Urban and Planning, 125*, 234–244. doi:10.1016/j.landurbplan.2014.01.017

Wu, C.-D., McNeely, E., Cedeño-Laurent, J., Pan, W.-C., Adamkiewicz, G., Dominici, F., Lung, S.-C. C., Su, H.-J., & Spengler, J. D. (2014). Linking student performance in Massachusetts elementary schools with the "greenness" of school surroundings using remote sensing. *PloS One*, *9*(10), e108548. https://doi.org/10.1371/journal.pone.0108548

Yılmaz, S. (2017). *Investigation of 5-year-old preschool children's biophilia and children's and their mothers' outdoor setting preferences* [Unpublished doctoral dissertation]. Middle East Technical University.

YMCA. (n.d.). *Youth development*. https://www.ymca.org/what-we-do/youth-development

Appendix A

Survey Email Letter

Hello, I am a doctoral student at the University of Southern California. I am conducting a study on the effectiveness of biophilic (nature) design on Black students' wellbeing and academic performance. You have been selected to participate based on your organization's implementation of biophilia school site design in an urban setting. Biophilia is a theory that postulates that, as humans, we innately love and tend to seek connectivity to nature and life. This survey will take approximately 10 minutes to complete. Your responses and information will remain anonymous and will be kept confidential. If you have any questions or concerns, please call or email me, Veda Ramsay-Stamps, at 213-256-7656 or vramsay@usc.edu. Thank you for your participation.

Instructions: Please score the 10 design patterns using the 5-point scale (1 to 5) as defined in each section. If your school does not have a specific feature, please score "0" for that item. Place each score to the left of individual items. Design includes the way the schoolhouse is made, how it is structured, and how the outside space within the school complements the curriculum. Each scale measures the school's learning environment.

Thank you for your time and participation.

Survey Link

https://www.surveymonkey.com/r/X3PNVQ3

Appendix B

Survey Tool

USC Rossier School of Education

Biophilia School Design

Biophilic Design in K-12 Schools

Hello, I am a doctoral student at the University of Southern California. I am conducting a study on the effectiveness of biophilic design on Black students' wellbeing and academic performance. Biophilia is the theory that humans innately love and tend to seek connectivity to nature and life. You have been selected to participate based on your organization's implementation of a "biophilia-like" school site design in an urban setting. This survey will only take 15 minutes or less to complete. Your responses and information will remain anonymous and kept confidential. If you have any questions or concerns, please call or email me, Veda Ramsay-Stamps, at 213-256-7656 or vramsay@usc.edu. Thank you for your participation.

Instructions: Please score the design patterns on a Likert scale (1 to 5) as defined in each section. If your school does not have a specific feature, please score "N/A" for that item. Place each score to the left of the individual item. Design includes the way the school building is made, how it is structured, and how the spaces outside and within the school complement the curriculum. Each scale measures the school's learning environment.

1. Which race/ethnicity best describes you? (Please choose only one.)

- ○ American Indian or Alaskan Native
- ○ Asian / Pacific Islander
- ○ Black or African American
- ○ Hispanic
- ○ White / Caucasian
- ○ Multiple ethnicity / Other (please specify)

2. What is your school district?

3. Gender: How do you identify? 0

- ○ Man
- ○ Non-binary
- ○ Woman
- ○ Prefer to self-describe, below

Self-describe:

4. How many years have you worked in education? 0

* 5. What is your current educational role? 0

- ○ Teacher
- ○ Principal
- ○ School Board Member
- ○ N/A
- ○ Student
- ○ Other

6. On a scale of 1 (very little) to 5 (a lot), how much time do you spend engaging in outdoor learning experiences with your students? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

7. On a scale of 1 (very little) to 5 (a lot), how much time do students spend learning about nature? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

8. On a scale of 1 (very little) to 5 (a lot), how would you rate the amount of natural light found indoors at your school? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

Other (please specify)

9. On a scale of 1 (very little) to 5 (a lot), how would you rate the amount of natural light in and the comfortability of your school's dining area? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

10. On a scale of 1 (very little) to 5 (a lot), how much outdoor green space (trees, grass, garden, or hedges) does your school currently have? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

11. On a scale of 1 (very little) to 5 (a lot), how would you rate the amount of natural light in your classroom? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

12. On a scale of 1 (very limited) to 5 (a lot), how would you rate your school's views of nature (wildlife, gardens, water features, mountains, etc.)? 0

1	2	3	4	5	N/A
○	○	○	○	○	○

13. Does your classroom have a classroom animal or pet (e.g., rabbit, gerbil, hamster, fish, or lizard)? 0

- ☐ Yes
- ☐ No
- ☐ Not Applicable

14. Has your school incorporated trees, shrubbery, water features, or colorful play spaces into the schoolyard spaces? 0

- ☐ Yes
- ☐ No
- ☐ Not sure

15. What are the top barriers, if any, that your students face in accessing nature? 0

- ☐ Lack of Transportation
- ☐ Lack of Interest from Student
- ☐ Lack of Money
- ☐ Lack of Interest from Caretaker
- ☐ Lack of Interest from Teacher
- ☐ Lack of Funding
- ☐ Lack of Public Policy
- ☐ Not Sure

16. Does your school administration think nature is important for student wellbeing and academic achievement? 0

- ☐ Yes
- ☐ No
- ☐ Not Sure

Appendix C

Interview Questions for Teachers and Principals

Hi, I am a doctoral student at the University of Southern California. I am conducting a study on the effectiveness of biophilic design on Black students' wellbeing and academic performance. You have been selected to participate based on your organization's implementation of "biophilia-like" school site designs in an urban setting. Biophilia is a theory that postulates that, as humans, we innately love and tend to seek connectivity to nature and life. Biophilic design is a new concept of incorporating more nature and naturalistic elements into urban environments. This interview will take 45–60 minutes to complete. Your responses and information will remain anonymous and kept confidential. If you have any questions or concerns, please call or email me, Veda Ramsay-Stamps, at 213-256-7656 or vramsay@usc.edu. Thank you for your participation.

Interview questions for schools with new biophilic design improvements:

1. What words do you identify with nature?

2. What words would your students identify with nature?

3. In what ways are your students connected to nature?

4. What new biophilic design improvements, if any, has your school recently implemented? Has your school recently made any nature-related design improvements (e.g., green space, colorful play spaces, more windows, LED light installation, water features, animals) on school campus? If so, what are those improvements and how long did it take to implement them?

5. What improvements, if any, have you seen among students as a result of biophilic design improvements at your school?

6. Do your students live in a neighborhood with opportunities to engage nature? If so, please describe the community.

7. What challenges do your students and their families face that may hinder them from accessing nature and biophilic designs?

8. Since making the nature-related design improvements, in what ways have you engaged students in discussions, learning, and activities focused on nature?

9. How did your school acquire funding to include green space and other nature-focused designs on campus?

10. How does the broader community interact with on-campus green spaces, if at all?

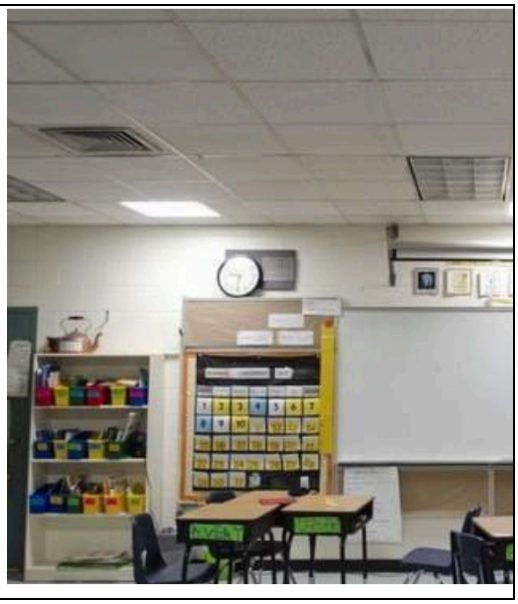
11. Which of the two photos resembles features of your campus schoolyard? Why?

a. 

b. 

12. Which of the two photos resembles most classrooms at your school? Why?

a. 

b. 

13. What are some of the academic challenges your students face?

14. In what ways, if any, do you think nature can help improve any of the challenges your students are facing? If you have already seen improvements, please describe them.

Appendix D

Telephone Screening Questionnaire for Focus Groups

Hi, I am a doctoral student at the University of Southern California. I am conducting a study on the effectiveness of biophilic design on Black students' wellbeing and academic performance. I got your name from the YMCA, and they mentioned that you might be interested in participating in a focus group. I am particularly interested in talking with Black youth between 18 and 24 who have attended camp within the past few years.

Do you fit these three criteria?

_____

I will be convening the focus group on Zoom within the next two weeks to learn about your experiences as a Black youth accessing nature through camp as well as the challenges that may or may not exist in Black connectivity to nature.

Date, day _____

Time _____

Will you be able to join us?

No _____ Okay, thank you for your consideration.

Appendix E

Sample Focus Group Instrument and Questions for Youth Who Attended Camp (18 to 24)

Hi, I am a doctoral student at the University of Southern California. I am conducting a study on the effectiveness of biophilic design on Black students' wellbeing and academic performance and will serve as your moderator today. You have been selected to participate in this focus group based on your experience as a Black youth attending camp and growing up and attending schools in an urban community. Biophilia is a theory that postulates that, as humans, we innately love and tend to seek connectivity to nature and life. Biophilic design is a new concept for incorporating more nature and naturalistic elements into urban environments. This focus group will be divided into three discussion topics, which include (a) experience with direct nature in your neighborhood (i.e., at home and in school), (b) wellbeing as a result of nature, and (c) access and connection to nature. This focus group will take 45–60 minutes depending on participants' engagement level. Your responses and information will remain anonymous and confidential. If you have any questions or concerns, please call or email me, Veda Ramsay-Stamps, at 213-256-7656 or vramsay@usc.edu. Thank you for your participation.

Opening

- Please share with us your first name, the name of your city, and which camp you attended.
- I know for many of you it has been a few years since you went to camp, but thinking back on those experiences, please share what it was like when you first arrived at camp.

Experiences in Direct Nature

1. How long did you attend camp?
2. Can you talk about what it was like to spend time in nature at camp?
3. What words would you identify with nature?

Wellbeing and Academic Performance

1. Can you describe how felt about yourself while at camp (e.g., did you feel good about yourself, healthy, bored, fearful, or confident)?
2. Can you describe how you felt about yourself after you left camp (e.g., did you feel good about yourself, healthy, bored, fearful, or confident)?

3. Did you or your family see any improvements in your behavior after camp?

Access and Connection

1. What words would you identify with nature?
2. In what ways are you connected to nature?
3. Do you live in a neighborhood with opportunities to engage with nature? If so, please describe the community.
4. What challenges do you and your family face that may hinder you from accessing nature and biophilic designs?

Appendix F

Sample Focus Group Instrument and Questions for Youth

Who Did Not Attend Camp (18 to 24)

Hi, I am a doctoral student at the University of Southern California. I am conducting a study on the effectiveness of biophilic design on Black students' wellbeing and academic performance and will serve as your moderator today. You have been selected to participate in this focus group based on your experience as a Black youth growing up and attending schools in an urban community. Biophilia is a theory that postulates that, as humans, we innately love and tend to seek connectivity to nature and life. Biophilic design is a new concept for incorporating more nature and naturalistic elements into urban environments. This focus group will be divided into three discussion topics, which include (a) experience with direct nature in your neighborhood (i.e., at home and in school), (b) wellbeing as a result of nature, and (c) access and connection to nature. This focus group will take 45–60 minutes depending on participants' engagement level. Your responses and information will remain anonymous and confidential. If you have any questions or concerns, please call or email me, Veda Ramsay-Stamps, at 213-256-7656 or vramsay@usc.edu. Thank you for your participation.

Opening

- Please share with us your name and the name of your city.

Experiences in direct nature

1. What words would you identify with nature?

Access and Connection

1. What words would you identify with nature?
2. In what ways are you connected to nature?
3. Do you live in a neighborhood with opportunities to engage with nature? If so, please describe the community.
4. What challenges do you and your family face that may hinder them from accessing nature and biophilic designs?

Appendix G

Information Sheet

University of Southern California
Rossier School of Education
Waite Phillips Hall
3470 Trousdale Parkway
Los Angeles, CA 90089

INFORMATION SHEET FOR EXEMPT RESEARCH

Study Title: Biophilia: A study of how nature-focused environments influence Black student wellbeing through an ecological systems theory lens

Principal Investigator: Veda Ramsay-Stamps

Faculty Advisor: Dr. Tracy Tambascia

You are invited to participate in a research study. Your participation is voluntary. This document explains information about this study. You should ask questions about anything that is unclear to you.

Purpose

This study aims to understand the environmental influences that hinder Black students from connecting to nature and how these nature-focused environments may affect their wellbeing and academic performance. We also want to see what positive outcomes are evident in biophilic-designed schools. You have been invited as a possible participant because you are an educator, parent, or stakeholder who has participated in designing a schoolyard, school building, or classroom with nature-related features, including green spaces, water features, windows, classroom features that mimic nature, animals, trees, and/or colorful and inviting spaces.

Participant Involvement

Participation in this study is strictly voluntary; if you agree to participate, you can withdraw from the study at any time. You can withdraw your permission to use your interview data and have any stored data deleted within two weeks of the interview date. You will not receive any monetary compensation for participating in the study.

Payment/Compensation for Participation

No compensation will be provided.

Confidentiality

The members of the research team and the University of Southern California Institutional Review Board (IRB) may access the data. The IRB reviews and monitors research studies to protect the rights and welfare of research subjects.

To minimize any risk to you and ensure that participant selection is conducted in an ethical manner, your confidentiality will be maintained. Confidential information will be stored in a cloud-based storage system. No information will be used by others except as outlined in this information sheet. Should you decide to leave the study at any point, there will be no penalty to you. Prior to your participation, you will be asked to provide permission to record the interviews.

Investigator Contact Information

If you have any questions about this study, please contact Veda Ramsay-Stamps (vramsay@usc.edu, 213-256-7656) or Dr. Tracy Tambascia (tpoon@usc.edu).

IRB Contact Information

If you have any questions about your rights as a research participant, please contact the University of Southern California Institutional Review Board at 323-442-0114 or email irb@usc.edu.