Blue Spaces and Identity: Interactions, Usage Factors, and Experiences among Undergraduate Students of Color

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ABSTRACT

Blue spaces, a type of outdoor space characterized by the presence of water, provide numerous benefits to human health and wellbeing. Individuals interact with blue spaces in a variety of ways and due to a myriad of factors. The experiences had in blue spaces are just as diverse. For people of color, experiences in blue spaces can be shaped by cultural traditions, historic access to outdoor space, and interactions with others. To explore the experiences of students of color in blue spaces, I asked the following question: How are UC Berkeley undergraduate students of color experiencing on-campus and off-campus blue spaces? I conducted nine semi-structured interviews of UC Berkeley students of color who frequently interact with both on-campus and off-campus blue spaces. I found that students of color are intentionally interacting with blue spaces for mainly personal and inter-social reasons. I also found that the majority of students of color in these spaces are experiencing benefits to their emotional health. Lastly, I found that generational access to blue spaces, present blue space accessibility, and current diversity within blue space environments strongly influence the type of experiences had by students in blue spaces. The findings from this thesis emphasize the benefit potential of blue spaces, the accessibility challenges that students of color face when interacting with blue spaces, and the various factors that influence the experiences that students of color are having in blue spaces.

KEYWORDS

environmental justice, outdoor access, students of color, human health, therapeutic landscapes

INTRODUCTION

The interactions between people and outdoor spaces are studied across a variety of disciplines such as urban planning, sociology, public health, ecology, and geography. The specific type of outdoor space that is focused on in the majority of these studies is green space. While there are several definitions of green space that vary depending on the context of their use (Taylor and Hochuli 2017), green spaces can be broadly defined as "publicly accessible areas with natural vegetation, such as grass, plants or trees" (Lachowycz and Jones 2013). Previous studies surrounding the interactions between people and green spaces have highlighted their benefits on human health and well-being (Hordyk et al. 2015; Richardson et al. 2013; Björk et al. 2008) and the multitude of influences on their varying accessibility and usage among differing populations (Nardone et al. 2021; Dai 2011; Rigolon 2017). Blue space is a type of outdoor space that, despite possessing great potential for the promotion of human health and wellbeing, is relatively understudied in comparison to green space. Similarly to green space, blue space is defined in differing ways depending on context; however for the purpose of this thesis, the term blue space will be used to refer to waterscapes and their surrounding areas. This definition encompasses both natural and manmade bodies of water. Examples of natural bodies of water include both saltwater (oceans, seas, and estuaries) and freshwater (rivers and lakes) bodies. Examples of manmade bodies of water include pools, fountains, and canals (Olive and Wheaton 2021). The word 'blue' is used to refer to these spaces because, although bodies of water come in a multitude of colors ranging from brown to clear, the color blue is most commonly associated with water (Foley and Kistemann 2015). As with green spaces, there are several studies that highlight blue space benefits on human health and well-being (Caddick et al. 2015; White et al. 2020; Pool et al. 2023) and the influences on their varying usage and accessibility among differing populations (Comley 2018; Phoenix et al. 2021; Haeffner et al. 2017).

There are a myriad of physical health benefits to spending time near or within blue spaces; urban blue spaces can mitigate the impacts of heat on the body (Burkart et al. 2016), freshwater and coastal blue spaces can inspire recreational activities and physical movement (de Bell et al. 2017), sustained movement in blue spaces can improve cardiovascular fitness (Brinks et al. 2009), and the desirability of blue space can encourage individuals to walk further

distances to them (Xie et al. 2021). The ocean spray associated with certain blue spaces has been shown to improve breathing and decrease asthma symptoms through improved lung function and reduced inflammation (White et al. 2020). The sun exposure associated with outdoor, uncovered blue spaces can increase human vitamin D exposure which reduces cancer, autoimmune disease, and cardiovascular disease risk (White et al. 2020). Blue spaces are beneficial for emotional and mental health in a variety of ways: viewing blue space can decrease distress levels (Nutsford et al. 2016), blue spaces can facilitate social connection (de Bell et al. 2017), coastal environments can provide feelings of restoration (White et al. 2013), and short walks in proximity to blue spaces have statistically significant associations with improved mental health (Vert et al. 2020). Blue spaces have calming sensory properties that do not require the use of sight to experience, such as calming smells and sounds. For individuals with sight impairments, these properties can generate feelings of pleasure (Foley et al. 2019). These characteristic aquatic sounds can also reduce stress, provide feelings of calmness and healing, and contribute to a sense of mental restoration (White et al. 2020; Olive and Wheaton 2021).

Blue spaces can have immense positive impacts on overall well-being. In a study by Ashbullby et al. (2013) focusing on the perceived benefits of beach-going among 15 families from coastal Southwest England, blue spaces were found to increase psychological well-being, physical health, and familial and social connection. Among the dozens of perceived benefits mentioned by the children and adults, a few examples were increased feelings of happiness, stress relief for the parents, a sense of freedom for the children, better sleep quality, and the development of a positive relationship with nature among the children. In a study of British individuals over the age of 50, blue spaces were shown to promote overall well-being by providing a valuable space for social connection with family and friends and by increasing feelings of ‘escape’ from psychological stress (Pool et al. 2023). Among 15 combat veterans experiencing post-traumatic stress disorder (PTSD) symptoms, surfing and time spent in the ocean increased feelings of calm and strengthened valuable social connections (Caddick et al. 2015).

A large aspect of the environmental justice movement focuses on equitable access to outdoor spaces and the benefits that they provide. Previous studies have focused on the safety levels, size, and quality of outdoor spaces in relation to income level, racial and ethnic identity,

gender, and age. These studies have found several trends: people of color and low-income individuals lack access to safe, uncongested green spaces within major cities in the United States (Williams et al. 2020), youth of color experience poor access to quality outdoor spaces such as parks (Rigolon 2017), and outdoor spaces located within neighborhoods of color tend to contain less amenities (Kephart 2022). Previous studies have also explored how marginalized groups have been historically excluded from accessing outdoor spaces. In the United States, mechanisms of racial residential segregation such as Jim Crow laws, discriminatory realtor practices, and the Home Owners' Loan Corporation's (HOLC) redlining practices manifest in present-day green space access and tree canopy coverage disparities between neighborhoods of color and predominantly white neighborhoods (Kephart 2022). Within the broader conversation around equity and outdoor spaces, fewer studies have focused on how identity shapes the experiences that are had within green and blue spaces (Hordyk et al. 2015; Sykes 2022; Wheaton et al. 2020). For Black, Indigenous, and People of Color (BIPOC) communities, perceptions of outdoor spaces and the resulting experiences within them can be influenced by cultural traditions, values, and histories. To truly explore the equity of green and blue space, it is therefore important to look beyond physical accessibility by exploring the quality of experiences had within outdoor spaces, and how identity can influence these experiences (Wheaton et al. 2020; Sykes 2022).

How are UC Berkeley undergraduate students of color experiencing on-campus and off-campus blue spaces? To address this central research question, I asked three subquestions: (1) How and why are BIPOC undergraduate students interacting with blue spaces? (2) What benefits do BIPOC undergraduate students experience while interacting with blue spaces? (3) Does racial/ethnic identity influence the experiences had within blue spaces amongst BIPOC undergraduate students? These questions helped facilitate my overall exploration of how campus communities of color experience outdoor spaces.

Frameworks

Blue Space Exposure

To explore how BIPOC undergraduates interact with blue spaces, I drew from theory developed by White et al. (2020) on the different pathways of blue space exposure. The authors

postulate that there are four main types of exposure: proximity, indirect, incidental, and intentional. Proximity refers to blue space exposure that occurs primarily due to one's proximity to a body of water. This type of exposure is supported by previous studies that demonstrate that if an individual lives or works close to a blue space, they will frequent it more than someone who lives or works farther away (Schipperijn et al. 2010; White et al. 2014; Boyd et al. 2018; Elliott et al. 2020). Indirect refers to blue space exposure that occurs when an individual is not directly in contact with a blue space. An individual viewing the ocean outside of their home windows or watching a documentary on waterfalls are two examples of indirect exposure. Incidental refers to blue space exposure that occurs when an individual is directly in contact with a blue space but that was not their main intention. An individual who passes by a creek while commuting to work on a bicycle is experiencing incidental blue space exposure. Intentional exposure occurs when an individual deliberately spends time near or within blue spaces. A group of people purposefully traveling to a beach is an example of intentional exposure.

While these four types of exposure are defined in unique ways, several types of exposure often interact with each other to explain how an individual is interacting with a blue space. For example, someone may interact with their local lake intentionally by seeking it out on a regular basis but their living proximity to the lake also plays a role in their actions and ability to frequent the lake. Someone who owns a home on the coast will indirectly interact with blue space as they walk by the windows in their home and this is an example of both indirect and proximity exposure. A family that often goes to the beach on the weekends is intentionally interacting with blue space but this family's living distance from the beach also plays a factor in their exposure to it. Overall, individuals who live in closer proximity to blue spaces will often have greater indirect, incidental, and intentional exposures (White et al. 2020).

Factors Influencing Blue Space Usage

To explore why BIPOC undergraduates interact with blue spaces, I drew from Smith et al.'s (2022) socio-ecological model of factors influencing usage (Figure 1). The authors identified four categories of factors that influence blue space usage: personal, inter-social, built environment, and natural environment. These factors can both attract and deter people from a blue space. Personal factors of usage refer to individual perceptions of blue space such as

perceived safety, awareness of the existence of the space, and awareness of the benefits of the space. An individual may frequent a local creek because they perceive the location as safe or they may avoid it because they perceive it as unsafe. Inter-social factors are influenced by friends, family, societal values, and others in general. Individuals may frequent a blue space because they see it as a space for socialization. On the other hand, individuals may frequent a blue space because they see it as a space to get away from external pressures to socialize. Built environment factors include the manmade aspects of, or surrounding, a blue space. The presence of benches, the quality of walking paths, and the general maintenance of the space are built environment factors. Natural environment factors refer to the natural phenomena that characterize the blue space from the flora and fauna present to the typical weather and sun exposure near the space.

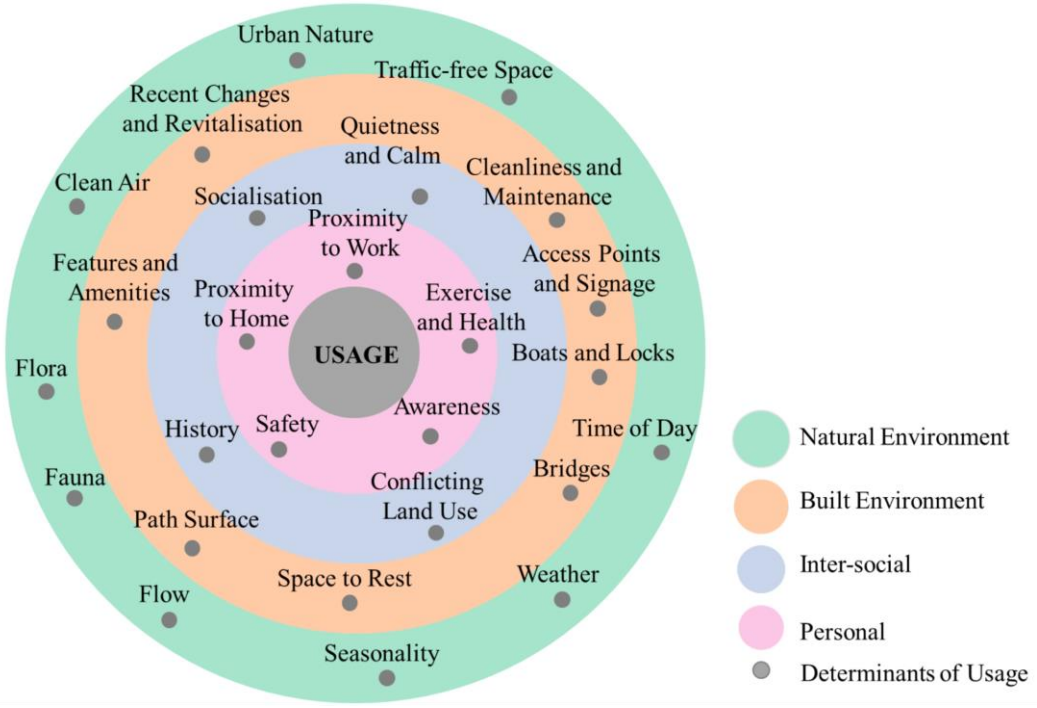

Figure 1. Socio-ecological model of factors influencing usage (Smith et al. 2020).

Blue Space Benefits

To set up my exploration of the perceived benefits provided by blue spaces amongst BIPOC undergraduate students, I synthesized blue space benefits documented across 26 studies

into 3 main categories of benefits: physical, emotional, and mental (Appendix A). While emotional and mental health often overlap, I differentiate the two terms based on the following definitions: emotional health refers to the ability to process and express the emotions that motivate our actions, thoughts, and behaviors while mental health refers to the brain's functioning in terms of cognitive thinking, memory processing, and the presence of mental illness. In the context of this study, the emotional health benefits of blue space refer to the emotions generated by, or encouraged within, blue space environments and the mental health benefits refer to the cognitive impacts of blue space environments (Unknown 2022).

Blue Space and Identity

Three concepts motivated the aim of my third sub-question: (1) there are close linkages between race and space (Burrell-Craft 2020; Phoenix et al. 2021; Gauthier et al. 2021), (2) meaning-making based on identity influences the benefits provided by blue spaces (Foley and Kistemann 2015), and (3) racialization influences the quality and type of experiences had within outdoor spaces (Sykes 2022; Gauthier et al. 2021).

Racial Space Theory (RST) examines the interactions between race and space. RST argues that current racial identities have been formed by socio-historical relationships to space and thus, an analysis of space must include an analysis of race and vice versa (Burrell-Craft 2020). Historical relationships to, engagement with, and experiences within blue spaces shape modern perceptions of, and attachments to, blue space. Communities that have experienced historical exclusion from blue spaces often engage with blue spaces less frequently in the present-day than communities that have not experienced this historical exclusion (Phoenix et al. 2021). The quality of experiences had within outdoor spaces by marginalized communities are often influenced by the legacies of settler colonialism and Whiteness that shape dominant understandings of outdoor space and usage (Gauthier et al. 2021). I drew from RST throughout my project by situating each participants' historical experience with outdoor space in order to further understand their current experiences within blue spaces. I allowed participants to trace their own connections between their current experiences within blue spaces and their broader views on blue space itself as shaped by their personal, familial, and cultural histories. It would be insubstantial to have a discussion surrounding the current lived experiences of BIPOC

individuals in blue spaces without framing the discussion from a historical perspective on blue space access and interactions throughout time.

While the benefits of blue spaces are well-supported across many disciplines (Appendix A), factors that influence the distribution of these benefits are not often discussed (Foley et al. 2019). Blue spaces have constructed meanings that vary between individuals, groups, and communities and these constructed meanings directly shape the health-promoting potential of blue space (Foley and Kistemann 2015). For example, for marginalized groups who have experienced exclusion from blue spaces, intergenerational meaning-making can influence their modern perceptions of blue spaces. As another example, for sight-impaired individuals, meanings of coastal space can be influenced by negative social interactions within the space, such as experienced alienation and infantilization. Alternatively, positive experiences within the space can also shape the meanings constructed by sight-impaired individuals. Coastal blue space can be easier to navigate for individuals with sight impairments in comparison to urban spaces. The sensory aspects of the coast that do not require sight (smells, sounds, and textures) can result in constructed meanings that define coastal blue space as an immersive, enriching site. As a third example, for coastal communities impacted by ocean pollution, blue spaces can be seen as dangerous sites (Foley et al. 2019). Across other identities and communities, meaning-making is nuanced and an understanding of differing constructed meanings is necessary in order to explore the benefits provided by blue spaces.

In the context of outdoor spaces, equitability must refer to more than just physical accessibility (Sykes 2022). A previous study exploring outdoor equity beyond physical access (Sykes 2022) focused on a group of Black women in Boston, Massachusetts who frequent their local parks. One of these parks, Franklin Park, is located amidst several neighborhoods of color and is an important feature of the community. Among the women interviewed, the majority of them explained that they feel uncomfortable frequenting other nearby parks that are located in predominantly white areas. The women mentioned that, in outdoor spaces outside of their immediate community, they are forced to engage in racialized emotional labor. For example, the women mentioned being approached by white individuals and asked invasive questions regarding their identity and lived experience, being stared at, and having their credentials as outdoor leaders invalidated while in these spaces. Despite these women having physical access to

these spaces, their treatment by others based on their identity impacts their enjoyment, comfortability, and overall experience within them. Legacies of anti-Blackness have influenced, and continue to influence, the experiences had in outdoor spaces by these women (Sykes 2022).

A study done by Gauthier et al. (2021) focused on the diversity of experiences had by Kinesiology students participating in course-required outdoor experiential education in Ontario, Canada. The program leaders were primarily white and the program's structure was rooted in settler-colonialism and classism. Participants were instructed to bring costly equipment and given no resources to find more affordable options, they were told to dress "appropriately" without being given further explanation of what "appropriate" attire referred to, and they had various negative experiences while participating in the program. Respondents of color and queer respondents explained that they felt forced to code-switch, assimilate, and participate in activities that were in conflict with their cultural and/or religious values in order to avoid negative consequences and complete the program. Despite the program taking place in the traditional territories of the Ojibway, Chippewa, Huron/Wendat, Mohawk, Potawatomi, Métis Nation of Ontario, and the Algonquin Anishnaabeg people, there was a lack of regard for Indigenous epistemologies and histories throughout the course of the program. Throughout this program, all of the students had equal physical access to the space yet the marginalized participants experienced barriers related to their identities that impeded their enjoyment of the space.

Moving beyond physical access to outdoor space and exploring the quality of experiences in these spaces allows for a broader, more comprehensive understanding of equitable access for marginalized communities.

Background

Study Site

The University of California, Berkeley (UC Berkeley) resides on the territory of xučyun (Huichin), the ancestral and unceded land of the Chochenyo speaking Ohlone people (see Appendix B for land acknowledgment co-created with the Muwekma Ohlone Tribe and Native American Student Development at UC Berkeley). The campus currently hosts an abundance of outdoor spaces for student usage; there are 18 campus gardens, 5 outdoor swimming pools,

countless open green spaces (Figure 2), a 34 acre Botanical Garden, a Redwood Grove, and Strawberry Creek which flows through the majority of the campus (Figure 2). Students also have access to the South Sailing Basin of the Berkeley Marina (Appendix E), though it is not located directly on the UC Berkeley campus.

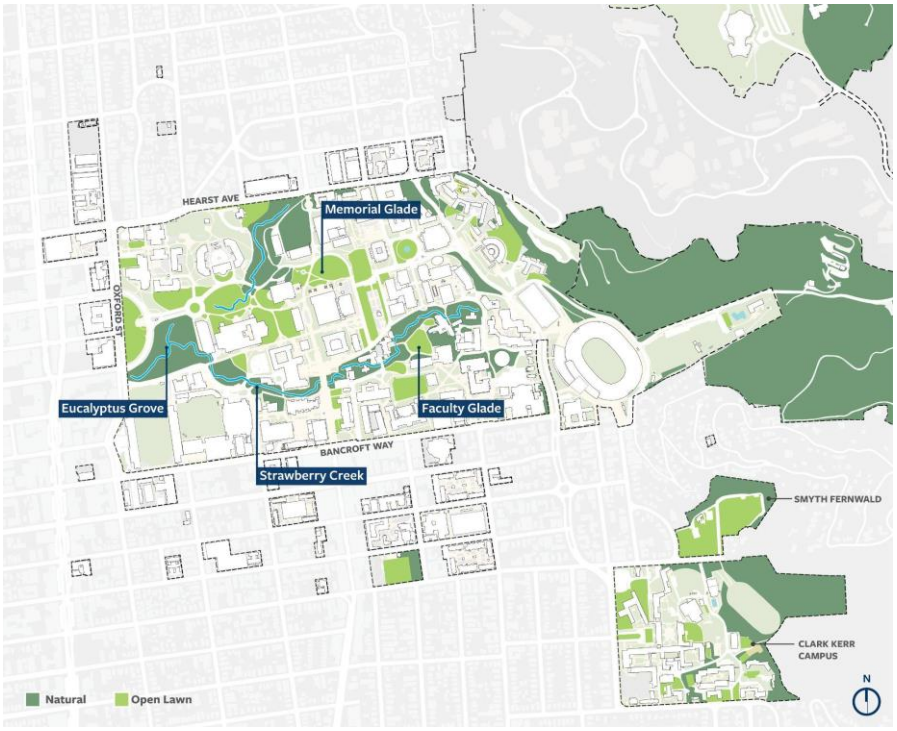

Figure 2. Campus Landscape Features (Unknown 2020).

In addition to the daily access that students have to on-campus outdoor spaces due to their proximity, there are also a number of programs and clubs dedicated to bringing students outdoors. UC Berkeley's Recreation & Wellbeing (RecWell) department provides free student access to the campus swimming pools. Cal Adventures, a subset of RecWell, provides free student access to activities such as sailing and paddle boarding at the Berkeley Marina. Cal Adventures also provides all necessary equipment free of charge for students, including wetsuits and other necessary clothing items. Exercise is Medicine On Campus (EIM-OC) and the Student Environmental Resource Center's Nature Education & Wellness Together (SERC NEWT) are two other departments on campus that support student access to outdoor spaces. These two departments have collaborated to provide free swim workshops to marginalized students on

campus in the past. There are a number of student-led organizations also dedicated to outdoor access: Cal Hiking and Outdoors Society (CHAOS), Outsiders, Graduate Outdoor Pals for Equity, and more.

Study Population

The University of California, Berkeley is responsible for a very large undergraduate student population with nearly 126,000 rising freshman and 20,000 junior transfers applying for the 2023-2024 academic year (Gilmore 2023). Within the undergraduate student body, there is a substantial BIPOC population (see Appendix C and D for the UC Berkeley 2023-2024 academic year demographic profile). BIPOC-identifying undergraduate students were the specific study population of interest for my thesis.

METHODS

Study System

To determine how BIPOC undergraduate students are experiencing on-campus blue spaces, I selected three specific campus-affiliated blue spaces as my study sites: the South Sailing Basin of the Berkeley Marina where Cal Adventures operates their programming (Appendix E), Strawberry Creek as it runs through campus (Figure 2), and the campus swimming pools. Unlike Strawberry Creek and the campus swimming pools which are centrally-located on the UC Berkeley campus, the Berkeley Marina is a 20 minute drive from campus. UC Berkeley students are provided with Clipper Cards which enable them to use the Berkeley bus system free of charge. One of the Berkeley bus routes, the 51B, takes students from campus directly to the Berkeley Marina. To determine how BIPOC undergraduate students are experiencing off-campus blue spaces, I encouraged study participants to identify and describe any off-campus blue spaces that they interact with.

To select study participants, I utilized purposive and convenience sampling to identify BIPOC undergraduates who had previously interacted with the 3 on-campus study sites (Gill 2020). To identify BIPOC undergraduates who had previously interacted with Strawberry Creek, I reached out to the UC Berkeley Strawberry Creek Restoration Program. To identify BIPOC

undergraduates who had previously interacted with the campus pools, I reached out to the Cal Women's and Men's swim teams, individuals who had taken part in a swim workshop for Black students during the Fall 2022 semester and BIPOC individuals who had taken part in a swim workshop for Queer & Trans students during the Fall 2023 semester. Both swim workshops were hosted by SERC NEWT and EIM-OC. To identify BIPOC undergraduates who had previously interacted with the Berkeley Marina, I reached out to BIPOC students who had participated in any of the recurring kayaking events hosted by Cal Adventures, SERC NEWT, and/or Outsiders in the last two academic years. I have worked for SERC NEWT for the last two years and my direct involvement with the campus program allowed me to access the names and emails of participants who met my study criteria. I also called for BIPOC participants who interacted with any of the 3 on-campus study sites on a number of campus forums and discussion boards. Word of my thesis topic was also spread throughout the campus community and several participants self-identified by reaching out to me via email. Identified participants were free to discuss any of the 3 on-campus blue spaces regardless of their previous involvement with the above-mentioned programs or study sites.

Semi-Structured Interviews

I conducted 9 semi-structured interviews over Zoom during the months of February and March, 2024. After each participant consented to participate in my study, I asked that they fill out a form to provide demographic information before taking part in their interview. Participants were able to self-identify their racial/ethnic identity by writing in their self-described racial/ethnic identity. To preserve anonymity, I have identified each participant by an assigned letter throughout this thesis (Table 1).

Table 1: Semi-structured interview participants.

Participant	Pronouns	Racial/Ethnic Identity
A	she/her	Black American, Japanese American, German Jewish American
B	they/she	Asian, Non-hispanic, Filipinx
C	he/him	Taiwanese-Korean-American

D	they/he	Hapa (mixed white and Asian Pacific Islander)
E	she/her	East Asian
F	they/them	Black
G	she/her	Black/African American
H	he/him	African-American, white, Afro-Latino
I	she/her	Bi-Racial - half Filipino and half Latino

I asked each participant the same 7 questions (Table 2). To allow participants to thoroughly express themselves regarding their experiences in blue spaces, I encouraged them to share stories, answer unasked questions, and provide additional detail as they saw fit (Smith and Sparkes 2016).

Table 2: Interview Questions.

Question 1	How often do you interact with on-campus blue spaces?
Question 2	How often do you interact with off-campus blue spaces?
Question 3	What benefits do you experience while in the blue spaces that you mentioned?
Question 4	What draws you to the blue spaces that you mentioned?
Question 5	Can you think of any key experiences that you've had in blue spaces in the past? What makes them stick out to you?
Question 6	Do you feel that your identity as a person of color has influenced the experiences that you have had in on-campus blue spaces?
Question 7	Do you feel that your identity as a person of color has influenced the experiences that you have had in off-campus blue spaces?

Interview Analysis

After each interview concluded, I downloaded the recording of the interview and the transcript provided by Zoom. I then cross referenced the video and transcript to correct any errors made by the automatic Zoom software. Once each interview had a complete and accurate transcript, I began my analysis for each of my sub-questions.

Blue Space Exposure

To explore how BIPOC undergraduate students are interacting with blue spaces, I analyzed each interview transcript to first identify each blue space interaction mentioned by the participants. I then categorized each interaction as one of the categories of exposure or as a combination of several categories of exposure (White et al. 2020). In the context of this thesis, I specifically focused on three of the categories of exposure: indirect, incidental, and intentional. I chose to omit proximity exposure as a category for the on-campus blue spaces due to the fact that all of the participants live within the same general distance to UC Berkeley and therefore experience a similar living proximity to the campus blue spaces. For continuity and to enable connections to be drawn across interview responses, I also omitted proximity as an exposure category for the off-campus blue spaces. It's important to note that the omission of this exposure category does not signify that a participants' proximity to a blue space is not a factor in their interactions with it. For analysis, I compared trends in exposure amongst on-campus and off-campus blue spaces, as well as trends between on-campus and off-campus blue spaces.

Factors Influencing Blue Space Usage

To explore why BIPOC undergraduate students are interacting with blue spaces, I analyzed each transcript to first identify what factors draw participants to blue spaces both on-campus and off-campus. Once the factors had been identified, I categorized them as one of the four factors of usage: personal, inter-social, built environment, or natural environment (Smith et al. 2020). For analysis, I compared trends in usage factors amongst both on-campus and off-campus blue spaces. I did not compare trends in usage factors between on-campus and off-campus blue spaces in this thesis because, after conducting the interviews, I found that the mentioned factors were largely applicable to the participants' experiences in both on-campus and off-campus blue spaces.

Blue Space Benefits

To explore the benefits that BIPOC undergraduate students are experiencing within blue spaces, I analyzed each transcript to identify the specific benefits mentioned by the participants. I then categorized each benefit as either a physical health benefit, emotional health benefit, or mental health benefit. For analysis, I compared trends in benefits experienced in both on-campus and off-campus blue spaces. Similarly to my analysis methods for the factors influencing blue space usage, I did not compare trends in experienced benefits between on-campus and off-campus blue spaces because, after conducting the interviews, I found that the experienced benefits were largely applicable to the participants' experiences in both on-campus and off-campus blue spaces.

Blue Spaces and Identity

To address my third sub-question, I conducted a thematic analysis using Braun and Clarke's (2006) approach in order to identify patterns and themes across the interviews related to blue spaces and BIPOC identity. I conducted the thematic analysis at the latent level, meaning that I "examined [the] underlying ideas, assumptions, and conceptualizations" (Braun and Clarke 2006) of each participants' responses. To conduct the thematic analysis, I followed six steps: (1) I read through each complete interview transcript two times to gather initial thoughts, (2) I generated initial codes regarding identity and experience within blue spaces, (3) I grouped my initial codes into broader themes, (4) I analyzed the themes to ensure they fit the overall dataset as well as the individual transcripts, (5) I refined the theme names and explanations, and (6) I related the identified themes back to my sub-question (Braun and Clarke 2006). I identified themes for blue spaces and racial/ethnic identity.

RESULTS

Blue Space Exposure

In total, the 9 participants mentioned 30 on-campus blue space interactions. I found that 18 of these interactions occurred in or near Strawberry Creek (Table 3), 7 occurred in or near the Berkeley Marina (Table 4), and 5 of these interactions occurred in the campus pools (Table 5).

Table 3. On-campus Interactions with Strawberry Creek and their Categorized Exposure. The frequency included with each interaction refers to the number of participants who mentioned that type of interaction.

Type(s) of Exposure	Interaction
Intentional	● Physical contact with Strawberry Creek (n=4) ● Eating near Strawberry Creek (n=3) ● Sitting near Strawberry Creek (n=2) ● Foraging near Strawberry Creek (n=1) ● Collecting rocks near Strawberry Creek (n=1)
Incidental	● Walking to class near Strawberry Creek (n=6)
Indirect	● Collecting Strawberry Creek data via computer (n=1)

I found that 11 of the 18 interactions with Strawberry Creek mentioned by the participants were intentional exposures. The specific interactions within this category of exposure were diverse. I found that 4 participants mentioned having physical contact with Strawberry Creek for differing reasons. Two participants mentioned 'dipping their toes in' or touching the Creek with their hands. Two participants mentioned physically interacting with the space for restoration work, one for professional work and one for a class:

> *"Working with Strawberry Creek, we've moved some fish around from the Lower Fork to the Upper Fork because they can't swim up the drops, or little waterfalls, that were built in."* - *Participant H*

> *"In my biology class, we actually had this section where we had to go into Strawberry Creek and look at different biomarkers to see what its status was: if it was healthy or lacking certain species that would usually help it get oxygen and keep the flow going*." - *Participant G*

Among the other intentional exposures, participants also interacted with Strawberry Creek by eating snacks and meals near it, sitting near it on benches or on the ground, foraging for herbs near it, and by collecting rocks near it for class projects.

I found that 6 of the 18 interactions with Strawberry Creek mentioned by the participants were incidental exposures. All of the interactions with Strawberry Creek within this category involved walking to class near Strawberry Creek:

> *"On my way to school, I found the path in between the Art Studio and the Creek area. So I just always walk through it just because I found that it looks nicer and it's also a diagonal where I can cut across through Sproul (an often busy part of the UC Berkeley campus). I thought that was really nice."* - *Participant E*

> *"Here on campus, if I walk past it or over one of the bridges, I will usually stop and lean over the side and look at the Creek."* - *Participant A*

> *"I would say Strawberry Creek is the one that I interact with the most because we walk through campus a lot and we usually have to walk over the Creek. Sometimes, on my way to class, I'll look into the Creek and be like, 'oh, how's it doing'?"* - *Participant G*

Only 1 participant mentioned indirectly interacting with Strawberry Creek. This participant's restoration work requires them to indirectly interact with Strawberry Creek on a regular basis:

> *"I'm in charge of sensors that are in the Creek so I create a data model for an alarm system to detect spills. So in that form, interacting is on the computer, looking at data being collected in the Creek."* - *Participant H*

I found that 7 of the 30 total on-campus interactions had by participants occurred in or near the Berkeley Marina (Table 4). Among these interactions, 6 were categorized as intentional exposures and 1 was categorized as an incidental exposure. There were no indirect exposures with the Berkeley Marina mentioned by the participants.

Table 4. On-campus Interactions with the Berkeley Marina and their Categorized Exposure. The frequency included with each interaction refers to the number of participants who mentioned that type of interaction.

Type(s) of Exposure	Interaction
Intentional	● Kayaking through Cal Adventures Program (n=3) ● Physical contact with Berkeley Marina (n=2) ● Sitting near Berkeley Marina (n=1)
Incidental	● Hiking along Berkeley Marina to nearby park (n=1)

The most common intentional exposure mentioned by the participants included participation in three different kayaking events hosted by campus clubs and facilitated by Cal Adventures. Of these kayaking participants, all 3 had only kayaked at the Berkeley Marina once. The other participants who mentioned intentionally interacting with the Berkeley Marina had dipped their feet in the Marina, walked along the rocks in the Marina, and sat near the Berkeley Marina on a nearby bench:

"At the Marina, I've dipped my feet in or walked in a little bit." - Participant H

"I usually like to drive there, sometimes I'll go eat lunch and do work because they have seating areas. Or I'll be like 'oh I just want to be with the water'. Usually when I'm really stressed, I just need to be with the water. So I'll go sit out and look at the San Francisco skyline on the little ledge. My friends visit pretty often so usually I'll be like 'oh we should go see the Marina' and we'll usually walk around the rocks and try and see if we can find crabs and sea anemones and stuff like that. It's my favorite place. It's so quick too so if I need to see a large body of water, I'm going to the Marina." - Participant G

The only incidental exposure with the Berkeley Marina involved a participant hiking along a Berkeley Marina path in order to get to a nearby park.

I found that 5 of the 30 total on-campus interactions had by participants occurred in the campus swimming pools (Table 5). Among these interactions, all were categorized as intentional exposures.

Table 5. On-campus Interactions with the campus pools and their Categorized Exposure. The frequency included with each interaction refers to the number of participants who mentioned that type of interaction.

Type(s) of Exposure	Interaction
Intentional	• Community swim event (n=2) • Recreational swimming (n=2) • Competitive swimming (n=1)

Two participants had taken part in the Queer & Trans swim workshop hosted by SERC NEWT and EIM-OC during the Fall 2023 semester. Two participants mentioned recreationally swimming over the summer in the Strawberry Canyon Pool, a recreational pool that is only open during the summer months. One participant, a competitive swimmer for UC Berkeley, mentioned having very frequent intentional exposure to the campus pools:

"I'm in a pool 20+ hours a week, 6 days a week, so all the time." - *Participant F*

Overall, I found that intentional exposure was the most commonly mentioned category of exposure in on-campus blue spaces. Intentional exposure was then followed by incidental exposure. Across all of the on-campus interactions, only 1 was an indirect exposure.

There were 39 off-campus interactions mentioned by the participants (Table 6). I found that 33 were intentional exposures, 5 were incidental exposures, and 1 was an indirect exposure.

Table 6. Off-campus Interactions and their Categorized Exposure. The frequency included with each interaction refers to the number of participants who mentioned that type of interaction.

Type(s) of Exposure	**Interaction**
Intentional	● Going to the beach with family and/or friends (n=8) ● Recreational swimming in family-owned or friend-owned pools (n=4) ● Involvement with a swim team (n=3) ● College trip to a body of water (n=3) ● Recreational activities while on vacation (n=2) ● Visiting springs (n=2) ● Canoeing (n=2) ● Recreational swimming in community pool (n=2) ● Hiking to bodies of water (n=2) ● Going to waterparks (n=2) ● Fieldwork (n=1) ● Nature photography near a body of water (n=1) ● Going fishing (n=1)
Incidental	● Walking by creeks in neighborhood (n=1) ● Commuting by the San Francisco Bay (n=1) ● Hiking near bodies of water (n=1) ● Spending time near grandmother's backyard fountain (n=1) ● Walking dog by a body of water (n=1)
Indirect	● Visiting aquariums (n=1)

Among the 33 intentional exposures, I found that 8 out of the 9 total participants mentioned interacting with off-campus blue spaces by going to the beach with family and/or friends. These beaches were located in various locations within the United States of America: California, Florida, and Hawaii. The second most commonly mentioned intentional interaction with off-campus blue spaces involved recreationally swimming in a family-owned or friend-owned pool:

> *"In the summers, I usually go swimming with my friends, both at the pool in my apartment or in my friends' personal pools."* - *Participant B*

"There was always a classic pool party growing up." - Participant E

Three participants mentioned a previous involvement with a swim team. Of these swim teams, two were competitive high school teams. One swim team was a non-competitive team:

"I was on - it wasn't a high school swim team - it was like somewhere below that in intensity, so we didn't do competitions, but I did a swim team for a while." - *Participant D*

Three of the participants mentioned visiting an off-campus blue space with a UC Berkeley club or organization:

"This weekend, I did get to go to Point Reyes with a school group. It was with Cal Queer & Asian, an Asian student group." - Participant D

"A lot of my clubs will have retreats and we'll usually go to the beach. I know we've been to Ocean Beach in the San Francisco area. We have picnics there and just watch the water." - Participant G

"I had a recent blue space event: I went with Outsiders to Cataract Falls." - *Participant E*

Two participants mentioned participating in water-related activities while on vacation. One participant mentioned snorkeling in Tanzania and Hawaii and another participant mentioned swimming in Florida and Hawaii:

"One of my favorite spaces has been on Oahu. I've had a few trips there and of all the things that we do there, my favorite is going snorkeling in the lagoons on the side of the island." - Participant A

"Recently, I traveled to Zanzibar. It's a little island off of Tanzania. So much water! It was incredible. . .We had the opportunity to go open-water snorkeling." *- Participant A*

"Going on vacation, too, to Florida. We went to Florida pretty often [and swam]." - Participant G

"When I was in Hawaii, I was in the water with my friend and we were just swimming. It was beautiful, the water was so warm, the water was so nice, but we did get caught in a riptide!" - Participant G

Two participants mentioned visiting springs, one located in Florida and one tidal hot spring located in Northern California:

"I'm from Florida, so when I'm at home I'll go to the springs and stuff like that. It's like really clear freshwater that forms a little pool and it naturally forms. It usually has a bunch of currents in it. So, the ones in Florida, they've made a lazy river where you can be in a floaty and float down. It's super cold water, but it's super clear and super refreshing." - Participant F

"When I still had a car at Berkeley, I would go to the beach in Marin. I would go there pretty often for a tidal hot spring that would come during low tide." - Participant H

Two participants mentioned canoeing. One participant mentioned taking part in a portage trip in Canada and the other participant mentioned canoeing in their hometown of Sacramento, California:

"In my junior year of high school, I did a 70 mile canoe portage trip. So that was 7 days in the Canadian backcountry where we were paddling 8 miles across the lake, picking up our canoes, walking a mile or two, placing our canoes in the next lake, and then paddling." - Participant C

"Before coming to Berkeley, I would take a canoe down rivers and creeks sometimes, mainly in the Sacramento area." - Participant H

Among the other intentional exposures to off-campus blue spaces, two participants mentioned recreationally swimming in a community pool - or a pool not owned by a family member or friend, two participants mentioned hiking to specific lakes and creeks with friends, two mentioned going to waterparks with their family and/or friends, one mentioned doing lake fieldwork with a UC Berkeley lab in Northern California, one mentioned taking photos of their local creek for an art project, and one mentioned going fishing in Northern California with their family.

Among the 5 incidental exposures, I found that the participants interacted with off-campus blue spaces by walking near the creeks of their Northern California neighborhood, by regularly commuting by the San Francisco Bay, by hiking near various streams and creeks, by spending time near their grandmother's fountain, and by walking their dog by a creek near their childhood home.

Across the 39 off-campus interactions, only one was an indirect exposure. This participant mentioned regularly going to aquariums:

> *"I love aquariums. Aquariums are awesome. I've always enjoyed going to an aquarium." - Participant E*

Factors Influencing Blue Space Usage

I found that there were 12 distinct personal factors, 4 inter-social factors, 4 built environment factors, and 6 natural environment factors that influenced the participants' usage of on-campus and off-campus blue spaces (Table 7).

Table 7. Factors Influencing Blue Space Usage. The frequency included with each factor refers to the number of participants who mentioned that factor.

Category of Usage	**Factor**
Personal	● Distance (n=5) ● Personal relationship with swimming (n=4) ● Awareness of health impacts (n=4) ● Personal appreciation of blue spaces (n=3) ● Awareness of ecosystem processes and services (n=3)

	• Possession of necessary equipment (n=3) • Fear of drowning (n=2) • Financial cost (n=2) • Time (n=2) • Impacts on hair (n=2) • Reminiscent of childhood (n=1) • Work responsibilities (n=1)
Inter-social	• Community (n=6) • Diversity (n=4) • Family values and interactions (n=5) • Place of solitude (n=2)
Built Environment	• Seating areas (n=3) • Gender-neutral changing areas (n=3) • Scenic quality (n=2) • Offline or away from screens (n=2)
Natural Environment	• Fauna (n=4) • Water flow (n=3) • Sounds (n=3) • Flora (n=2) • Heat mitigation (n=2) • Rocks for collecting (n=1)

Among the personal factors, 5 participants mentioned that the perceived distance of a blue space influenced their usage of the space. Four of these participants explained that far distances deter them, or have the power to deter others, from visiting both natural and manmade blue spaces:

> *"In high school, [competitive swimming] is not very accessible. Not a lot of high schools have a pool. I was just lucky enough to have my high school be at a pool. . .I know people that drive half an hour or an hour to go to their pool. Obviously at UC Berkeley, there's a lot of [pools] so that's not something that I have to do anymore. . ." - Participant F*

> *"I feel like it's enough of a trek to get to one of the off-campus blue spaces and enough of a 'I got to plan it with friends' that it hasn't, very often, come together."* - Participant D

> *"No [the Berkeley Marina] is a little far for me to get to. I used to go there sometimes but I don't go there often and I've never gone regularly."* - Participant H

On the other hand, one participant felt that the distance of natural blue spaces from urban environments made their desire to frequent them increase. In comparison to green spaces, this participant felt that natural blue spaces were memorable to them because of the traveling distance required to reach them:

> *"I feel like green spaces are a lot easier to visit than blue spaces. . .I feel like they're less urban than maybe a trail next to a city. You might have to go further out to visit a lake or go deeper into the woods to visit a stream. I think [blue spaces] are more impactful to me because I've had a lot of larger trips associated with water versus I'll go hiking for the weekend in a green space. It feels like more of an activity."* - Participant C

I found that four participants mentioned that their personal relationship with swimming as an activity influences their usage of blue spaces. Of them, three participants mentioned their love of swimming has influenced, and continues to influence, their usage of blue spaces:

> *"I've always liked to swim. I didn't swim competitively, that's so different, but I just enjoy the act of swimming. I either would live in a condo where we had a community pool or a water center where they'd have water slides or 'water days'. My family would often do that especially since my birthday is in the summer so any time they were like 'what do you wanna do', I'd be like 'can we go swimming'?"* - Participant G

> *"I love swimming. . .I've always very much loved swimming in the sense that it's very fun but also it was something that would tire me out as a kid and then I could go home and my parents wouldn't have me running around the house." - Participant D*

> *"Swimming is a giant passion for me so being in the water and working and training is really emotionally fulfilling for me." - Participant F*

I found that four participants mentioned that they seek out blue spaces because of the various health benefits that these spaces provide them. I also found that three participants seek out blue spaces because they have a strong personal appreciation for water and aquatic environments. Along a similar vein, three participants seek out blue spaces because they have an awareness of ecosystem services and processes related to aquatic environments. Among these participants, two seek out Strawberry Creek:

> *"Here on campus, if I walk past or over one of the bridges, I will usually stop and lean over the side and look at Strawberry Creek. Just because I think it's just so interesting to see [that on] some days it's rushing past because we just had rain and some other days it's very calm. It's really cool to see that through all different parts of campus. I will always really enjoy Strawberry Creek in that way." - Participant A*

> *"Sometimes, on my way to class, I'll look into the Creek and be like, "oh, how's it doing?" because with rain, there'll be more flow in the water so I think "oh that's good that it's getting rain". When I was here the past couple of summers and it was super dry, it'd kind of be dried out with not as much water running through." - Participant G*

Among the other personal factors influencing blue space usage that I identified, three participants mentioned that their possession or lack of necessary equipment limits their usage of blue spaces, two participants mentioned that they have a fear of drowning which either limits

their usage of certain types of blue spaces or influences the ways in which they frequent them, two participants mentioned financial barriers that limit blue space usage, and two participants mentioned time constraints and busy schedules as a limiting factor of blue space usage. Two participants also mentioned that the impacts of both natural and manmade blue spaces on their hair influence their usage of them:

> *"Chlorine in itself is extremely damaging, especially for Black hair. . .It's so hard. I have to have the resources to have a protective style in always. I locked my hair finally because I was so tired of spending so much money on taking care of my hair so it didn't fall out because of the chlorine." - Participant F*

> *"'Oh, my hair'", that was always the thing that was running through my head when I was little, swimming in pools or going to the beach." - Participant G*

I also found that one participant seeks blue spaces out because they are reminiscent of the blue spaces she frequented as a child and one participant seeks blue spaces out due to his restoration-related responsibilities.

I identified 4 inter-social factors that influence the participants' usage of blue spaces on-campus and off-campus. Six participants mentioned that the presence of other people in blue spaces influences their usage of them:

> *"I like to do things with my friends instead of alone. So if my friends are not like 'let's go to the pool' then I don't usually do things like that." - Participant D*

> *"I'm not going to go kayaking alone on the Marina but when it becomes a social or group activity, there's something really special about that, in sharing in that space. . .It's not an independent thing that I do." - Participant A*

> *"Specifically with the creek trail by my house, I liked people watching there and watching them take a moment out of their busy days to walk around." - Participant I*

> *"There's 100% a community aspect [to competitive swimming]. . .When I go home, and let's say it's a break so no one's at the pool, and I have to just train by myself, it's the most arduous thing ever because there's no one there. There's no one to laugh with, there's no one to talk to. By itself it's just really dreary. I don't think I could ever train alone."* - Participant F

Four participants mentioned the diversity of a blue space as a factor influencing their usage of them:

> *"If I just see a group of white people in the water, I don't know how they'll-I just don't feel included or safe".* - Participant B

> *"If I ever go to a beach, or a spring, or a pool, there's a high chance I'm the only Black person there. A high, high chance. . ."* - Participant F

> *"Everytime I would go to community spaces or the beach, there weren't that many people of color. I feel like water and water sports are naturally identified with white people. I don't necessarily know why but that's just how I always felt in those spaces."* - Participant G

Five participants mentioned that their family's values and interactions with blue spaces are a factor in their present usage of blue spaces:

> *"Growing up, an appreciation of the [San Francisco] Bay in general was very ingrained in me. We wouldn't necessarily go down and interact with it; we wouldn't go and touch the water or do any sports on the Bay but everytime we would drive past it, my mom would always say 'water in the Bay!' My entire life it was always just like, 'look, water in the Bay!' so there was always just an awareness that this was close to us and this was important and was also just a beautiful thing about the Bay Area."* - Participant A

> *"I also had a pool growing up, too, so I feel like me and my family would swim a lot with each other. It was like a fun hobby that we all enjoyed. My dad basically taught most of my family how to swim which was nice. . .I just associate the water with my family." - Participant G*

> *"I've been swimming for a very long time because my family on my mother's side - my Asian side - is from Hawaii. They're from an island so it was very important to my mom to know how to swim for safety reasons and also because it's a fun activity." - Participant D*

In contrast to the first inter-social factor of community that I identified, two participants mentioned solitude as a factor influencing their usage of blue spaces:

> *"I'd have my headphones in and sometimes I would just sit [at the creek] and watch the water and it was really nice to get out of the house away from my parents for a moment because it was just me and them. [Just] spend some time kind of alone." - Participant I*

> *"Blue spaces like creeks and outdoor blue spaces are kind of like spots of solitude where you can get away from things." - Participant H*

I identified 4 built environment factors that influence the participants' usage of blue spaces on-campus and off-campus. Three participants mentioned the availability of seating areas near a blue space as a factor in their usage:

> *"I usually like to drive [to the Berkeley Marina]. Sometimes I'll go eat lunch and do work because they have seating areas." - Participant G*

> *"There's a part right by 4.0 hill where there's trees and blocks of concrete that kind of go across the Creek and one time, I went out and sat on it." - Participant I*

"The [blue space] I interact with the most would probably be Strawberry Creek just because it's so easy to sit by the Creek and eat lunch or do things like that." - Participant D

Three participants mentioned the accessibility and inclusivity of changing areas and bathrooms as a factor in the blue space usage:

"I don't particularly want to go to the pool alone as a very visibly trans person. I do not want to have to figure out locker rooms and things like that. So those [things] have definitely kept me out of spaces like the pools and whatnot." - Participant D

"Also, being a nonbinary person, never will I ever, probably in the next 5 to 10 years, see a pool with gender neutral bathrooms." - Participant F

Two participants mentioned the aesthetic or scenic quality surrounding a blue space as a factor in their blue space usage:

"I found the path in between the Art Studio and the Creek area. So I just always walk through it just because I found that it looks nicer. . .It's very good, scenically, and at different times a day, you get to take a picture of the waterfall which is always really sweet." - Participant E

"I feel like the Cal fountains are kind of ugly, in my opinion." - Participant A

Two participants mentioned the disconnection from phone screens and wifi that often accompanies natural blue spaces as a factor influencing their usage of blue spaces:

"Sometimes some lakes are offline. You just have to relax." - Participant E

"It's definitely nice to not be looking at a screen. . .A way away from the screen is always a win." - Participant H

I identified 6 natural environment factors that influence the participants' usage of blue spaces on-campus and off-campus. Four participants mentioned that the fauna in or near a blue space influences their usage of blue spaces:

> *"I get to recognize different bird species. I notice if there's a coot, if there's a grebe, if there's a duck, if there's a cormorant, and all those spotting things. And the different types of fish. It's always sweet to be able to do that." - Participant E*

> *"I love seeing the fish and I think that's something that we really lack in the Bay where the water is not clear enough to see down. The biodiversity in Oahu is just so invigorating. . .I saw an octopus once too, and that was so cool. Or maybe it was a squid, it moved really fast. But it was so cool. It was so fast that all I saw was a flash of red and then a big thing of ink." - Participant A*

Three participants mentioned water flow as a factor in their blue space usage. These participants seek out Strawberry Creek to casually monitor changes to its water flow. Similarly, three participants mentioned frequenting blue spaces due to the sounds generated by the water flow. I identified the presence of flora as another natural environment factor mentioned by two of the participants. These participants mentioned foraging near blue spaces such as creeks and appreciating the different plants around natural blue spaces. Two participants mentioned frequenting blue spaces because they can be cooler in temperature than the surrounding natural spaces. Another participant mentioned frequenting natural blue spaces to collect rocks in or near the space.

Blue Space Benefits

I found that there were 4 distinct physical health benefits, 14 emotional health benefits, and 4 mental health benefits experienced by the participants in on-campus and off-campus blues spaces (Table 8).

Table 8. Benefits of Blue Space Exposure. The frequency included with each benefit refers to the number of participants who mentioned that benefit.

Type of Benefit	**Benefit of Blue Space Exposure**
Physical	• Buffered noise pollution (n=1) • Heat mitigation (n=1) • Opportunity for exercise (n=2) • Energy regulation (n=1)
Emotional	• Relaxation (n=5) • Social connection (n=4) • Calmness or peace of mind (n=4) • Slowness/Stillness (n=2) • Emotional release (n=2) • Presence/Groundedness (n=2) • Freedom (n=1) • Feeling alive (n=1) • Happiness (n=1) • Excitement (n=1) • Fun (n=1) • Refreshment (n=1) • Fulfillment (n=1) • Improved attitude (n=1)
Mental	• Mental break from problems (n=3) • Fostered curiosity (n=1) • Stress relief (n=1) • Confidence (n=1)

Among the 4 distinct physical health benefits of blue spaces experienced by the participants, I found that one participant is shielded from the total impacts of highway noise pollution due to the creek environment near her childhood home. Another participant who was raised in a portion of Southern California that regularly reaches over 100 degrees in the summer, explained that she grew up swimming in order to remain cool during the summer months. Two participants mentioned that exposure to blue spaces encourages exercise and its resultant benefits on their physical health. One of these participants explained that they grew up swimming as a way to regulate their energy levels.

Among the 14 emotional health benefits of blue spaces experienced by the participants, I found that five participants experience feelings of relaxation in blue spaces, four participants experience enhanced social connection, four participants experience feelings of calmness or peace of mind, two participants experience feelings of stillness or of slowness amidst their busy schedules, two participants experience an emotional release in blue spaces, and two participants feel more present or grounded in blue spaces. One participant experiences a sense of freedom near coastal blue spaces, specifically:

> *"It was very important to me to [go to college] near a coast. It was just important to me because it makes me feel more grounded but also free too. If I felt very landlocked I would be really unhappy."* - *Participant A*

This participant also mentioned feeling 'alive' in blue spaces:

> *"I feel like the vastness of the water is simultaneously terrifying but also the most beautiful human thing ever. Something about water reminds me of our humanness, for some reason. Yesterday I was walking from class to my apartment and all of a sudden it just started raining, like pouring all of a sudden and I didn't have my umbrella. I was talking to my roommate and she was like, 'oh, you must've been so upset' and honestly, it just made me feel so alive to be in water that way. I think that's an experience that I've always felt."* - *Participant A*

Among the other emotional health benefits experienced by the participants, I found that one participant experiences a feeling of happiness in blue spaces, one participant experiences a feeling of excitement, one participant experiences a feeling of fun, one participant feels refreshed in blue spaces, and one participant feels emotionally fulfilled while competitively swimming in blue spaces. One participant feels an improvement in their attitude when spending time in or near blue spaces:

> *"It feels great to be outside. Having a reason or place to do something outside is a good way for me to make sure that I have a positive day. If I start the day and don't go outside or spend the first part [of it] in the house, I think my days aren't*

as good as when I spend the beginning of the day outside. [Blue spaces] help improve my attitude throughout the day. That's a good way to put it." - Participant H

I identified 5 mental health benefits of blue spaces mentioned by the participants. Three participants experience a mental break from their problems such as homework and other responsibilities while in blue spaces. One participant feels as though her curiosity is fostered within blue spaces:

"They're something that you can explore and have fun with and [they] foster my curiosity because I find myself wanting to find out more or explore further down the creek or get my hands wet and play around with it." - Participant I

I identified two other mental health benefits experienced in blue spaces by the participants: increased overall stress-relief and increased confidence in swimming ability and body image.

Blue Spaces and Identity

I identified 3 interview themes regarding how racial/ethnic identity influences the experiences had in blues spaces: family and culture, accessibility, and diversity (Table 9).

Table 9. Interview Themes for BIPOC Identity and Blue Spaces.

Family and Culture
● Familial and Cultural Access
Accessibility
● Accessible Information regarding Blue Spaces
● Accessibility for all Hair Types and Textures
● Accessibility in Green Spaces
● Accessibility for Queer, Trans, and Non-Binary students
Diversity
● Lack of Diversity in Blue Spaces
● Importance of Having a Diverse Community in and near Blue Spaces

I identified the family and culture theme as several of the participants mentioned aspects of their familial and/or cultural access that continue to influence their experiences in both on-campus and off-campus blue spaces. One participant, Participant A, feels a strong appreciation for her current access to natural blue spaces due to her grandparent's internment in Arkansas during World War II:

> *"I'm part Japanese American and the Japanese side [of my family] originally came from Japan to California and was a farming family. Then, when the war started, they were relocated to the incarceration camps. So my family went to Arkansas, they went inland. My grandma's family lived in a train car in the middle of the country just to [avoid] the camps. And my grandpa's family lived in Jerome, Arkansas. I was just thinking about how grateful I am that they came back to the coast after something so traumatic happened where they were literally told 'you cannot be here', 'you cannot be near water because we think you're an immigrant spy'. Even after that, they returned to California. I just feel like I'm so grateful for that because I would have felt so isolated if they had stayed in Arkansas after. There would definitely be an isolation of not many people of color but also something in me feels so good being surrounded by water and having these natural water spaces next to me. I'm just so grateful they came back to the coast."* - *Participant A*

Another participant, Participant D, has experienced a strong comfortability in blue spaces throughout their life due to their family's Asian Pacific Islander identity and access to blue space. Participant D notices a difference in how their mother and father view the importance of blue spaces, and how their identities influence their different perspectives:

> *"I feel like the fact that my family is Asian Pacific Islander and lived in Hawaii definitely influenced the fact that I got to spend so much time in the water as a kid. It was one of the main reasons my parents, especially my mom, was like 'my kids need to learn how to swim for safety because my family lives on an island. If they're going to be by the ocean they should know how to swim'. My mother grew up paddle boarding and canoeing out in Hawaii and she grew up on the water*

> *there. Even though we don't live there, [my sister and I] were in the pool and swimming before we could walk. Even though the California beaches are very cold and not as swimmable as Hawaii, [my mom would] always bring us out to the beach and to the pool. It was very much my mom who was pushing us to do these things and getting us in the water. It was her thing that she wanted us to be able to do. My dad is white and he grew up in Wisconsin so swimming and being in the water and whatnot is definitely not something that was as big or important to him. But he was still like 'obviously I'm gonna let my kids go swimming and whatnot'. It definitely felt like it was my mom who was like 'yes, I want my kids to be able to swim, I want them to get to be in the water all the time' because that was such a big, important part of her life." - Participant D*

One participant, Participant F, has had a past experience in blue space where they taught a stranger how to swim, an experience that prompted them to reflect on the connections between identity, historical access, and blue spaces:

> *"I remember I went to a spring one time, it was my sophomore year, so a year ago or a year and a half ago, and this guy didn't know how to swim - this Black guy. He wanted me to teach him so he spent the time learning how to kick, learning how to do these things. I literally taught someone how to swim in a spring. And that shows - you know, there was like a statistic and I think it was 60% or something of Black people don't know [how to swim] or aren't comfortable in water. Obviously, [there's] so much historical background as to how this got to this point. Water safety is a big thing for Black people that should be emphasized and should be pushed for." - Participant F*

This awareness of how identity influences the experiences had in blue spaces is shared by other participants. Four participants shared that their family members are either unable to swim or did not have access to blue spaces throughout their lives, and reflected on how this has influenced their experiences in blue spaces or perceptions surrounding blue spaces:

"I think the key experiences that I've had in relation to swimming just solidify the fact that I belong in the sport and that more Black people should be in the sport.. . .My mom doesn't know how to swim, my dad barely knows how to swim. This is like, it's very, very common [among Black people]. If I didn't have the background I did, I probably would approach blue spaces with fear because there's a lot of stigma and fear surrounding it for Black people - rightfully so because of the history with it. There's definitely a lot of cultural barriers and stuff like that to coming to a pool." - Participant F

"I felt like my dad teaching me how to swim was like 'yeah you need to know this' but looking at my cousins who don't live in California, none of them know how to swim. And I don't know if that deters them from going in the water - obviously that is a deterrent if you don't know how to swim." - Participant G

"My parents didn't grow up too much around blue spaces. My dad didn't really want me going out on the creek alone when I was younger. He perceived it as dangerous and that belief was passed through his mom. . .Maybe as a result, I feel like I can have a greater appreciation for the creeks and the Marina, and everything like that. My grandparents also had a garden, and I know it's not the same thing, but I think they also taught me that nature can be play and you can have fun with it, and you can be friends with certain aspects of nature. I carry that whenever I'm around a blue space and I see it as something that's fun and interesting and also calming." - Participant I

"I am a Black American and I feel privileged that I've learned how to swim and had access to those sorts of spaces. Growing up, not everybody - especially Black Americans - have access to the spaces or resources to swim. I feel very grateful that that's been prioritized in my life. My dad was raised knowing how to swim, as well. I'm not sure about my grandpa." - Participant A

I identified the accessibility theme as several of the participants mentioned various aspects of blue space accessibility for marginalized communities both on-campus and off-campus. One participant, Participant B, explained that blue spaces on-campus are inaccessible because knowledge regarding how to interact with blue spaces, what equipment to bring to blue spaces, and what rules to follow in blue spaces is not spread to marginalized communities on-campus:

> *"I just feel like blue spaces are not accessible to minorities, especially low-income. I know the pool has rules and stuff and that's why I haven't been to blue spaces on campus besides Strawberry Creek because they have certain guidelines like you have to have swimwear, you have to have a cap, you have to have goggles. . .most people don't even have that stuff or know what it is unless they've done swim. You should just be able to wear what you're comfortable with. It shouldn't be that hard to just go in the water. . .The only time I've been to the Marina was to go kayaking with some club. They were very inclusive and made it very accessible and through them, I was able to learn about Cal Adventures and that it's free for students. Without that, I wouldn't have even been to the Marina. . .I think we need more programming around blue spaces like where they are, how to get there - just make it more accessible."* - *Participant B*

Two participants explained that blue spaces on-campus and off-campus can be inaccessible for individuals with certain hair types and textures. One of these participants, Participant F, explained that this inaccessibility results in a financial burden that only certain communities face in blue spaces:

> *"There's only one size cap and it's not for long hair. It's not for textured hair. Chlorine in itself is extremely damaging, especially for Black hair. And these caps don't keep my hair dry - it's bad. It's so hard. I have to have the resources to have a protective style in always. I locked my hair finally because I was so tired of spending so much money on taking care of my hair so it didn't fall out because of the chlorine. That's just an experience that only I'm gonna struggle with, you know. I don't really have many people to talk to about it and that's not something*

that anyone talks about. [Swimming] is the worst sport I could do for my hair and my skin. . .It's something that only a few people are going to experience and have to struggle with. I had to go and outsource and buy my own caps from a brand specifically for Black hair so that I can actually keep my hair dry when I'm swimming so it doesn't break. It's just a very costly experience. Going to the pool all the time is a costly experience. . .Yeah, it's so hard. I just remember crying so much over hair-related issues in swimming. It was so annoying. I couldn't do anything!. . .If Black people were the majority in the sport or if white people had hair that got this damage, there would be a solution that would have been found already. It would already be out on the market; you could buy something that would permanently protect your hair. But obviously no research is going into that because there's not enough people with curly hair [in swimming], you know? So it's just like, yeah, you're kinda just on your own for so many things which sucks about pools in general. . .It's so expensive to get braids every month, every 3 weeks or so for years. That's thousands of dollars that [white people] just don't have to pay. The inaccessibility is just so broad." - Participant F

"'Oh my hair': that was always the thing that was running through my head when I was little, swimming in pools or going to the beach. My mom would always be like, 'don't mess up your hair when you go in the water'." - Participant G

One participant, Participant C, explained that, in order for blue spaces to be accessible to him as a person of color, he needs to feel comfortable in other outdoor spaces as well:

". . .blue spaces are an extension of green spaces so I'm thinking about, if green spaces are accessible then they make blue spaces accessible. I see them as very connected. When I think of my experiences as a person of color, I need to feel comfortable in green spaces and that'll expose me more to being a part of blue spaces. Especially since I think blue spaces in general are harder to access so I feel like a lot of people who are now in blue spaces might have a background in being outside." - Participant C

Three participants, when asked about their experiences in blue spaces as people of color, also discussed their experiences in on-campus and off-campus blue spaces as queer, transgender, and/or non-binary people. These participants explained that these aspects of their identity influence their experiences in blue spaces either just as much or more than their identity as people of color:

> *"I feel like my interacting with blue spaces on-campus has a lot more to do with my transness. I don't always feel comfortable - I don't particularly want to go to the pool alone as a very visibly trans person. I do not want to have to figure out locker rooms and things like that. So those things have definitely kept me out of spaces like the pools and whatnot. I still have tried to make an effort to be by the creeks and visit the Marina and whatnot but I feel like my other identities have had more to do with that fact than my being a person of color." - Participant D*

> *"Being a nonbinary person, never will I ever, probably in the next 5 to 10 years, see a pool with gender neutral bathrooms. There's only one type of suit: there's a women's suit and a men's suit, there is a women's* this *or a men's* that, *you know. It's very restricting because it kind of indirectly says that you have to look and be a certain type of person to be in this place and if you are not, it's just gonna be a lot harder for you." - Participant F*

> *"When do [I] feel like [I'm] able to go in these spaces? Being a queer person: changing rooms and showers, like having the accessibility to gender inclusive bathrooms and changing rooms. Some people might feel uncomfortable; even though you're not looking at them, they might assume that you are. Stuff like that, that's even before you're entering the blue spaces. It can be pools, beaches, anything like that. I'm more feminine-presenting but for other people that aren't, it's very difficult for them." - Participant B*

One participant, Participant F, explained that having access to a pool can be a barrier to accessing blue spaces but that as a student at UC Berkeley, they no longer face this barrier to accessing blue space:

> *"In high school, [competitive swimming] is not very accessible. Not a lot of high schools have a pool, I was just lucky enough to have my high school be at a pool. It was just well-funded enough and that's rare. I know people that drive half an hour or an hour to go to their pool. Obviously at Berkeley, there's a lot of them so that's not something that I have to do anymore and I don't have to worry about the finances part of it but to get to this point there was a lot of money spent." - Participant F*

I identified the diversity theme as several of the participants explained how a lack of diversity or the presence of diversity influences the experiences that they have in blue spaces on-campus and off-campus. Three participants mentioned that they feel as though they stand out or do not belong in blue spaces because of a lack of racial/ethnic diversity in these spaces:

> *"When I look at the [UC Berkeley] swim team or the people practicing on the water polo team, it's just like tall white people. . .If I just see a group of white people in the water, I don't know how they'll - I just don't feel included or safe." - Participant B*

> *"There's three Black people on the [UC Berkeley swim] team out of thirty. That's a big number; there's a lot of big differences. I guess I'm kind of going into sports and athletics. So I guess in the pool area, there's just not a lot of representation. My coaches are probably never going to be people of color. It's just kind of a very homogeneous sport that makes it seem like I don't belong." - Participant F*

> *"I did go to Strawberry Canyon Pool last summer and again, I was maybe one of 5 other people of color there who were swimming so I did feel like the [odd] one out. Also at the lake too, there were basically not that many people of color there other than me and my friends. I didn't feel anything in particular but I was*

> *definitely aware that there was a lack of numbers. . .Yeah, everytime I would go to community spaces or the beach there weren't that many people of color. I feel like water and water sports are naturally identified with white people. I don't necessarily know why but that's just how I always felt in those spaces. . .Also, for spaces outside of Berkeley it's the same thing; like [at] the beach, there's not that many people of color but immediately when I'd go off the beach into the side shop areas I'd start to see more. So those are things that I would experience." - Participant G*

Another participant, Participant B, noticed a lack of diversity on their high school swim team in regards to gender which influenced their experiences within competitive swimming:

> *"When do [I] feel like [I'm] able to go in these spaces? I guess if it's not really male-dominated. Back in high school, the swim team was mainly guys. There were like thirty guys and five girls so we had a co-ed team. And I was one of those five girls." - Participant B*

Another participant, Participant C, explained that the type of activity that they are participating in within blue spaces influences whether or not they notice a lack of racial/ethnic diversity:

> *"I feel like [UC] Berkeley generally is a college that has a student body that appreciates hiking. When it comes to hiking, I feel very welcome and included. But when you get to more high adventure outdoor recreation spaces such as skiing and backpacking and climbing, that's where the demographic gets really white. Those are spaces where I feel more isolated. It's very noticeable when I'm like 'oh, I'm the only Asian dude here'. I feel different. So I feel like it definitely depends on the activity. I don't interact that much with Marina activities such as kayaking or sailing. I imagine kayaking is relatively accessible to the student body but I imagine that sailing is probably more white. That's just an impression that I have since I haven't spent too much time doing the adventure programs. . .I don't have a strong recreative relationship with blue spaces specifically. . .I'm not*

a sailor, I'm not a rower. I feel like swimming is typically very inclusive or not particularly seen as just a white thing." - Participant C

Two participants noticed a difference in diversity and its impacts on their experiences in blue spaces based on how isolated a particular blue space is.

"I would say blue spaces are more isolated so I'm not really conscious of, 'oh there's a lot of white people here'. That's not really a reality because there's not a lot of people in general when you're like out by a lake." - Participant C

"Blue spaces like creeks and outdoor blue spaces are kind of spots of solitude where you can get away from things. Getting out there makes it easier to be comfortable with everyone, including yourself. It's one of the spots where I experience prejudice the least. In particular, nature spots. A little caveat is that I do feel like I stand out a little bit more in those types of places. But only a few times I felt like me standing out has manifested into anything." - Participant H

One of these participants, Participant H, had a previous experience with prejudice in an on-campus blue space:

"It depends on the part of [strawberry] Creek you're on but a lot of them are less solitary. There's a lot of people around or walking through. So I do feel like me standing out sometimes manifests a little more in super urban areas because there's more people coming around. One thing that happened near the Creek: I was getting some tools to do Creek [restoration] work and one of the [contracted cogeneration power plant employees] assumed that I was stealing from our little lock box. They were trying to get me to put back a pair of boots which was an example of prejudice manifesting itself in a nature or restoration space. In terms of being near or in the Creek, I think as soon as I get closer and closer away from the walking paths and to the actual Creek - further away from the high banks and deeper down closer to the Creeks, I'll notice less of that and more solitude or just

relaxation. Even people I do see, if you go that far they're usually pretty chill and in a similar headspace." - *Participant H*

Two participants explained that the racial/ethnic diversity surrounding a blue space influences their experiences within them:

"The spaces that you mentioned, the Marina, Strawberry Creek, and the pool, I feel like have very little barriers as a person of color. I feel very included. I feel like generally speaking, places of recreation are more white but I think UC Berkeley tries hard to break barriers to entry. . .I feel like generally speaking though, geographically, Berkeley is pretty diverse so I don't feel particularly isolated. I feel like there's diversity in the Marina. Going to Cesar Chavez Park, there's better representation so I feel like that's a big factor. . .I do remember when I was working at my job with this environmental non-profit, TreePeople, there were sites near this lake/reservoir and I remember there being a really prominent Latino population. And I think that's where I speak about [how] geographic factors are a big part of who spends time in blue spaces. I think the surrounding population had a large Latino population." - *Participant C*

"I'm always excited to see people of color and Black people doing restoration work. I'm extra excited to help facilitate and work with those groups [on-campus]. I think people in the restoration space are generally super nice, especially at UC Berkeley, so I've only felt empowered by my coworkers and supervisors. I've never felt ashamed or wrong, you know." - *Participant H*

Two participants mentioned that their experiences in blue spaces are influenced by the diversity of their family and friend groups as they often go into these spaces with members of their community:

"I've never been not a person of color so I don't quite know what's on the other side and I've never really experienced anything where it's like, 'just because you're a person of color, you can't access this space or there's an invisible

barrier' per say. But [that's] just because I've been around people where in general I don't find I'm the only person of color, I find that there's other people of color there too. And it's not like I'm alone in that sense. Maybe that's just because my community is more diverse so I've never really experienced a singularity where I'm just like 'oh I'm the only person of color' kind of thing. . .I usually go with my family or groups of friends and those are already people of color. But even when there's just like strangers, I don't really see any non-people of color, if that makes sense. It's not really Caucasian people only. So it's just always been around me, in that sense." - *Participant E*

"My friends are mainly people of color. . .I made sure that the people I brought into [blue] spaces were already welcoming or had no biases." - *Participant B*

DISCUSSION

Through undertaking this thesis, I sought to better understand how students of color are experiencing blue space environments. The literature surrounding blue spaces is lacking in comparison to the literature surrounding green spaces, and the literature surrounding how identity influences the experiences had in blue spaces is even harder to find. I found that the students of color that I interviewed are mainly interacting with blue space environments intentionally, for personal reasons and with community members, and are experiencing a range of emotional-health related benefits. Additionally, I found that identity influences the experiences that they are having in blue spaces in diverse ways. Overall, my findings contribute to the understanding of how and why people interact with blue spaces, the benefits provided by these spaces, and the intersections between identity and experience outdoors.

Blue Space Exposure

For my first sub-question, I explored how BIPOC students are currently interacting with on-campus and off-campus blue spaces. My findings overwhelmingly show that the participants are interacting with blue spaces intentionally, meaning they are seeking out these spaces both on-

campus and off-campus. On-campus, the participants are interacting with Strawberry Creek the most, a trend that can likely be explained by Strawberry Creek's extensive network throughout the highly-populated areas of the University of California, Berkeley campus (Figure 2). Even among participants who were sampled for their previous interactions with the Berkeley Marina or campus pools, Strawberry Creek is the on-campus blue space that they frequent most often and most consistently. While the majority of their interactions with Strawberry Creek are intentional, nearly all of the participants incidentally interact with Strawberry Creek while walking to class (Table 3). This means that students are encountering Strawberry Creek, and reaping the benefits that blue spaces provide (Table 8), while going about their daily routines and responsibilities. These findings highlight the potential for human health promotion possessed by blue spaces incorporated into urban environments (Völker and Kistemann 2013; White et al. 2010; Katayama et al. 1991). I found that the majority of the participants' interactions with the Berkeley Marina were intentional and that the Cal Adventures Program has the potential to expose students to blue spaces (Table 4). It's important to note, however, that the latter finding is likely influenced by the fact that I sampled from populations that had previously taken part in a Cal Adventures event. There was only 1 incidental exposure with the Berkeley Marina mentioned by the participants likely due to the Marina's location away from spaces where UC Berkeley students often find themselves. The campus pools were the least interacted with on-campus blue space among the participants. I found that of the three on-campus blue spaces, the swimming pools were the least accessible to the students for a variety of reasons ranging from a lack of equipment, lack of accessible infrastructure, and lack of diversity. Additionally, the swimming pools were the only manmade blue space that I focused on for this study. This finding emphasizes the need for future studies comparing the accessibility and trends in usage of natural versus manmade blue spaces.

Off-campus, the participants are interacting with blue spaces in a variety of ways and locations (Table 6). I found that across all exposure types to both on-campus and off-campus blue spaces, the majority of interactions involved the presence of multiple people. These findings align with those in previous studies that show the potential of blue spaces to foster social connection (de Bell et al. 2017; Ashbullby et al. 2013; Pool et al. 2023). I also found that among the participants, nearly all of them (six out of nine) had previous interactions with blue spaces

during their childhood and frequented blue spaces very often throughout their upbringing. This supports previous findings that individuals who are currently interacting with natural spaces were typically exposed to them during their youth (Asah et al. 2012; Ward Thompson et al. 2007; Stehl et al. 2024). Overall, I found that indirect exposure was the least common type of exposure among the participants both on-campus and off-campus, suggesting a potential relationship between increased physical access to blue spaces and decreased indirect exposures. This finding contrasts with previous findings that greater proximity to blue spaces increases indirect exposures to blue space (White et al. 2020).

Factors Influencing Blue Space Usage

For my first sub-question, I also explored why BIPOC students are currently interacting with on-campus and off-campus blue spaces. The four categories of factors influencing usage (Smith et al. 2022), and the resulting factors that I identified throughout my study, offer valuable insight into why the participants interact with blue spaces. My findings show that there is a wide variety of personal factors influencing interactions with blue spaces, with the most commonly mentioned factors being the perceived distance to blue spaces, personal relationships with blue spaces, and awareness of the health impacts of blue spaces (Table 7). Among the inter-social categories of factors influencing blue space usage, community was mentioned by nearly all of the participants. This once again supports previous studies demonstrating the connections between blue spaces and social connection (de Bell et al. 2017; Ashbullby et al. 2013; Pool et al. 2023). The built environment factors mentioned by the participants emphasize the need for accessible infrastructure in blue space environments. A lack of seating areas, a lack of inclusive changing areas, and poor maintenance quality in blue spaces can potentially deter individuals from frequenting these spaces, even when they have physical access to them. The natural environment factors that I identified showcase the participants' appreciation of the natural aspects of blue space environments. These students are able to connect with different types of plants and animal species due to the availability of these spaces, even amidst the urbanized UC Berkeley campus. This finding is very important as previous studies have found a connection between wellbeing and nature connectedness (Pritchard et al. 2020; Samus et al. 2022; Mantler and Logan 2015)

Blue Space Benefits

For my second sub-question, I explored the benefits that BIPOC undergraduate students experience in blue spaces. I found that the participants overwhelmingly experienced emotional-health related benefits in blue space environments, even participants who mainly interact with blue spaces by exercising within them (Table 8). The emotional-health benefits of blue space exposure mentioned by the participants support findings that highlight blue space environments as therapeutic landscapes (Vaeztavakoli et al. 2018; Finlay et al. 2015; Bell et al. 2015) and once again support their potential to increase social connection. Among the participants, the therapeutic experience took on many forms; participants experienced feelings of relaxation, calmness, slowness, release, presence, freedom, happiness, and more within these spaces. These differing, often personal benefits within blue space environments emphasize how blue spaces can provide the therapeutic experience in a variety of ways (Bell et al. 2015).

Blue Spaces and Identity

For my third sub-question, I explored how racial/ethnic identity influences the experiences had within blue spaces amongst BIPOC undergraduate students. I found that racial/ethnic identity, along with other aspects of identity, did influence the experiences had within blue spaces by the participants. Across the participants, perceptions surrounding the connections between identity and experiences in blue space environments were nuanced. Overall, I found that by looking beyond physical accessibility to outdoor space, it is possible to identify other barriers to safe, comfortable outdoor access (Sykes 2022). For the participants, who all have some form of physical access to the on-campus blue spaces, interactions with these spaces can be uncomfortable and unsafe. I found that for queer, transgender, and non-binary students, the lack of inclusive changing areas and restrooms can be a barrier to accessing the campus pools. Additionally, the stigma of others within these changing areas and restrooms and non-inclusive swimming attire can deter this population from feeling comfortable utilizing both on-campus and off-campus blue space environments. Previous studies support these findings and showcase the unique experiences that queer, transgender, and non-binary individuals often have in blue spaces (Caudwell 2022; Elling-Machartzki 2017; Hargie et al. 2017). I also found that for

Black students who wish to interact with both natural and manmade blue spaces, inaccessible caps, a preoccupation with worries surrounding how entering the water will impact their hair, and the financial burden that accompanies caring for their hair while frequenting blue space environments can cause feelings of distress and isolation, a finding that aligns with a previous study exploring hair and the minority swimming gap (Norwood 2010). I found that many participants are acutely aware of their identities while in blue space environments both on-campus and off-campus that are not diverse. If blue space environments are not diverse in terms of race/ethnicity, gender, and sexuality, individuals can be deterred from interacting with them. I also found that interacting with blue space environments with other friends of color is one way that the participants are accessing these spaces more comfortably despite a lack of diversity within the space.

Experiences that the participants are having in blue spaces in the present are influenced by their family's or broader cultural community's past interactions with blue spaces and any barriers to blue space access that they may have faced. For the African American community, historical barriers to blue space access such as segregated pools and discrimination faced in natural blue spaces manifest in the modern-day as lower swimming ability rates compared to other ethnic groups (Brown 2014; Wiltse 2014; White 2021). For several participants who identify as a member of this community (Table 1) and who currently have access to blue spaces, this legacy of diminished access still impacts their experiences through an awareness of their family members' lack of swimming ability, their appreciation of their swimming ability, and their positive and negative encounters with others in these spaces. Legacies of diminished access impact other participants as well; Participant A has a deep appreciation for her upbringing near the coast and prioritizes living near a coast because her grandparents were forcibly moved away from it due to discriminatory practices in the 20th century, and Participant I was raised within a family that perceived blue spaces as dangerous due to their lack of access to them. Family and cultural values and historical access to blue space environments influence the experiences had by the participants as well. Participant D was raised frequenting blue spaces because of their family's identity as Asian Pacific Islanders, their connection to Hawaii, and their relationship with blue spaces in general. Participant I was raised viewing nature as a 'friend' and as something to enjoy. All of these findings emphasize the importance of intersectional research; if

certain populations are facing barriers to outdoor space access beyond physical accessibility, it is crucial to explore what these barriers are, where they stem from, and how to deconstruct them. This process requires the expertise of a variety of disciplines ranging from history, ethnic studies, and queer studies to public health, urban planning, and environmental science.

Limitations and Future Directions

My study was limited primarily by the number of students that I interviewed. There are numerous students of color on the University of California, Berkeley campus interacting with blue spaces and the participants that I interviewed in no way represent them all. The perspectives and experiences of the participants of this study, while providing valuable insight into how students of color experience blue space environments, cannot be generalized to represent the larger BIPOC student population of UC Berkeley. Another limitation of my study lies within my sampling methods: I interviewed a number of students who had taken part in Cal Adventures, SERC NEWT, and EIM-OC events on-campus and their experiences within on-campus blue spaces are likely very different than the experiences of participants interacting with these spaces through different channels. Additionally, given the nature of my data collection and analysis methods, emergent themes are potentially influenced by my subconscious biases and subjective interpretations of the findings.

Future research regarding the experiences of students in blue space environments can reach greater conclusions if more participants are included in the study. For a more-comprehensive study, further research should also focus on other groups or communities of people such as disabled students, low-income students, and students of different religious orientations. Additionally, future research should analyze any differences in exposure types, usage trends, perceived benefits, and identity-related experiences in natural versus manmade blue space environments.

Broader Implications

The findings of my thesis show that individuals can reap the immense benefits of blue spaces when they are incorporated into the environments where individuals are living, working, and studying. This finding is broadly important for the field of urban planning as it emphasizes

the importance of preserving natural spaces within urban environments and the importance of incorporating new infrastructure sustainably within existing natural spaces. This thesis also highlights how blue space environments foster social connection, benefit human health and wellbeing, and increase feelings of nature connectedness. These findings are important specifically for the University of California, Berkeley as they underscore the need for natural space preservation to be a priority on campus.

The findings of this thesis also demonstrate that even when students have physical access to blue spaces, there are aspects of their identity that can influence the type of experiences that they are having within them. To ensure that all communities can interact with blue space environments comfortably, safely, and positively and therefore experience the benefits that they provide, it is crucial to increase accessible blue space infrastructure, support events and initiatives dedicated to increasing diversity within blue space environments, and continue researching how students of various identities are experiencing blue spaces.

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APPENDIX A: Synthesis of Physical, Emotional, and Mental Health Blue Space Benefits

Benefit Category	Activity	Benefit	Literature
Physical	Living in proximity to urban blue space	Decreased heat-related mortality	(Burkart et al. 2016)
	Inhaling mists and spray associated with oceans, waterfalls, and other natural blue spaces	Asthma symptom mitigation	(White et al. 2020)
	Absorption of vitamin D in outdoor blue space	Reduced risk of cancer, autoimmune disease, and cardiovascular disease	(White et al. 2020)
	Participation in water-related recreational activities	Enhanced breath control	(Armitano et al. 2015; Clapham et al. 2014)
		Enhanced muscular strength	
		Enhanced flexibility	
		Increased cardiovascular	(Armitano et al. 2015; de

		fitness	Bell et al. 2017; Brinks et al. 2009; Clapham et al. 2014; Xie et al. 2021)

Benefit Category	**Activity**	**Benefit**	**Literature**
Emotional	Participation in water-related recreational activities	Increased sense of freedom	(Casey et al. 2009)
		Increased feelings of "fun"	(Casey et al. 2009; Mitchell and Nielsen 2002)
	Listening to aquatic sounds associated with blue space environments	Increased feelings of calm	(Foley et al. 2019; Olive and Wheaton 2021; White et al. 2020)
		Increased feelings of overall pleasure	
	Exposure to blue space (regular and irregular)	Increased social connection	(de Bell et al. 2017; Ashbullby et al. 2013; Pool et al. 2023)
		Increased spiritual satisfaction	(Corvalán et al. 2005)
		Increased feelings of nature connectedness	(Stehl et al. 2024)
		Increased overall life satisfaction	(Brereton et al. 2008)
		Increased feelings of calm	(Pool et al. 2023)

		Increased relaxation	(Pool et al. 2023; White et al. 2013)
		Decreased distress levels	(Nutsford et al. 2016)

Benefit Category	Activity	Benefit	Literature
Mental	Participation in water-related recreational activities	Mitigation of symptoms related to post-traumatic stress disorder	(Caddick et al. 2015; Rogers et al. 2014; Dustin et al. 2011; Mowatt and Bennett 2011)
		Stress relief	(Wheaton et al. 2021)
	Exposure to blue space (regular and irregular)		
		Mitigation of symptoms related to major depressive disorder	(Berman et al. 2012)
		Increased overall mental health	(Alcock et al. 2015; Garrett et al. 2019)
		Increased intellectual knowledge of the environment and ecological processes	(Corvalán et al. 2005)

APPENDIX B: Land-Acknowledgement

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Native American Student Development recognizes that UC Berkeley sits on the territory of xučyun (Huichin), the ancestral and unceded land of the Chochenyo speaking Ohlone people, the successors of the sovereign Verona Band of Alameda County. This land was and continues to

be of great importance to the Muwekma Ohlone Tribe and other familial descendants of the Verona Band.

We recognize that every member of the Berkeley community has benefitted, and continues to benefit, from the use and occupation of this land since the institution's founding in 1868. Consistent with our values of community, inclusion and diversity, we have a responsibility to acknowledge and make visible the university's relationship to Native peoples. As members of the Berkeley community, it is vitally important that we not only recognize the history of the land on which we stand, but also, we recognize that the Muwekma Ohlone people are alive and flourishing members of the Berkeley and broader Bay Area communities today ("Ohlone Land | Centers for Educational Justice & Community Engagement" 2024).

APPENDIX C: Office of Planning and Analysis 2023-2024 academic year demographic profile, new first-time college entrants ("UC Berkeley Fall Enrollment Data for New Undergraduates | Office of Planning and Analysis" 2023)

Ethnicity	2022 Fall Count	2023 Fall Count	2022 Fall %	2023 Fall %
African American/Black	241	255	3.6%	3.8%
Asian	3,514	3,374	52.1%	50.5%

Chicanx/Latinx	1,425	1,529	21.1%	22.9%
Native American /Alaska Native	121	96	1.8%	1.4%
Pacific Islander	40	71	0.6%	1.1%
Southwest Asian /North African	371	359	5.5%	5.4%
White	2,071	1,897	30.7%	28.4%

APPENDIX D: Office of Planning and Analysis 2023-2024 academic year demographic profile, new transfer entrants ("UC Berkeley Fall Enrollment Data for New Undergraduates | Office of Planning and Analysis" 2023)

Ethnicity	2022 Fall Count	2023 Fall Count	2022 Fall %	2023 Fall %
African American/Black	141	156	5.3%	5.6%
Asian	1,257	1,352	46.9%	48.5%
Chicanx/Latinx	628	591	23.5%	21.2%
Native American /Alaska Native	67	87	2.5%	3.1%
Pacific Islander	25	21	0.9%	0.8%
Southwest Asian /North African	217	225	8.1%	8.1%
White	840	849	31.4%	30.5%

APPENDIX E: Berkeley Marina, see South Sailing Basin and Cal Adventures (image taken from The City of Berkeley website)


FEATURES & AMENITIES
VISITOR & PERMANENT SLIPS AVAILABLE
DIRECT ACCESS TO THE BAY & GOLDEN GATE
100 ACRES OF OPEN SPACE & PARKS
7 MILES OF PEDESTRIAN TRAILS
4-LANE PUBLIC LAUNCH RAMP
SHORT WALK TO 4TH STREET
ADVENTURE PLAYGROUND
FREE MOBILE PUMP OUTS
CERTIFIED CLEAN MARINA
DOUBLE TREE HOTEL
HAUL OUT SERVICES
PANORAMIC VIEWS
4-RESTAURANTS
NATURE CENTER
FERRY SERVICE
WATERSPORTS
FAMILY FUN
Western Burrowing Owl Habitat
Protected Natural Area
NORTH SAILING BASIN
Chávez Memorial Solar Calendar
Dog Park OFF LEASH AREA
César Chávez Park
SPINNAKER WAY
Spinnaker Way Vista Point
Doubletree Hotel, Restaurant, Coffee Shop, and Event Space
SAN FRANCISCO BAY
Berkeley Marine Center Boatyard
4-Lane Public Launch Ramp
McLaughlin Eastshore State Park
Gas Dock
Free Compost Pick Up
BERKELEY MARINA
Berkeley Yacht Club
Yacht Club Point
1 Mile to 4th Street Shopping District
1/3 Mile to I-80
SAN RAFAEL
LARKSPUR
RICHMOND
TIBURON
BERKELEY
SAUSALITO
EMERYVILLE
OAKLAND
SAN FRANCISCO
ALAMEDA
20 mi
30 km
5 Nautical Miles to Angel Island
8 Nautical Miles to the Golden Gate
5 1/2 Nautical Miles to San Francisco
Horseshoe Park
UNIVERSITY AVE
Berkeley Marina/ Waterfront Office
Skates on the Bay Restaurant
Small Scale Ferry Service & Charter Boats
San Francisco Bay Trail
BERKELEY PIER (closed until further notice)
SEAWALL DR
Shorebird Park
Shorebird Park Nature Center & Classroom
Beach
Adventure Playground
Cal Adventures & Cal Sailing Club
Hana Japan Restaurant
Berkeley Sportsman's Center
Shorebird Park Playground
Small Boat Docks and Hoists
Watersports - Sailing, Windsurfing, Kayaking
SOUTH SAILING BASIN
His Lordships Restaurant and Event Space
BERKELEY MARINA
YOUR GATEWAY TO THE GOLDEN GATE
CITY OF BERKELEY
Parks Make Life Better!