Barriers to Access Large Green Spaces in Oakland, California

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ABSTRACT

Environmental justice connects social injustices to environmental pollutants and anthropogenic climate change. One indicator of environmental injustice is access to green spaces, which provide urban heat island relief, mental health improvements, and noise and air pollution abatement. Larger green spaces are a unique type of green space because it's size provides opportunities for outdoor recreation activities like camping, hiking, and backpacking, which are also important factors for mental and physical health. Considering the uneven access to green spaces, this research paper identified the barriers to access large green spaces in Oakland, California through survey and interview deployment. My findings indicated 1) access to large green spaces among demographic groups, 2) the importance of social organization and interaction when overcoming experiential and education barriers to large green spaces, and 3) desired amenities for large green spaces.

KEYWORDS

environmental justice, regional parks, institutional organizations, youth development, outdoor recreation

INTRODUCTION

Green Spaces are valuable resources that contribute to community wellbeing and connecting people to their environment. Green spaces are areas that function to biodiversity and are important in metropolitan areas because of their benefits (Aronson et al. 2017). Green spaces are an environmental benefit because they are generally cooler than metropolitan areas, provide pollution abatement, and are connected with increased mental and physical health (Cohen-Cline et al. 2015). Urban heat islands are an effect of climate change and cause increased temperatures in urban areas. This is due to the higher heat capacity of city building components like concrete and asphalt (Shishegar 2014). Green spaces mitigate heat islands because their lower heat capacity creates cooler conditions (Shishegar 2014). Additionally, the presence of trees alleviate pollution in metropolitan areas by providing a noise barrier and air circulation (Shishegar 2014). Green spaces provide opportunities for physical activity and recreation, which are extremely important to the physical health of residents (Cohen-Cline et al. 2015). Beyond a physical standpoint, proximity and accessing green spaces is associated with improved mental health benefits. Green spaces also provide an area for community building and environmental education.

There are different types of green spaces that have unique benefits. In large metropolitan areas, there are multiple types of green spaces. There are informal green spaces, urban green spaces, and larger green spaces (Ngom et al. 2016). Informal green spaces include tree canopy and sidewalk gardens (Sikorska et al. 2020). These informal spaces are not meant for recreation, but still provide the benefits of aesthetic greenery and combating urban heat islands (Sikorska et al. 2020). Urban green spaces are parks and fields that are designated for leisure and recreation. Some examples of urban green spaces include parks, botanical gardens, and sports fields. In addition to addressing urban heat islands, urban green spaces offer opportunities for physical activities, which are associated with improving physical and mental health (Cohen-Cline et al. 2015). Larger green spaces are larger areas that can facilitate hiking, camping, mountain biking, boating, and other recreational activities. In many cases, larger green spaces also function as essential habitat for species and provide unique opportunities for people to directly interact with endemic ecosystems (Aronson et al. 2017).

Green spaces are incredibly important resources for influencing human health and environmental connection, however accessibility to green space can vary significantly based on

race and socioeconomic factors (Wolch et al. 2014). This results in disproportionate access to the environmental benefits that green spaces provide. Given these disparities, access to green spaces is an environmental justice issue. Communities of color and low-income communities regularly have less access to urban green spaces (Rigolon and Flohr 2014). Levels of access can vary based on distance, safety, transportation, the size of green spaces, and the number of informal and formal green spaces in an area (Wolch et al. 2014). In larger green spaces like National Recreation Areas, regional parks, and state parks, utilization of these areas has been shown to vary based on race and ethnicity (Byrne et al. 2009). In a 2009 study of Santa Monica Mountains National Recreation Area, the majority of park visitors were white, wealthy, and lived in the vicinity (Byrne et al. 2009). Data from BIPOC park visitors indicated less physical activity, further distances traveled, and lower visitor retention rates (Byrne et al. 2009). Understanding how different communities interact in large green spaces is crucial because there are many activities in large green spaces that are not possible in others. Furthermore, understanding the barriers that develop into differing levels of access across race and socio-economic lines is crucial in order to fully address access to green spaces as an environmental justice topic. However, little research has been done on the barriers associated with accessing larger green spaces.

This study aims to understand the barriers to access large green spaces in Oakland, California by incorporating environmental justice perspectives. I specifically focused on the effect of social interactions on perceived access to large green space, the differences in access to large green spaces based on demographic categories, and the desirable features of large green spaces. In this study, I take large green spaces as the East Bay Regional Parks System, a network of parks that provide recreation activities associated with larger green spaces. In order to collect my information, I surveyed and interviewed Oakland residents to understand their perceptions and interactions with large green spaces.

BACKGROUND

Systemic racism creating a landscape of varying access

Differing access to green spaces derives from institutional systems that created racially segregated landscapes. For example, redlining was a strategy executed in the 1930s that graded specific regions in cities as varying levels of desirable and worthy of investment (Perry

Harshbarger and 2019). Redlining was part of the New Deal, which was a set of policy packages that aimed to support citizens during the Great Depression (Perry and Harshbarger 2019). Redlining policy specifically benefited white, middle-class families in finding housing; potential homebuyers received loans supported by the federal government (Perry and Harshbarger 2019). This New Deal protocol was surveying cities and classifying neighborhoods as green, blue, yellow, and red (Perry and Harshbarger 2019). The "red" communities were later dubbed as redlined, because mortgage lenders refused to offer people from those neighborhoods mortgages (Perry and Harshbarger 2019). The vast majority of these areas were majority Black, Indigenious and people of color (BIPOC).

Redlining and its generational effects created conditions for inequitable access to green space. These "hazardous" redlined communities received lower government investment, creating neighborhoods with lower property values and public spaces. The result was a clear difference in green space quality and area in the "red" communities compared to the areas where only wealthy white families were greenlit to buy (Hoffman et al. 2020). Fifty-three years after banning redlining, formerly redlined communities still lack equal tree canopy compared to other neighborhoods (Schell et al. 2020). On average, redlined communities have 21% less tree canopy, lack mature trees, and have less environmental green spaces when compared to areas that BIPOC individuals were excluded from (Schell et al. 2020). Through systemic racism, BIPOC communities experienced segregation, creating long-lasting geographical effects of communities that are predominately BIPOC and poorer than white neighborhoods.

In addition to the systemic segregation and lower investment through redlining, Black citizens and Indigenous people were heavily discouraged from enjoying larger green spaces like national parks. To keep and "preserve" wilderness areas like Yosemite National Park, Indigenous people were forced off of their land to create national parks (Bloom and Deur 2020). As the National Park System began to develop, Black communities were told that national parks would not provide facilities for basic needs. This alluded to the lack of bathrooms and accommodations at National Parks to uphold the "Separate but Equal" façade (Young 2009). William Trent Jr., an advisor of African American affairs to the Secretary of Interior, advocated for the desegregation of National Parks (Young 2009). The first non-segregated national park campground was established in 1939, and all national parks were desegregated in 1941 (Young 2009). Past racist

policies against Indigenous and Black citizens demonstrate how generations of BIPOC individuals were intentionally made unwelcome in large green spaces.

Figure 1. Shenandoah lands general campsites. Photo provided by the National Park Service depicting segregated campgrounds (Young, 2009).

Current research on green spaces

To build an understanding of access to green spaces across different communities, researchers use a variety of methods. Case studies of cities using GIS are valuable methods to assess how access to green spaces varies among different neighborhoods. An example of this is Shuk Wai So's master's thesis on environmental justice in Phoenix, Arizona. Using network analysis, they confirmed variability of spatial access to green spaces amongst racial demographics in the city (So 2016). In addition to GIS survey methods, semi-structured interviews and surveying are common techniques to gain insight on communities' perceptions of green spaces. A study conducted by leisure scientists Gearin and Kahle using semi-structured interviews proved different generations had different uses and desires for green space access (Gearin and Kahle 2006). Similarly, understanding varying uses along cultural lines is key to quantifying access to green space. A study conducted in Santa Monica National Recreation Area found that different ethnic and racial communities used the park for different activities and varying recreation levels (Byrne et al. 2009). Key discoveries from their work was that white residents were more likely to visit the park again, and BIPOC residents traveled further and were less likely to participate in active

recreation like mountain biking or hiking (Byrne et al. 2009). Current research demonstrates clear inequities to accessing green spaces exist on racial and ethnic lines.

Understanding anecdotal trauma

It is also important to understand how personal and community experience affects perceived access to green spaces. A notable example is the eminent domain seizure of a resort for Black residents along Manhattan Beach, California. Owned and operated under Black leadership, Bruce's beach provided a space specifically for Black residents to swim, dance, and enjoy the California Coast under the Jim Crow Era (Fortin 2021). This land was seized by the city to create a public park in 1924; the Bruce's lost their business and the Black community lost a hub for outdoor recreation. The land failed to be turned into a park for three decades and now serves as a lifeguard training center under the ownership of Los Angeles County (Fortin 2021). This example demonstrates that even recreation land owned by Black citizens for Black citizens can be revoked, terminating a key opportunity for BIPOC recreation.

Another example of trauma experienced by BIPOC recreationalists is exemplified by the experience of avid birder Christian Cooper in Central Park. Christian informed a dog walker that the birding area was a leashed area for pets, which resulted in the woman calling the police on him (Brakkton 2021). In context of the Black Lives Matter movement and the relationship between the police and Black men, this woman used the police force to threaten the safety of Christian Cooper. These experiences of disenfranchisement and violence highlight how providing and recreating in green spaces can be affected by anecdotal experiences among different communities.

The East Bay Regional Park District (EBRPD)

The East Bay Regional Park District is a network of parks in Alameda and Contra Costa counties, east of the San Francisco Bay. It includes a network of seventy-three parks totaling 125,000 acres and 1,250 miles of trails. In 2015, the EBRPD adopted the UN goals for sustainable development as a roadmap for their organization ("About Us" n.d.). In 2021, the EBRPD received a UN global citizen award based on its adherence to the 17 goals for sustainable development ("About Us" n.d.).Their website specifically describes how their actions contribute and further a more equitable, inclusive, safe, and sustainable parks for Bay Area residents, which are the UN

sustainable development goals ("About Us" n.d.). Each park within the system is unique in the experiences it offers. For example, Redwood Regional park is a larger park that offers a significant amount of hiking trails, campsites, and meadows to picnic. Mountain biking and horseback riding is also permitted in the park. It is a secondary growth redwood forest and implements different natural history components along the trail.

Research approach

For the purpose of my research, I used a combination of surveys and semi-structured interviews to identify barriers to access large green spaces. Each technique contains strengths to address specific questions within my research. Surveys were deployed to a large audience of people. I distributed surveys to Oakland residents to understand how people access, socialize, and want their green spaces. Survey results were visualized conveyed through graphs and statistics like mean, median, and mode. Survey respondents had an opportunity to express interest in a longer, compensated semi-structured interview. From the interviews, I coded common themes and topics among interviewees and had in depth discussions about barriers to access larger green spaces with Oakland residents.

METHODS

Reinhardt Redwood Regional Park

Reinhardt Regional Park is a 1,830 acre park within the East Bay Regional Park District. The park is in Oakland, California and consists of seven entrances. The main entrance has an access fee of $5 during peak usage months on weekends and holidays. In addition to the main entrance gate, there are six other access points for Reinhardt Regional Park. Additional access points that do not have collection fees provide access to dirt hiking trails. According to the East Bay Regional Park District website, Reinhardt Redwood Regional Park is also accessible by AC transit bus lines and additional walking.

From a recreation perspective, the park offers a variety of activities. From the main entrance, there is a paved trail that leads to a playground and multiple picnic areas and meadows. Additionally, there are three group campsites located along the paved access trial. Other hiking trails within the park are unpaved and are a variety of lengths. On the rails, visitors can mountain bike, horseback ride, hike, and walk their dogs. While in the park, visitors have the opportunity to experience secondary growth redwood forests and chaparral ecosystems. Occasional programs provided by the East Bay Regional Park District include guided walks, llama and alpaca visits, and annual ladybug wintering.

Survey development and distribution

To assess Oakland resident's use of large green spaces, social history with large green spaces, and demographics, I developed a three part survey. The first portion of the survey introduces my real world example of a large green space in Oakland, Reinhardt Redwood Regional Park. Using Reinhardt Redwood Park contextualized the amenities that large green spaces could provide with a real world example. In this section, there were multiple choice questions and a short response question. The second part of my survey focused on previous experience in green space and if respondents felt they had the time and opportunity to easily access large green spaces. All of the questions in this section used Likert response formatting. The last section collected demographic information including, age, race, and income.

I distributed my survey online through Nextdoor, Facebook groups, and Meetup groups. Using my Nextdoor account, I posted my survey to twenty-seven unique neighborhoods in Oakland. The majority of the neighborhoods are within a ten-minute drive of Reinhardt Redwood Regional Park. Survey distribution on Nextdoor was limited to the neighborhoods adjacent to my childhood homes' neighborhoods. Recent studies have shown disparities between Nextdoor members and the actual demographic composition of communities [CITE]. To address anticipated demographic differences, I also deployed my survey to relevant Facebook and Meetup Groups. The Facebook group that I posted my survey to is "BIPOC Outdoor Educators." The Meetup Group that I posted my survey to is "Meaningful Conversations Oakland."

To analyze my survey responses, I created bar charts to represent the distribution of respondents among demographic groups. Additionally, I calculated statistics like mode, mean, and standard deviation. For the free response question, I counted and code keywords and themes.

Semi-structured interview development and execution

To address my questions related to social influence on perceived access and desired amenities for green spaces, I developed a nine-question interview. My interviews were semi-structured, which facilitated a more natural conversation with my interview respondents. Questions were developed to focus the conversation on first interactions with large green spaces, storytelling, and desirable features of large green spaces.

I selected interviewees from survey respondents. From online survey deployment, survey respondents had the opportunity to express interest in a 30-minute interview. To ensure a variety of experiences, or lack thereof, in large green spaces, I contacted survey respondents with a variety of answers to survey questions. This allowed me to ensure a more diverse interview pool.
I conducted interviews via zoom.

From my survey respondents, 126 expressed interest to participate in interviews. I contacted 34 people for an interview request based on their survey responses and previous experience in large green spaces. To analyze interview responses, I asked for interviewees consent to be recorded. I uploaded these recordings on Trint, which transcribed each interview. My analysis methods focused on reading through transcripts and coding interview responses.

RESULTS

General survey and interview results

Survey distribution yielded 366 survey responses. The racial and ethnic distribution of my survey results (Figure 1) were inconsistent with 2019 American Community Survey demographics (Figure 2). Discrepancies between my results and other demographic surveys of Oakland, indicate bias in my survey deployment methods. Since there is bias in the racial and ethnic makeup of my survey results, it impacted my ability to do statistical analysis comparing survey results by

demographic groups. Therefore, my analysis to address my question about demographic differences was limited to computing the mean, median, and mode. In addition to my survey deployment, I interviewed 8 people for 30 minutes via zoom.

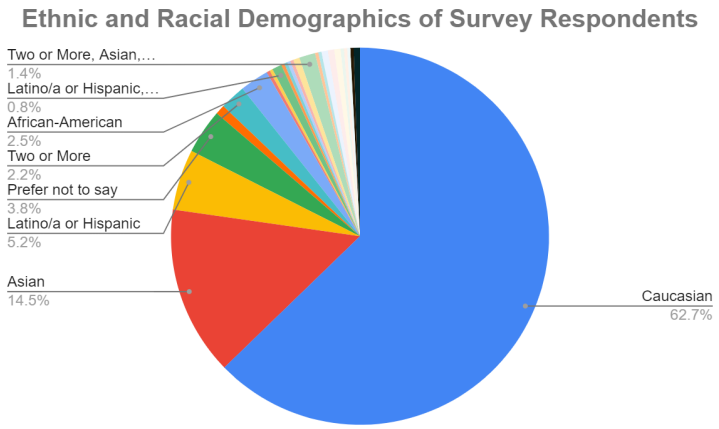

Figure 2. Survey respondents by ethnic and racial demographics. Unique categories racial and ethnic categories that survey respondents selected. Respondents had the opportunity to select as many categories they identified.

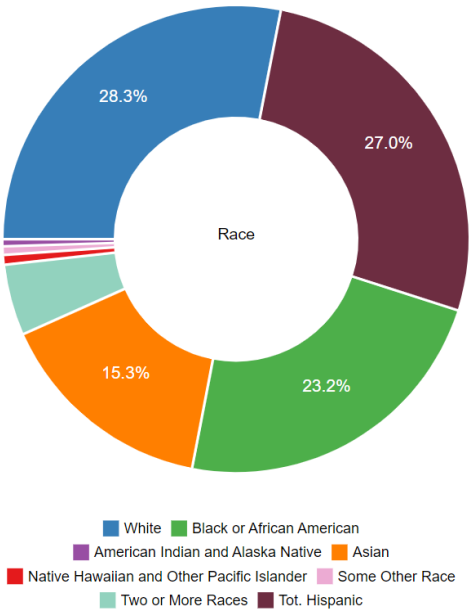

Figure 3. Representative demographics of Oakland, California. Demographic composition of respondents for the American Community Survey (2019). (Oakland, California Population 2022 (Demographics, Maps, Graphs). (accessed 6 May 2022)

Access to large green spaces

The following quotes are representative examples of my interview and free response coding results. The quotes focus on general accessibility to large green spaces, including responses directly related to my survey question which focused on my example of large green space (Reinhardt Redwood Regional Park).

"I ❤️ this park. Unfortunately, 54 doesn't get me to the park directly" - Survey Response

"Taking AC Transit sounds like it would take all day to get there and back. I am fortunate to have a car." - Survey Response

"Usually turned off by entrance fees for parking" - Survey Response

"There are many entrances to this park that do not charge an access fee. Since we live close by we access some of these entrances" - Survey Response

"Sounds great although not sure if the parking cost is justified when so many parks are free to visit" - Survey Response

"Violence and attacks on people, especially Asians. So I would certainly be more aware of my surroundings if I was like at Redwood now, you know, we were a little more careful" - Interviewee #8

"The last one I didn't say is like getting the permits to go backpacking or just like camping is so competitive in the space that it's very limiting. So the getting the permits part really sucks, even though it's not expensive" - Interviewee #3

"The camping thing, you really have to be disciplined… Seven months I had every weekend I wanted to go camping and you had to jump on it to get to space because it had been so popular" - Interviewee #5

Access to large green spaces by demographic responses

The following figures (4-9) and table 1 display my results for questions that focussed on different factors that influence accessibility to large green spaces. Figures 4 and 5 display survey results for my question about their transportation needs. I used hiking, camping, and backpacking as example activities in large green spaces instead of explaining the difference between large and small urban green spaces.

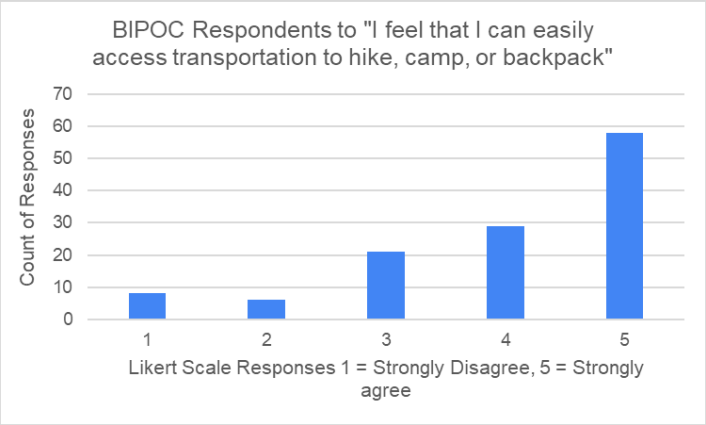

Figure 4. Distribution of transportation based access questions. The distribution of BIPOC responses for the question indicates a key form of access, transportation.

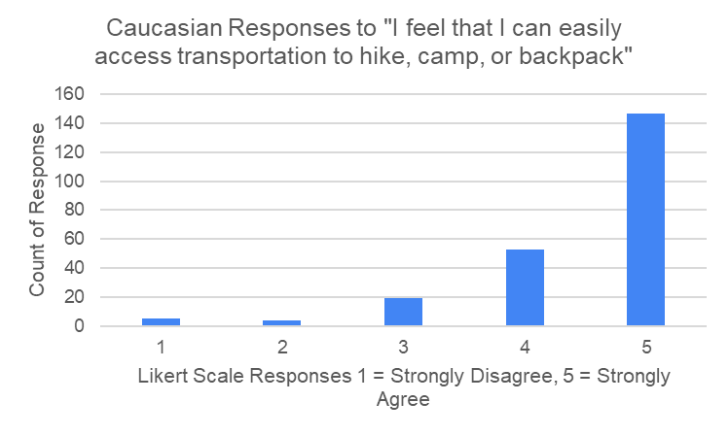

Figure 5. Distribution of transportation based access questions for caucasian respondents. The distribution of BIPOC responses for the question indicates a key form of access, transportation.

The second question in my survey focuses on the relationship between time and accessibility. Time can hinder accessibility to large green spaces because of travel-time, lack of

sufficient time to explore large green spaces, and other restrictions to available time to recreate in large green spaces.

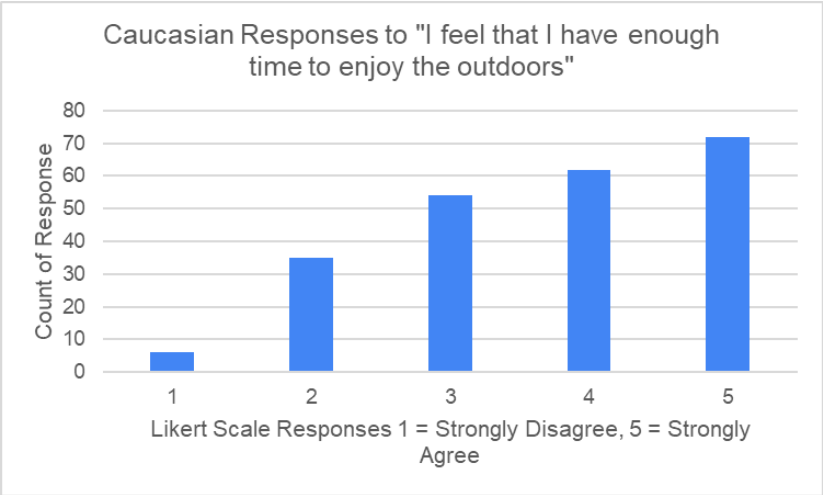

Figure 6. Distribution of time based access questions for white respondents. Using time as an indication of availability and access, this figure highlights the distribution of responses for white results.

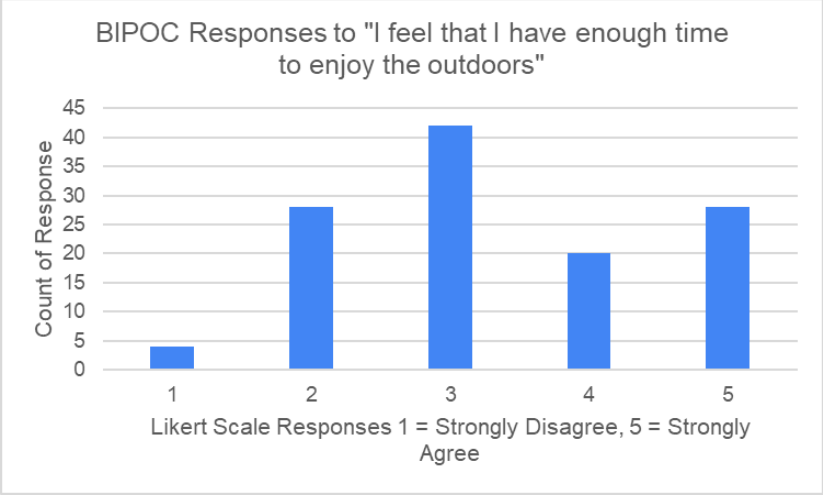

Figure 7. Distribution of time based access questions for BIPOC respondents. Using time as an indication of availability and access, this figure highlights the distribution of responses for BIPOC results.

My third and final question focuses on entrance fees in large green spaces. In the first section of my survey, I introduced Reinhardt Redwood Regional Park including its entrance fees. The second section of my survey expanded with general questions about large green space usage and entrance fees.

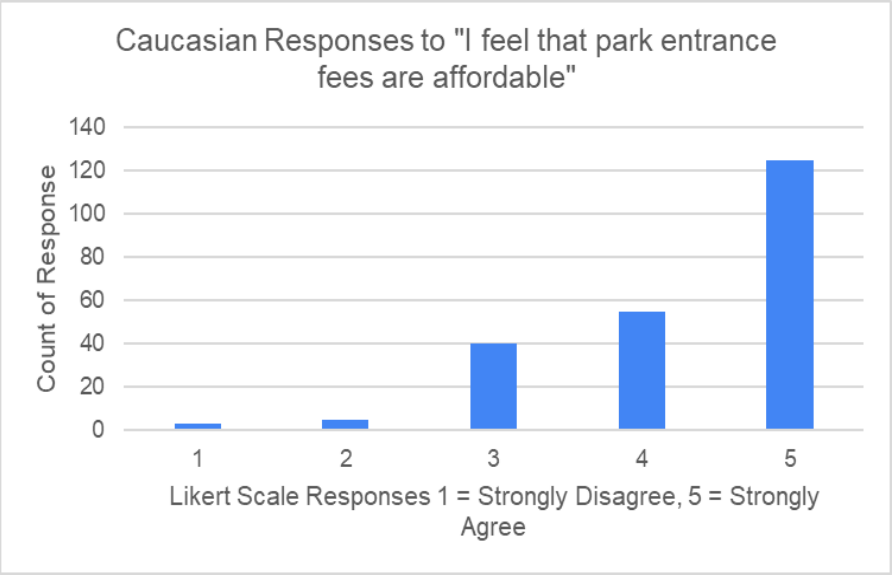

Figure 8. Distribution of monetary based access questions for white respondents. A potential barrier to access large green spaces is the monetary cost to enter them. This question and distribution of responses focuses on park entrance fees.

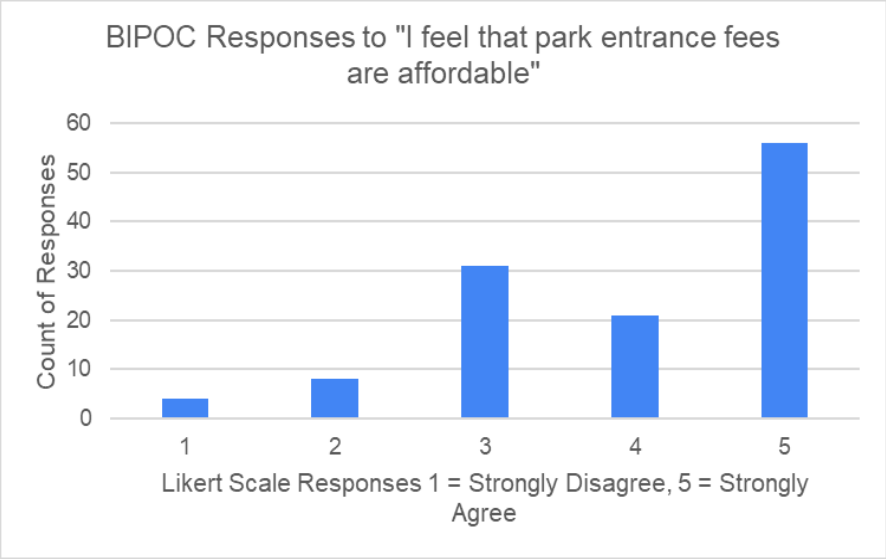

Figure 9. Distribution of monetary based access questions for BIPOC respondents. A potential barrier to access large green spaces is the monetary cost to enter them. This question and distribution of responses focuses on park entrance fees.

Table 1. Summary of statistics for each survey question. General statistics of mean, mode, and standard deviation for each survey question by demographic grouping.

Question	Demographic Group	Mean	Mode	Standard Deviation
"I feel that can easily access transportation to hike, camp, and backpack"	BIPOC	4	5	1.2
	White	4.5	5	0.9
"I feel that I have enough time to enjoy the outdoors"	BIPOC	3.3	3	1.2
	White	3.7	5	1.1
"I feel that park entrance fees are affordable"	BIPOC	4	3	1.1
	White	4.3	5	0.9

Social interactions in large green spaces

Social organizations and initial introductions to large green spaces

"So I got my job there, introduced me to this group by Zika, an all volunteer run kayak club that I have been part of for seven years. So this club specifically didn't require me to have any skills or a kayak" - Interviewee #3

"I was in the ESL, the English as a second language class. So all that school organized, those camping trips and the ski trip for the international students. I mean that's interest based of where wanted to sign up that's how I met friends" - Interviewee #7

"I was sent to camp as a child, and those were outdoors in large green spaces. And I liked being outside. And I think outside, frankly, I had some issues in life." - Interviewee #4

"With my Girl Scout troop, like I said, that small town in Kentucky, they have a nice greenspace. I use greenspace and they would, you know, trails on it, trails so you could walk and big, huge

trees that also cross the gully that you didn't get down in, back up, you know. And you'd have to balance and walk over the trees" - Interviewee #2

"I mean, I learned how to whittle. You know, just, like, kind of basic survival stuff. Light a fire and all that kind of stuff. Super basic. Like, you know, I went to a camp Hampshire" - Interviewee #6

Social interactions and learning new outdoor activities

"I would do the 1 to 1 exposure at this point in my life, even though I can afford it (climbing classes). I don't really like going down that path because for me, also being in the outdoors is very like relationships is about like spending time with people I care about" - Interviewee #3

"It just so happens my inner circle and it just worked out as sort of like ex colleagues and husband of an ex-colleague that likes to hike. So, yeah, it kind of fell together and it's been like that for the last year, but it really started because of course, it evolved because I was not a hiker before. And I took the opportunity to one of the few safe spaces outside the house at the time" - Interviewee #5

Large green spaces and amenities

"Things that you can't see everywhere, such as redwoods and sequoias. Accessible and adequate parking. Water stations and bathroom facilities along the trails" - Interviewee #8

"Welcoming with clear signage. Depending on where it is parking. Friendly for children to like. It'd be great if there were play structures, walkable paths and interpretive signs. Bathrooms." - Interviewee #3

"I like the fact that wildlife can be there" - Interviewee #1

"So hiking trails that are well-groomed. And fire safe to the extent they can be. And also clean facilities, restrooms and picnic areas" - Interviewee #5

"A variety of terrains. And Microclimates. I'm interested in birds. So, you know, things type of species of types of things of animals and birds, flora, fauna that are there" - Interviewee #4

"Not as not as nice as the others. You know, you're closer, closer to the highway there and stuff like that" - Interviewee #2

"Hopefully a creek. Mm hmm. You know, those are great. And we have a lot of them that intersect to run into other creeks, you know, and they get larger" - Interviewee #2

"But we having picnic tables is great we've used we do that are local parks, but the national parks, you know, bathrooms and stuff, those are all important" - Interviewee #6

DISCUSSION

The research demonstrates key findings about how Oakland residents utilize, access, and are introduced into large green spaces. Survey responses for key accessibility indicators were slightly different among demographic groups. Findings about the accessibility of large green spaces through transportation were consistent with other relevant research. More interesting findings emphasized the importance of social interactions and organized programs in order for residents to learn new high barrier activities and initially be introduced into large green spaces. My research begins to address questions about the barriers to access large green spaces and highlights community needs in order to make sure that large green space use is accessible to everyone.

Access to large green spaces

Interview and survey findings suggest that an issue with accessibility to large green spaces include the role of public transportation reaching park access points. In the free response portion of the survey and semi-structured interviews, respondents discussed accessibility in regards to primary mode of transportation. In the section of my survey that used Reinhardt Redwood

Regional Park as an example of a large green space, two residents who use public transportation commented that it would be difficult for them to use the listed bus lines to visit the park. Although the regional park is listed as accessible via public transportation by two bus lines on the EBRPD website, Respondents commented that traveling would take a significant amount of time using public transportation and others outright did not believe they could feasibly visit the park safely via bus. The importance of accessibility through public transportation is an important environmental justice topic that has also been reflected through other studies (Chen and Chang 2015). My results further emphasize how public transportation should not only be available, but also functional in travel time, and safety.

There were multiple unique opinions about entrance fees in my results. For the portion of my survey about Reinhardt Regional Park and its $5 entrance fee at the main gate and parking lot, many respondents felt that the fee was nominal for maintaining large green spaces. One other respondent wanted more transparency about where their money would be going to maintain the park. A majority of respondents in my survey that referenced the entrance fee in the free response section commented that they preferred to visit free options or used entrances to Reinhardt Redwood Regional park that did not have fees. This is an important finding that Oakland residents will opt for other parks or entrances that do not have an entrance fee. For my example of large green space, the majority of survey respondents viewed the park fee as a barrier, especially when free options were available nearby. Entrance fees are considered a barrier to access large green spaces with other studies, which is supported by results of residents opting for cheaper options (Biernacka et al. 2020).

In my interviews, two interviewees out of eight specifically cited complications with reservations as a barrier to access large green spaces through camping. Both interviewees cited complications with planning up to 7 months in advance to secure a camping spot and how quickly campsite and backpacking permits can be taken. Comments from participants about difficulty obtaining reservations is a developing challenge that many large green spaces are engaged with. National Parks like Yosemite, Glacier, and more have instituted reservation fees during peak visitation and other large green spaces like Arches National Park are considering the change (KSLNewsRadio 2021). These permits to enter and camp in parks are often quickly taken the moment they are available online. My results indicate that some of my interviewees found the

permit and reservation system to be a deterrent from visiting large green spaces because of the time and effort required months in advance.

Access to large green spaces and demographic differences.

My survey had different responses based on demographic groups looking at accessibility through dummy variables questions. For all of my survey questions (transportation, entrance fees, and time available), White responses had higher average responses and lower standard deviations (Table 1). Higher average responses mean that White residents were closer to "5 - strongly agree" on average. Additionally, lower standard deviations indicate that the sample of White respondents had less variation among survey responses. Less variation and a higher average demonstrate that White respondents find large green spaces to be more accessible. This is consistent with other research findings that access to large green spaces varies with demographic factors (Wolch et al. 2014).

Large green spaces and social interaction

Organized social activities and introductions to large green spaces

Interviews findings that suggest the importance of organized activities as a first introduction to large green space. From interviewees that indicated they did not grow up exploring large green spaces with their friends or family growing up, summer camps and organized activities were incredibly important as their first introduction to large green spaces. Other interviewees also noted a kayaking club at work and weekend excursion opportunities with an english as a second language course. The role of organized social activities for those that did not have the opportunity to be introduced to it with family and friends is crucial for people to begin recreating in large green spaces. There is some research into the role of social interaction and introduction to outdoor recreation that support the importance of organized activities to make long standing impacts for large green space recreation (Kelly 1983). The implications of organized activities as the first introduction are crucial for making sure that more diverse communities have introductory access to large green spaces that transcend gear and experiential costs.

Social interaction and high barrier outdoor activities

Interviews implicated the importance of social networks to introduce high barrier recreation activities. Interviewees expressed interest to learn more about mushroom hunting, birding, kayaking, birding, and other activities that have educational and cost barriers. However, interviewees noted that in order to learn more about those activities they would most likely find friends and have a social interaction in conjunction with learning new activities. My results are important because it highlights that recreation in large green spaces is also a social activity. The understanding of how socialization impacts outdoor recreation in green spaces has been studied (Kelly 1983), but my results are unique because they specifically determine how people learn high barrier activities. This result is important because it provides insight into how people learn new high barrier activities and inform outdoor recreation program implementation and planning.

Amenities and deterrents of large green space

Interviewees appreciated multiple amenities that exist in large green spaces that provide insight to planning and accessibility. Two interview participants indicated the importance of signs to their experience in large green spaces. Participants desired information about the location of restrooms, where it is acceptable to hike, and general educational facts. Three survey respondents also desired diversity and originality within their large green spaces. This included multiple microclimates, different types of trails, and unique attractions that they could not see elsewhere. Current research on desirable green space amenities help inform the planning process for many cities (Wright Wendel et al. 2012). Additionally, understanding how biodiverse large green spaces can further improve mental health is an important research topic (Lai et al. 2019). When asked about deterrents, many residents cited the opposite of their desired amenities. Understanding what Oakland residents look for in large green spaces is an important planning tool to increase visitor satisfaction and visitation.

Limitations and future directions

This study's methodology provided a lot of valuable information but there was bias in survey results. The demographics of survey participants were not representative of the Oakland population (Fig 1 & Fig 2). This means that my results that focused on demographic differences between respondents could be tested for statistical significance; therefore, my results are only important for my specific sample of respondents, not the entire Oakland population. Improvements to survey deployment through physical and online methods might improve the diversity of responses demographically. My survey did yield responses from Oaklands that did and did not access large green spaces; however, my interview did not include people that were not accessing large green spaces. Increasing outreach to potential interviewees and holding more interviews is an opportunity to improve the variety of experiences within my interview sample.

Future studies can broaden outreach within Oakland communities and continue the discussion about large greens spaces in the Bay Area. This study can also serve as a case study for other research focused on accessibility and the development of outdoor reaction habits. My results can also fuel more research into social interaction and its impact on recreation in large green spaces. Understanding how to facilitate social communities that allow more introductions to high barrier activities and the accessibility of summer camps and organized activities for initial introductions into large green spaces provide another opportunity to research the effect of large green spaces.

Broader implications

This study begins to fill a gap of knowledge about large green space access in Oakland, California. It is important to differentiate between large green spaces and urban green spaces due to their size and the difference in activities. My research reinforces the green space access paradigm, but also provides new insight into how people begin using large green spaces and learn new recreational activities. Furthermore, my study identified important design features for large green spaces, which can help inform the planning process. Large green spaces provide excellent opportunities to increase mental and physical well-being.

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APPENDIX A: Survey Questions

***Complete this five-minute survey for a chance to win a $15 giftcard! This survey is administered by a UC Berkeley Student for a school project ***

The purpose of this survey is to find out how the "Redwood Regional Park" is used. It is not necessary to know "Redwood Regional Park" to complete this investigation. This survey will take FIVE minutes to complete! Participants in the survey will be entered into a raffle worth a $ 15 dollar gift card.

This survey is conducted by a Bay Area native (Oakland) and senior at University of California, Berkeley. All response to this survey will be anonymized and used only for the purposes of this school project. You must be 18 or older to participate in this survey.

Question 1: I have heard of Reinhardt Redwood Regional Park

- Yes
- No

Question 2: Mark all that apply

- I visited Reinhardt Redwood Regional Park in the last week
- I visited Reinhardt Redwood Regional Park in the last month
- I visited Reinhardt Redwood Regional Park in the last 6 months
- I visited Reinhardt Redwood Regional Park in the last year
- I have never visited Reinhardt Redwood Regional Park
- I haven't been to Reinhardt Redwood Regional Park yet, but I have plans to visit
- I have never visited Reinhardt Redwood Regional Park, and I have no plans to visit

Question 3: Reinhardt Redwood Regional Park is a park in Oakland California. This park offer opportunities for walking, hiking, camping, playgrounds, dog walking, cycling and horseback riding. The park is accessible by AC Transit and bus lines #54 and #39. The entrance fee to access the park and parking lot is $5 . Based on this information, would you be interested in visiting this park?

- Yes
- No
- Maybe

Question 4: Please explain your answer above (1-2 sentences)

Question 5: I feel connected to the environment

- 1 (Strongly Disagree)
- 2
- 3
- 4
- 5 (Strongly Agree)

Question 6: I have been frequently hiking, camping, and backpacking over the past 6 months

- 1 (Strongly Disagree)
- 2
- 3
- 4
- 5 (Strongly Agree)

Question 7: I feel that I have enough time to enjoy the outdoors

- 1 (Strongly Disagree)
- 2
- 3
- 4
- 5 (Strongly Agree)

Question 8: I feel that I can easily access transportation to hike, camp, or backpack

- 1 (Strongly Disagree)
- 2
- 3
- 4
- 5 (Strongly Agree)

Question 9: I feel that park entrance fees are affordable

- 1 (Strongly Disagree)
- 2
- 3
- 4
- 5 (Strongly Agree)

The following demographic questions are for the senior thesis project. All answers will remain confidential and anonymous and will only be used for the school project.

Question 10: What gender do you identify as?

- Female
- Male
- Non-binary/Other
- Prefer not to answer

Question 11: What is your age?

- 18-25
- 25-35
- 45-65
- 65+

Question 12: Please specify your race or ethnicity. Check all that apply.

- Two or More
- Native Hawaiian or Pacific Islander
- Native American
- Asian
- Latino/a or Hispanic
- African-American
- Caucasian
- Other/Unknown
- Prefer no to say

Question 13: What is your annual household income?

- Less than $25,00
- $25,000- 50,000
- 50,000-100,000
- 100,000-200,000
- More than 200,000
- Prefer no to say

Question 14: Which languages do you speak? (Check all that apply)

- English
- Spanish
- Cantonese
- Vietnamese
- Mandarin
- Tagalog
- Other

Question 15: Please Select what best describes your primary mode of transportation

- Carpool
- Public Transportation
- Other
- Personal Vehicle

If you would like to be entered in a raffle to win a $15 dollar giftcard please enter your email address

If you would like to participate in a compensated 30 minute interview please enter your email address.

APPENDIX B: Interview Questions

Good morning thank you for expressing interest in this interview. This interview will be used to complete a senior thesis project about access to large green spaces. This interview will be recorded and transcribed for the analysis process. All recordings will be deleted by June 2022. Additionally, any information from this interview will only be used for the purpose of this research project.

Do I have your permission to record this meeting?

Thank you for your permission.

For my project I am interested in large green spaces like Reinhardt Redwood Regional Park, state parks, national parks, open spaces etc.

Do you have any questions about my definition of large green spaces?
Can you identify some key features of a larger green space that are important to you?
Did you visit large green spaces with your family or friends growing up?
How do you think this experience impacted your interests now?
Who do you like to visit large green spaces with?
What activities do you like to do in large green spaces?
Are there any you are interested in learning more about?
Was there ever a time that you found it difficult to visit large green spaces?
Have there been anytimes you have felt unsafe in large green spaces?
Can you tell me a favorite story/experience about your time in the large green spaces?
Do you have any questions/experiences/stories you want to share with me?

Thank you, those were all of my questions. How would you like to receive your $10 compensation?