Analysis of Mask Wearing Motivations and Compliance in Outdoor Recreational Spaces During the COVID-19 Pandemic at Lake Chabot Regional Park

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ABSTRACT

Unlike the entrance to a storefront or a building, mask use in outdoor recreational spaces can not be easily monitored or enforced, depending primarily on the voluntary actions of the individual to comply, especially in areas where outdoor mask guidelines are set in place. This study aims to analyze how safe visitor's feel in outdoor recreational spaces during the pandemic. Specifically, it investigates the relationship of outdoor mask wearing compliance and the motivations of wearing those masks at Lake Chabot Regional Park in order to measure park visitor's overall feelings of safety. Proper mask compliance was directly observed at Lake Chabot Regional Park at 6 total fixed spots located on two trails at the park, and suggest that the more people there are present in an area, the higher the compliance percentage was with a significant difference between more trafficked parts of the trail and less trafficked areas. A voluntary response survey of 668 respondents was analyzed for determining motivations for mask wearing and feelings of overall safety in outdoor spaces. The results suggest that those who rated mask wearing and social distancing consideration of others higher were more likely to report feeling more safe in recreational spaces. On this basis, support for widespread face mask use in outdoor spaces should be continued even as COVID-19 conditions change.

KEYWORDS

personal safety, visitation frequency, face covering, social distancing, mandates

INTRODUCTION

Initially identified in Wuhan, China in December 2019, the emergence of the novel coronavirus SARS-CoV-2, or COVID-19, has been declared by the World Health Organization (WHO) as a global pandemic and consequently has transformed the way that we interact and use public spaces because of the transmission and spread of the virus (Dhama et al. 2020). The socioeconomic implications of the pandemic have affected at least one aspect of every person's life. By the end of 2020, there have been over 18.3 million reported cases of COVID-19 and over 323,000 resulting deaths in the United States alone (CDC 2020b). The virus is primarily transmitted from person to person through close contact with someone who is infected or through airborne transmission such as respiratory droplets (Li et al. 2020). Furthermore, the transmission of the virus can come from both asymptomatic and symptomatic infected individuals shedding the virus simply by talking, breathing, coughing, or sneezing (Li et al. 2020). The route of transmission and virus shedding is a problem when trying to control the spread of the virus.

With no pharmaceutical protections widely available well until 2021 such as vaccines or antivirals, governments worldwide resorted to the use of large-scale policies in an effort to mitigate and prevent the spread of the virus (Dhama et al. 2020). Among these large scale policies include social and physical distancing, school and workplace closures, travel bans, quarantine, face covering and mask wearing, limiting contact between households and communities, and isolation (Li et al. 2020). Although the goal of these policies was to minimize the spread and protect the public, these mitigation strategies have also raised concerns about their potential negative impact on the physical and mental health of the overall general population (Xie et al. 2020). The societal and economic implications of the COVID-19 pandemic has had a rippling effect on the economy, stress levels, job and housing security, and on society. The feelings of loss that resulted from the pandemic include those related to income, social interactions, and routines is one of the largest reported stressors and caused an emergence of reports of increased feelings of depression, paranoia, and anxiety (Alradhawi et al. 2020).

Green spaces provide communities with identifiable physical and mental health benefits. Interactions with the natural environment and nature have many holistic and synergistic benefits that are essential for improving an individual's and population's health and well being. Natural

environments and greenspaces provide communities with improved air quality and increased space and opportunities to perform physical activity. Having the space and ability to perform physical activity has been demonstrated to reduce the rates of obesity and diabetes and also reduce the morbidity and mortality caused by cardiovascular health problems (Braubach et al. 2017). Along with the physical benefits that these spaces provide, they also provide many positive mental health benefits such as social cohesion. Greenspaces can reduce rates of stress by physically and even mentally distancing individuals from stressors and exposures that may be found in their daily lives and these spaces also have restorative qualities (Hartig et al. 2014). The beauty of natural landscapes allows for an appreciation of nature which has restorative amenities on mental health and can help improve mental resilience (Hartig et al. 2014). Together, the mental and physical benefits work in conjunction to improve physical health and improve mental well being.

Consequently, many of the COVID-19 mitigation strategies isolate and physically distance and socially distance individuals from their communities, friends, and even family members which has had a negative impact on mental and physical health (Alradhawi et al. 2020). Because of the toll that the pandemic has had on mental and physical health, public health officials have declared public parks and outdoor recreational spaces as a very essential service. The CDC recommends visiting parks and greenspaces and staying physically active as a means to keep the mind and body healthy during the pandemic (CDC 2020c). These spaces are safe places for physical activity during the pandemic, especially if the recommended risk reducing behaviors such as social distancing and mask wearing are followed by the users of the park.

Community transmission from asymptomatic carriers and undetected carriers are potentially some of the main drivers of the pandemic and several studies suggest that mask wearing has the ability to protect the wearer from acquiring and transmitting infections (Eikenberry et al. 2020). The airborne transmission route of the virus spreads through infected aerosol particles that can persist in the air over extended distances and for longer periods of time (Li et al. 2020). The implementation of face coverings and a combination with other risk reducing behaviors such as social distancing and handwashing plays a large role in flattening the total infection curve (Li et al. 2020). Although medical masks such as surgical masks and N95 respirators offer the greatest degree of protection, homemade masks and face coverings offer a significant degree of protection especially when used by a large portion of the population (Eikenberry et al. 2020). For these reasons, local and state governments in the United States have mandated the use of masks while

in public to reduce the transmission rate of the virus, but the implementation of statewide mask mandates vary according to state and even local governments (Sherling and Bell 2020). Although mask wearing and social distancing in public spaces has been proven to slow the spread of the virus, its mass use has not been consistent while in the outdoors because of inconsistent information about the spread and efficacy of the virus outdoors, a flux in changing recommendations by local and state governments about COVID-19 protocols, and that mask wearing in the United States is still considered controversial and has been heavily politicised (Eikenberry et al. 2020); (Sherling and Bell 2020). The aforementioned reasons for mask wearing in the outdoors and in public spaces can present a problem to those who wish to use the space but are uncomfortable around people without face coverings or are at a high risk of infection.

Ensuring safe access to urban parks has proven to be an essential service during the pandemic. With new information coming to light on the virus and the ever-changing safety recommendations by governments, along with the new and widespread availability to a vaccine, the public's understanding and adherence to those guidelines varies. To explore how safe people feel while in recreational greenspaces during the COVID-19 pandemic in this study, I analyzed how safe visitors feel in outdoor recreational spaces during their activities as they utilize the space. In this study, I investigated this notion by answering several subquestions: Are masks being properly worn around popular areas of Lake Chabot Regional Park, what behaviors and activities concern those who use outdoor recreational spaces during the pandemic, and what are the motivations for mask wearing while outdoors?

Background

COVID-19 timeline and response in California:

On March 19, 2020, the governor of California, Gavin Newson, issued the first statewide shelter-in-place order in the United States which shut down all non-essential business and required residents to only venture outside for essential activities in an effort to slow the spread of COVID-19 and prevent the healthcare systems from being overwhelmed (Friedson et al. 2020). One study approximated that one month after this order was implemented the shelter in place order led to approximately 1,500 fewer COVID related deaths than if there was no order (Friedson et al. 2020).

Other measures implemented in California to combat COVID-19 include the closure of certain facilities and activities, mandated mask and face covering usage in public areas and outside of their homes, limited capacity in certain facilities, and stay at home orders. In May of 2020, counties across the state received approval to reopen with certain restrictions. Following the reopening of businesses, holidays, and other activities, the state has observed and reported a steep increase in the amount of cases and deaths ("Coronavirus" 2020). As of December 23, 2020, in California there have been approximately 1.97 million total COVID cases and almost 24,00 deaths ("Tracking COVID-19" 2020). As this study was conducted, California has once again been placed under a regional stay home order which went into effect on December 7, 2020 in Alameda County or when a region has less than 15% capacity in the ICU available (California 2020). As cases continue to increase, the healthcare system will continue to be overwhelmed.

Politicization of public health initiatives: mask wearing

The politicization of public health initiatives and measures is not a new concept nor is it unique to this pandemic or administration. The problem is that many public health policies challenge especially polarizing economic philosophies and religious beliefs (Zaza 2020). Examples of politicized public health issues and interventions include gun violence and control, cigarette smoking, required vaccination, environmental health, access and affordability to healthcare, and access to abortion. The study and practice of public health is inherently a politicized contradiction because of the never-ending tension between its objective and its means of implementation (Brown 2010). The goals of public health are to protect the population, prevent threats to their health, promote healthy living, monitor and anticipate health issues, and provide medical services to disadvantaged citizens and non-citizens (Brown 2010).

One important tool that public health agencies use to achieve these goals are typically through the use of policy which stems from the power of a governmental agency (Zaza 2020). Writing and passing policies and legislation in the United States government system is by definition "political" especially since these activities require resources and funding. These interventions are inherently controversial in that they challenge the role of the state's authority in relation to an individual's liberty and autonomy about social versus personal responsibility (Brown 2010). John Stuart Mill, a philosopher, said that the state cannot force an individual's choice or

liberty "for their own good" unless harm to others is occurring, which is a common concept in Western ideology (Brown 2010). An example of this idea is the United States' battle against the "obesity epidemic" and if they have the ability or authority to influence how much a citizen weighs, eats, or their physical activity (Brown 2010). This concept is also observed in the politicization of mask wearing and other COVID-19 interventions.

Compared to other developed countries in the world, the United States has struggled to control the spread of the COVID-19 virus, an unfortunate reality illustrated by the increasing and record breaking daily rates of confirmed cases and deaths (CDC 2020b). It has been widely accepted that an amalgamation of universal face covering, social distancing, hand hygiene, widely available testing, and contact tracing are pivotal in quelling the COVID-19 pandemic (Li et al. 2020). A public health intervention that has been widely implemented is the universal wearing of face coverings or masks when in public. Proven to be one of the most effective mitigation strategies in reducing the spread of the virus during the COVID-19 pandemic, universal mask and face covering usage while in public areas has been an issue of controversy and has become heavily politicized in the United States ("Republicans, Democrats differ on why masks are a downside of COVID-19 | Pew Research Center" 2020). In a Quinnipiac University poll, 64% of Democrats were in support of universal mask wearing in public while only 33% of Republicans agreed (Quinnipiac University 2020). Those who oppose the use of masks while in public have coined the term "anti-maskers" for their disbelief in the virus and the pandemic.

Many "anti-maskers" do not believe the seriousness of the virus, or believe that states don't have the power to create laws that regulate the health and safety of individuals in private settings, a common way of thinking especially in anti-paternalistic and libertarian ideologies, or that wearing masks is a means of showing support for Donald Trump (Martin n.d.). This opposition to public health interventions parallels the 1970s and 80s when seat belt laws were set in place (Sherling and Bell 2020). These groups made similar arguments about mask wearing and cited that seat belts were ineffective, inconvenient, uncomfortable, and a violation of their liberties (Sherling and Bell 2020). Despite the arguments, the implementation of mandatory seatbelt use has saved approximately 329,715 lives from 1960 until 2012 ("Seat Belts Save Lives" 2018). Similarly, the implementation of face mask mandates suggested that from March until May of 2020, more than 200,000 COVID-19 cases were prevented because of the orders in several states (Lyu and Wehby 2020). Battling the pandemic should be about protecting public health not politics, yet the

politicization of the interventions as a result of the current administration and media have created a partisan divide (Gollwitzer et al. 2020).

In April of 2020, the CDC began recommending the voluntary use of face masks in the United States while out in public after weeks of discouraging healthy individuals from wearing masks because they believed it did more harm than good ("CDC Now Recommends Americans Consider Wearing Cloth Face Coverings In Public" 2020). To date, there is currently no federal face covering mandate in the United States. The implementation of mask wearing varies widely depending on state and local governments because those governments have the primary responsibility to protect public health according to the distribution of powers outlined in the Constitution (Haffajee and Mello 2020). In September 2020, the national average for self-reported mask wearing in the United States was 49% (Reiner et al. 2021). Universal mask wearing, or 95% mask use while in public, could be enough to avoid the worst effects of the pandemic and prevent re-emergence of the virus in many areas, potentially saving an additional 129,574 lives from September 2020 until the end of February 2021 (Reiner et al. 2021). Yet as of December 8, 2020, there are still 12 states that do not require face masks at the state level, but either leave it as a recommendation or give local authorities the ability to mandate it ("Here are the US states that don't require face masks - CNN" 2020). Besides Georgia and Arizona, all other states that do not have a mask mandate voted for Trump in the 2020 election ("US Election 2020 map by state" 2020). The results of one study implied that partisanship was more strongly associated and the county level consumption of conservative media sources were associated with higher levels of COVID-19 infection and fatality, a behavior observed in pro-Trump counties (Gollwitzer et al. 2020). Depoliticization of COVID-19 mitigation strategies are imperative to slowing the spread of COVID-19.

Mask mandates in Lake Chabot Regional Park:

Located in the East Bay Area in California, Lake Chabot Regional Park serves as the study site for exploring mask wearing behaviors and motivations while outdoors in a recreational space. In June of 2020, California issued a state mandate that requires all people to wear a mask while outside of their homes to prevent both symptomatic and asymptomatic spread of the virus (Angell and Newsom 2020). This mandate included face coverings to be worn in any indoor or outdoor

space in public or when engaging with members outside of one's household. Lake Chabot Regional Park is part of the East Bay Regional Parks District (EBRPD) which resides within the jurisdiction of Alameda County, a county with one of the strictest mandates on the use of masks in public spaces ("EBRPD - Lake Chabot" n.d.). Considered to be an essential service by definition of the state and county, the majority of the park has remained open throughout the pandemic.

To ensure that the general public is safe while using these services and the spread of the virus is minimized, the state and county governments have provided recommendations and mandates on mask usage in the outdoors. In accordance with the mandates of the state, "everyone over the age of 2 should wear a face covering when...outside their home and within 30 feet of anyone else other than members of their social bubble...Face coverings may be removed when...Alone or with members of one's household in an outdoor area such as a park or patio, while maintaining six feet of distance from others" ("Face Covering | COVID-19 | Alameda County Public Health" 2020). But unlike the entrance of a storefront or a mall, proper face coverings and mask wearing while in the outdoors is harder to enforce and monitor. Although the risks of transmission are significantly lower outdoors compared to the risk distribution while indoors, the chance of infection is very much still possible with some studies indicating that the virus can be transmitted through aerosols which can persist in the air even hours after (Prather et al. 2020). Currently, Alameda County has been placed under a "Shelter-in-Place" order which allows for "outdoor recreation activities" to remain open as long as visitors are wearing face masks and are adhering to the 6-foot social distance requirement ("EBRPD - COVID-19 Park and Trail Updates" n.d.).

To protect visitors to the parks, the East Bay Regional Park District has implemented similar mitigation measures and recommendations to promote risk reducing behaviors while partaking in outdoor activities to help prevent the spread of COVID-19. The district has closed all visitor centers, water fountains, picnic areas, swimming pools, all campsites, and any facility that can be reserved in the park ("EBRPD - COVID-19 Park and Trail Updates" n.d.). ERPD has urged visitors to follow their rules and guidelines to protect the safety of themselves and their community during the pandemic as part of their "Healthy Parks Healthy People" campaign. These rules include visiting parks close to one's home, wearing a face covering or mask when within 6 feet of other visitors outside of one's household, only doing activities with other members in one's immediate household, no meeting up with groups outside of their household or social bubble, and

visiting the park at less crowded times if possible ("EBRPD - COVID-19 Park and Trail Updates" n.d.). At the parks, there are multilingual signs containing information about safe behaviors and reminding the visitors of the rules of the park. On the park's website, there are multilingual informative videos explaining the significance and the science behind these behaviors and regulations.

Study System Description

The COVID 19 pandemic has impacted all facets of everyday life, especially in relation to social interactions. Public parks and recreational facilities have been found to provide a necessary service during the pandemic by providing the community with essential benefits both physically and mentally. One community, in particular, that profits from these benefits are the visitors of Lake Chabot Regional Park. Originally built as a primary reservoir for the East Bay in 1874, the 315-acre Lake Chabot opened to the public for recreational use in the 1960s. Located in the East Bay Area, Lake Chabot Regional Park is an urban park system that features many amenities such as hiking trails, bicycling trails, boat launches and rentals, fishing piers, a golf course, camping, and picnicking areas. While there have been no complete closures of the main park and trails as a result of the pandemic, several of the amenities around the park have been closed or limited in access. The camping areas are still closed to the public and the boat launch and rentals at the marina reopened during the summer time. With a wide variety of available activities at the park, this study site is optimal for the measurement of mask compliance during the pandemic.

The park includes a vast range of hiking, riding, and bicycle trails that connect to other park systems in the East Bay Regional Park district. Lake Chabot Regional Park is a heavily trafficked park that has over 20 miles of hiking trails which are connected to another 70 miles of trails that lead to the neighboring Anthony Chabot Regional Park. The 12.4 mile and 14.4 mile bicycle loops trace the perimeter of the lake. The heavily trafficked West and East Shore trails are paved and 3.5 miles long that provide access to the east and south shores of the lake. These trails intersect at the Lake Chabot Marina and the parking lot. The East and West Shore trails are also the trails that lead to many of the other trails throughout the park.

METHODS

Mask compliance measurement

To measure the mask and face covering compliance around the Lake Chabot Regional Park loop, I observed visitors' behavior from three sections along two different trails in the park from December 13, 2020 until March 27, 2021. I took measurements at three locations along the East Shore trail and along the West Shore trail, each starting one mile in from the entrance of the trailhead for a total of 6 observation locations (Figure 1-6). Each observation site was located between the restrooms along the side of each trail. Zone 1 was at the beginning of each trail. Zone 2 was located approximately 0.5 miles into each trail. Zone 3 was located around the one mile mark. Each observation zone was located within 6 feet of the main path to ensure that each visitor came approximately close enough to me to where mask wearing is required by the park and county since it is the recommended length for social distancing.

Before collecting the data in each zone, I notated the time of each measurement, the weather conditions and temperature for each measurement, and the current COVID tier and conditions that Alameda County was in. I collected observations on both the weekdays and on weekends in the morning or in the afternoon. To ensure randomness, I alternated observing on the East and West Shore trails. Before every observation, I determined the sequence of zones that I would observe by using random drawing.

When I arrived in each zone, I stayed in my designated observation zone for 10 minutes. During that 10 minutes, I observed off the trail on who was wearing a mask properly as well as the total number of people who passed me by. Proper mask wearing is defined by the CDC as a cloth face covering or surgical mask that is fitted to cover both the nose and the mouth, is secured beneath the chin, and fits snugly on the sides of the face. Since the CDC does not recommend mask use for those below the age of 2, I assumed that any children that were being carried or riding in a stroller were not counted. To measure the amount of people that complied with mask wearing during observation, I measured the total amount of people that passed by me and the amount of people properly wearing face coverings during the time. In my left hand was a tally counter that was measuring the total amount of people that passed by me and in my right hand was the tally counter that measured the amount of people wearing face masks properly. If they were merely

holding a mask or if it was not being worn properly as defined by the CDC, I did not count them as having worn a mask. After each observation, I notated the two measurements of mask wearers and total visitors that passed me in their corresponding observation zones in a notebook.

Figure 1. West Shore Trail zone 1.

Figure 2. West Shore Trail zone 2.

Figure 3. West Shore Trail zone 3.

Figure 4. East Shore Trail zone 1.

Figure 5. East Shore Trail zone 2.

Figure 6. East Shore Trail zone 3.

Motivations of mask wearers and safety

To measure the attitudes and behaviors toward mask wearing in recreational spaces and to gauge overall feelings of safety, I created an anonymous survey using Qualtrics (Qualtrics 2005) that contained both quantitative and qualitative questions to understand how respondents over the age of 18 in Northern California, particularly in the cities surrounding Lake Chabot Regional Park, feel during the COVID-19 pandemic. At the time that the survey was released (March 9, 2021 until March 21, 2021), COVID-19 vaccination was still limited to certain populations and was not yet widely available to a majority of the population. The goal of the survey was to answer the sub questions: What behaviors or activities concern those who use recreational spaces during the pandemic and what are the motivations for mask wearing while outdoors. To answer these questions, the survey included questions about their visitation to recreational spaces both before and during the pandemic, about how safe they felt in recreational spaces while visiting, how well the participant believed others around them were complying to mask mandates in the spaces, the participants reasons for wearing a mask in these spaces, and open ended questions on mask wearing and other behaviors during the pandemic.

The main variables from this survey are the self reported personal risk to COVID-19, their vaccination status or presence of COVID-19 antibodies in their system, their rated importance to

parks, their visitation patterns to these spaces before and during the pandemic, their reported feeling of safety, behaviors and factors that cause feelings of unsafety, their motivations to wear masks in the space, which situations they would likely wear a mask, and how well they believed others around them were complying to mask wearing and social distancing guidelines. Their personal risk, vaccination status, their rated importance to parks, their visitation patterns, how well they believed others were compling were all categorical rankings. Their motivations for wearing a mask in outdoor recreational spaces and which situations they would likely wear a mask were both categorical and they could pick more than one answer choice. Their reported feelings of safety in these spaces was reported numerically on a scale from 1 to 10. The behaviors and factors that cause visitors to feel unsafe in these spaces was an open-ended, qualitative question. In the survey, the term "recreational space" and "parks" were used interchangeably to mean outdoor, public spaces where recreational activities take place. Social distancing was defined as 6 feet apart from someone outside of one's household. Pretesting for this survey was conducted prior to its release by a group of my peers to check for any potential bias, clarity of questions and language, and duration.

Initially this survey was to be distributed while collecting data at Lake Chabot Regional park, but as the pandemic worsened in the area, I decided it would be best to distribute the survey virtually. The survey was distributed as a link on several Facebook community groups that were chosen because they are the cities surrounding Lake Chabot Regional Park and were active from March 9, 2021 until March 21, 2021. Using a voluntary response sample, the link to the self-administered survey was distributed on the following targeted Facebook group pages: The Castro Valley Share & Discuss, SAN LORENZO COMMUNITY, SAN LEANDRO Community, Neighbors informing neighbors, Living in Hayward- Heart of the Bay, Oakland Now, Alameda 94501 page, and the Bay Area Hikers page. These were the first groups that appeared when I searched each surrounding city's name on the social media platform. Distributing the survey digitally over the social media platform, Facebook, was the best option because I was able to better target my intended survey audience of those living around the Lake Chabot Regional Park area, but this survey was not representative of the true population and is a nonprobability sample.

Data analysis methods

Mask compliance at in the park

To analyze face covering and mask compliance at Lake Chabot Regional Park, I used R Studio (R Development Core Team 2004) and R Commander (Fox 2005) to calculate the overall compliance percentage for the study. I also calculated the overall mask compliance percentage of the East Shore trail and the West Shore Trail to get an overview of the compliance throughout the entire study. I conducted a two-sample t-test to determine if the means of mask compliance between the East Shore Trail and West Shore trail sides were significantly different. To determine if there was an effect of the physical observation sites on the observed percentage of mask compliance, I used a one-way ANOVA test to determine if there was a significant difference between the 6 observation sites. If the results of the ANOVA test indicated that there was significant difference in mean compliance levels between the sites, I followed it with a Tukey HSD test to determine which pairs were found to be significantly different. To determine if there was an association between mask wearing and total people present, I calculated the Pearson correlation coefficient between mask wearing and total people to understand the strength of that association. To determine the association between total visitors and mask compliance percentage, I calculated Pearson correlation coefficient between compliance percentage.

Survey analysis

To analyze various relationships between information collected on the survey, I took a univariate approach using Qualtrics' Stat iQ program (Qualtrics 2005) and used a significance level of 0.05 for all tests. For respondents' motivations for wearing a mask in outdoor recreational spaces and which situations they reported they would likely wear a mask, I only conducted a preliminary analysis so they were visualized using a bar chart and the percentage of each choice determined their result. The first part of the analyses I conducted were between the demographic variables and the numerical and categorical variables of interest (their personal risk, vaccination status, their rated importance to parks, their visitation patterns, how well they believed others were

complying) to determine any confounding relationships in order to analyze how safe people feel safe and what influences those feelings.

To analyze these various relationships, I conducted chi square tests. To test the association between the categorical variables, I used Pearson's correlation tests to explore the association between the numerical variables, and one-way ANOVAs were to test associations between categorical and numerical variables. To develop a deeper understanding about the relationships and associations between categorical variables and numerical variables, I assigned some categorical variables with numerical values.

To analyze overall how the sample population's park and recreational space visitation and use changed before the pandemic and during the pandemic, I assigned numerical values to the categorical responses to the questions and I conducted a paired t-test was conducted to evaluate if a significant difference was found between the means of the two questions. I assigned the almost never category as a recorded as a 1, about several times a year was recorded as a 2, about once a month was recorded as a 3, about 2-3 times a month was recorded as a 4, about once a week was recorded as a 5, and almost daily was recorded as a 6. The numerical result determined if the visitation patterns changed and by how much.

I followed this with Pearson's correlation tests to test the correlation between the importance of parks during the pandemic and how frequently they visited the parks and how well the visitors felt others were complying to social distancing and mask guidelines. To test the correlation between the respondents' vaccination or antibody status to COVID-19 and how often they visited the parks during the pandemic, I conducted a one-sided ANOVA test. To explore the association between how respondents rated their personal risk to COVID-19 and how frequently they visited space during the pandemic, I used a Pearson correlation test. To determine if vaccination status or antibody status was related to how they rated their personal risk to COVID-19, I used a one-sided ANOVA test.

Overall reported safety levels were measured numerically on a scale from 1 to 10, therefore I conducted one sided ANOVA test to determine the association between this variable, vaccination and antibody status, how they ranked their personal risk to the virus, and how well they reported others were complying to social distancing and mask guidelines around them as set by the state in order to explore factors that may be related to overall personal safety in outdoor recreational spaces. I conducted Pearson correlation tests that were used to assess the relationship between

personal safety, reported personal risk, and how well others were complying with face coverings and social distancing. For the relationship between personal risk and overall safety levels, I conducted a Spearman's rank correlation because the relationship appeared to be non-linear.

To analyze the open ended question about behaviors and factors that cause feelings of unsafety in the outdoors during the pandemic, I manually coded each response into categories based on their answers. The categories I used were social distancing, improper mask use, presence of people, physical spaces in the outdoor environment, the behavior of others, COVID was not a concern for them, and other factors.

I defined the social distancing category as 6 feet of distance between those outside of someone's household and included responses that explicitly mentioned the term or mentioned not having enough space between themselves and others. I coded the category of improper face mask with responses that discussed face coverings, lack of mask use, or similar answers.

The presence of people category I defined as the amount of people using the space or the presence of large gatherings or crowds and was used for responses that mentioned too many people present at the time in the space, crowds and gatherings, or other terms related to the category. I coded the category of physical spaces in the outdoor environment as specific locations such as playgrounds or parking lots, characteristics of a trail or space, the cleanliness and sanitation of surfaces and other areas.

Behavior of others is the category I coded contains reponses that I found to have mentioned the behaviors of others, not including mask wearing or social distancing, that caused them to feel unsafe such as sneezing or coughing, recklessness towards guidelines, other's attitudes or beliefs toward the pandemic, and other behaviors similar to that theme. For the category on COVID not being a concern for them, I included responses that mentioned not believing in the pandemic or that mask wearing was necessary in outdoor spaces.

Another factor I coded is the category that includes comments that did not fall into the other categories and include themes about concerns for the environment and not feeling safe due to not enough people being present. After each response was coded and categorized using Qualtrics Text iQ software (Qualtrics 2005), I calculated the percentage of respondents who mentioned each category and I used it to determine the overarching behaviors and factors that caused feelings of unsafety in outdoor recreational spaces during the course of the pandemic.

RESULTS

Survey demographics

At the end of the survey's duration period, a total of 851 people answered the survey and of that group, 668 people answered all of the questions and fully completed the survey giving it a 78% completion rate. Only surveys that were fully completed were used for analysis. Majority of the participants of the survey were female (80.5%) and 17.5% were male.

Also, a majority of the participants were Caucasian (63.8%), 16.8% were Hispanic or Latino, 16.5% were Asian, 2.2% were Native Hawaiian or Pacific Islander, 1.6% were Black or African American, 1.3% were Native-American, 4.3% preferred not to state, and 2.4% reported "other" ethnicity.

Majority of the participants reported that they were in the 35-44 age group (25.5%), 24.6% reported to be in the 45-54 age group, 18.1% reported to be in the 55-64 year old category, 13.2% for the 25-34 year age group, 8.1% for the 65-74 age group, 7.8% for the 18-24 year age group, 1.5% for the 75-84 year age group, 0.3% for the 85 years or older category, and 1.5% preferred not to state.

Household size ranged from 1 person to 10 people with an average household size of 3.2. Of these households, a majority of them did not have children (56.3%), 42.7% had children, and 2.1% preferred not to state their response.

Majority of the respondents reported their annual household income to be more than $200,000 (20.5%), 19.6% preferred not to state their annual household income, 12.9% reported an income of $140,000 - $199,999, 9.6% reported $100,000 - $119,999 for annual income, 8.2% reported $120,000 - $139,999, 7.3% reported an annual income of $80,000 - $99,999, 7.3% reported $60,000 - $79,999, 5.5% reported annual income of $40,000 - $59,999, 4.5% reported annual between $20,000 - $39,999, and 4.5% reported less than $20,000 for their annual household income.

Majority of the sample population obtained at most a 4 year college degree (32.3%), 27.5% obtained some type professional degree, 19.5% completed some college, 8.1% completed a 2 year degree, 5.7% completed at most their high school degree, 4.6% completed some form of doctorate degree, and 2.4% preferred not to state.

Mask compliance

The total average mask and face covering compliance, or the number of observed individuals wearing masks divided by the total number of people observed, at Lake Chabot Regional Park across all observation sites was 77.96% (N=150) compliant. The mean mask compliance was 78.71% (n=74) on the East Shore Trail and 77.22% (n=76) for the West Shore Trail. Results of the independent sample t-tests were conducted to determine if there was a significant difference in means of the two sides of the lake and they indicated that there were no significant differences between the East Shore Trail and the West Shore Trail means for mask compliance, $t(134.72) = 0.714$, $p = 0.477$, 95% CI [-2.64, 5.62].

There was a highly significant positive correlation between the number of individuals wearing masks properly and the total number of visitors observed, $r = 0.99$, $p < 0.001$, $N = 150$ (Figure 7). As the number of visitors on the trail increased, the number of individuals wearing masks properly also increased. Between the variables of total visitors observed and mask compliance percentage, the Pearson correlation indicated that there was a positive linear association, $r = 0.44$, $p < 0.001$, N=150 (Figure 8). The more individuals there were present on the trail tended to have higher percentages of mask compliance compared to trails with fewer individuals.

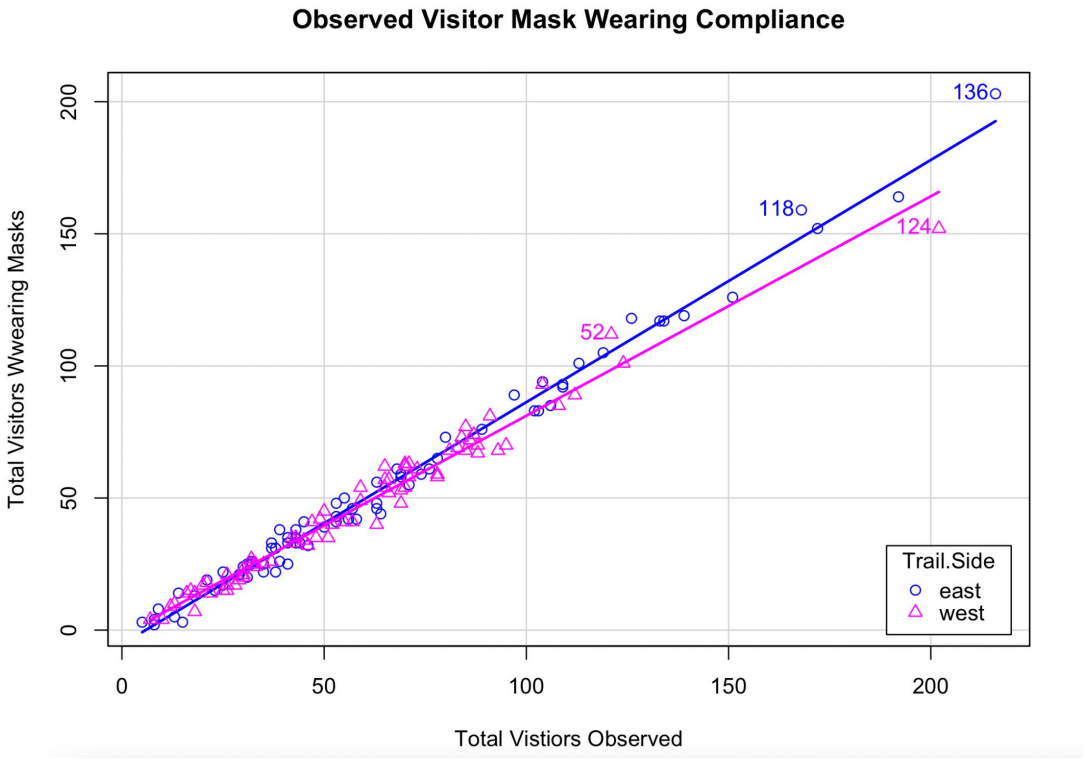

Figure 7. Observed visitor mask wearing compliance. This figure illustrates the association between total visitors and total visitors wearing masks (r=0.99, p < .001, N= 150).

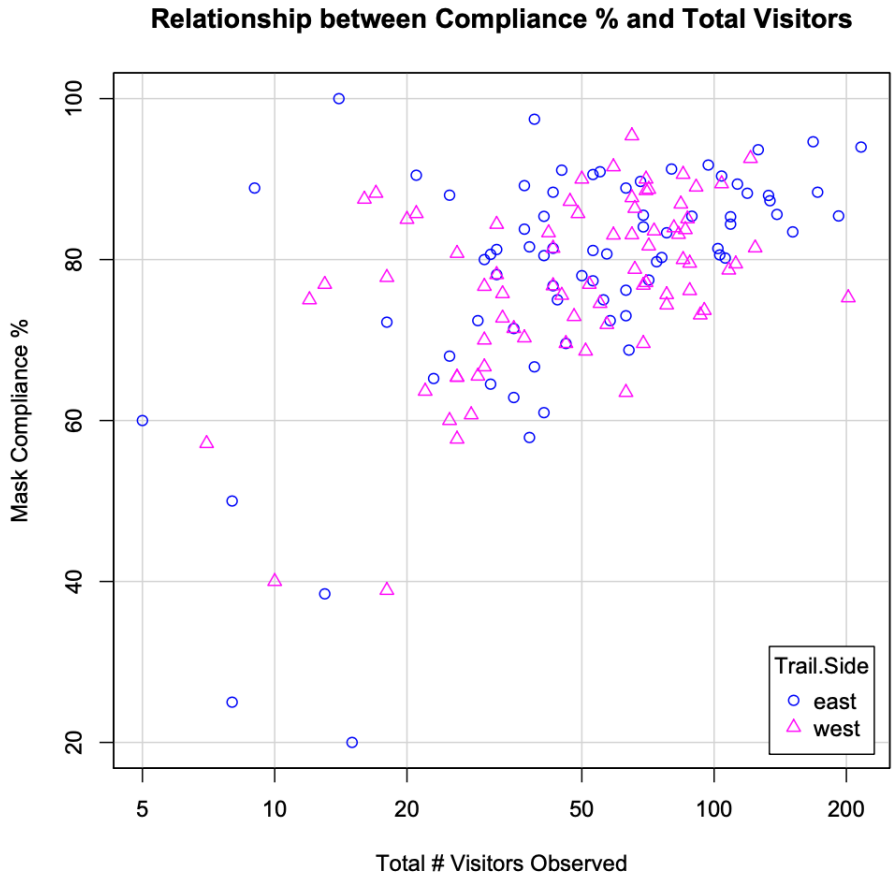

Figure 8. Relationship between compliance percentage and total visitors. Log transformed x-axis for visualization purposes, r=0.443379, $p < .001$, N= 150.

There was a statistically significant difference in the mean percentage levels between the observation areas, ($F(5, 144) = 3.53$, $p = 0.005$). The mean mask compliance percentage for East Shore Trail site 3 ($M = 73.16$, $SD = 14.41$) were significantly different (p= .007) than East Shore Trail site 1 ($M = 85.52$, $SD = 6.89$) (Figure 9). Mask compliance percentages on the East Shore Trails tended to be higher closer to the entrance of the trail compared to the compliance further in on the trail. The test also indicated that there was a statistically significant difference in the mean mask compliance percentage for West Shore Trail site 2 ($M = 74.08$, $SD = 14.00$) was significantly different (p= 0.015) than East Shore Trail site 1 ($M = 85.52$, $SD = 6.89$). Among the other sites from the West Shore Trail and the East Shore trail, the mean mask compliance percentage did not significantly differ with that of the other observation sites in the study.

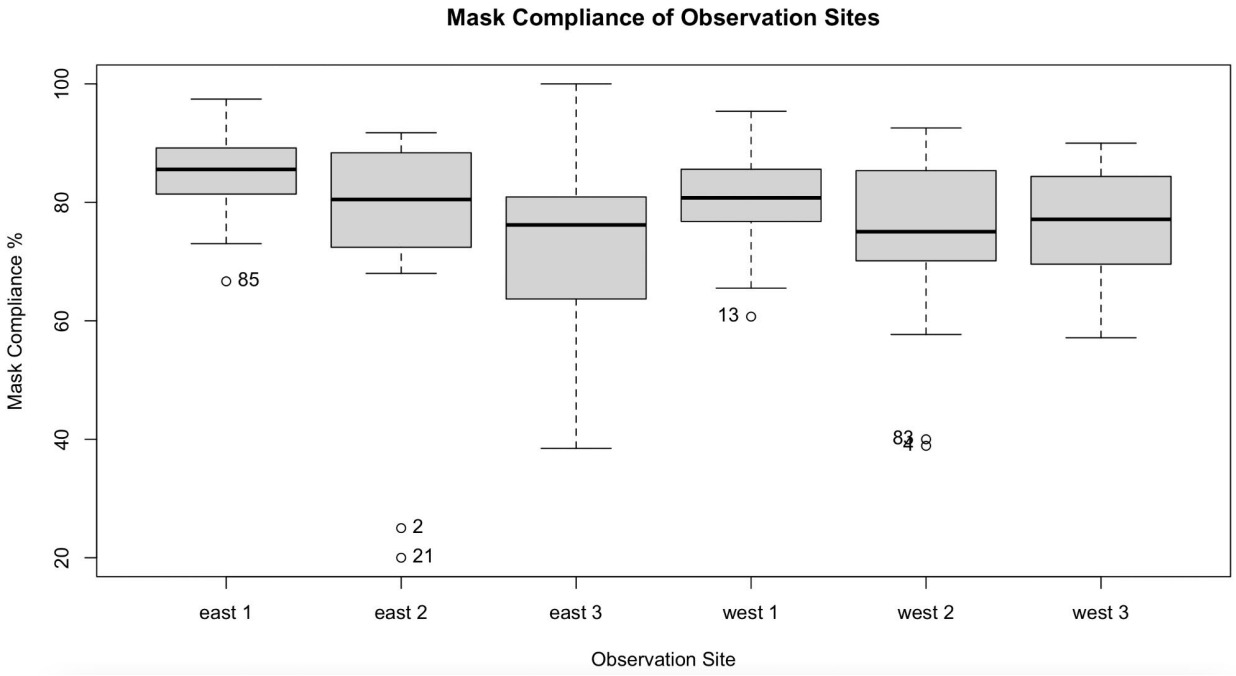

Figure 9. Comparison of mask compliance of observation sites. Observations collected from 12/13/2020 until 3/27/2021, *N*=150.

Motivations for mask wearing and safety

To protect themselves against COVID-19 during the pandemic, a majority of respondents listed wearing a face covering or mask and social distancing (Figure 10). To better understand the drivers of mask wearing in recreational spaces, a survey was dispersed and found that the primary ranked reasons that people chose to wear a masks was for personal protection from the virus, to protect those around them from the virus, and in adherence to guidelines set in place by the state, the county, and the CDC (Figure 11). The most common situation that respondents reported wearing a mask while in outdoor recreational spaces corresponds with the minimum level of social distancing requirements as determined by the state (Figure 12).

Of the original 851 respondents who filled out the survey, I found that within the write-in responses that mentioned “other category” for their motivations for mask wearing in recreational spaces, were several respondents who claimed COVID-19 to be a political hoax. However, all of these responses were excluded from the survey analysis because they were ineligible because they did not complete the entire survey.

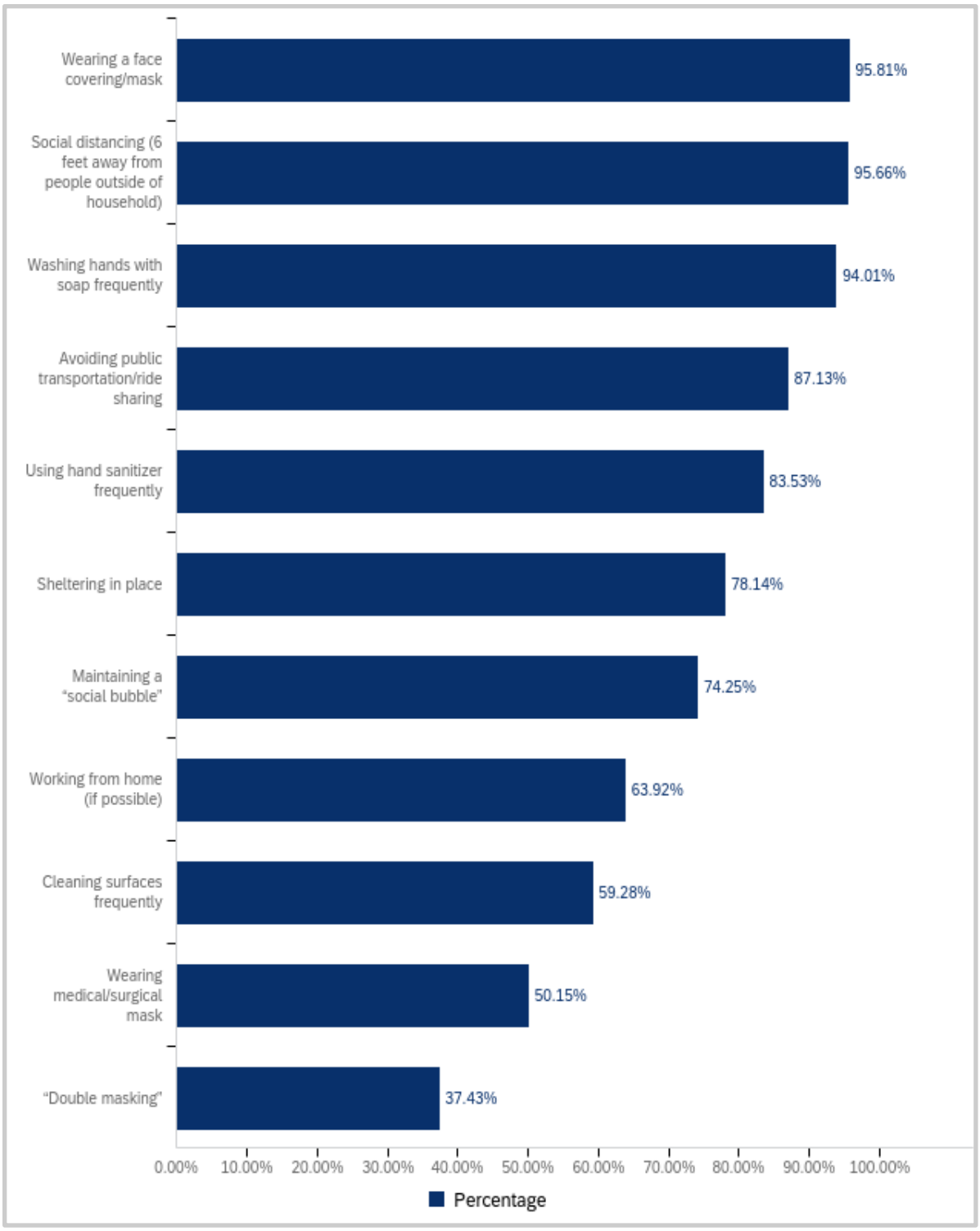

Figure 10. Recommended actions taken to protect against COVID-19. This figure illustrates the percentages of responses of recommended actions that survey respondents reported taking to protect themselves again COVID-19, *n*=4432.

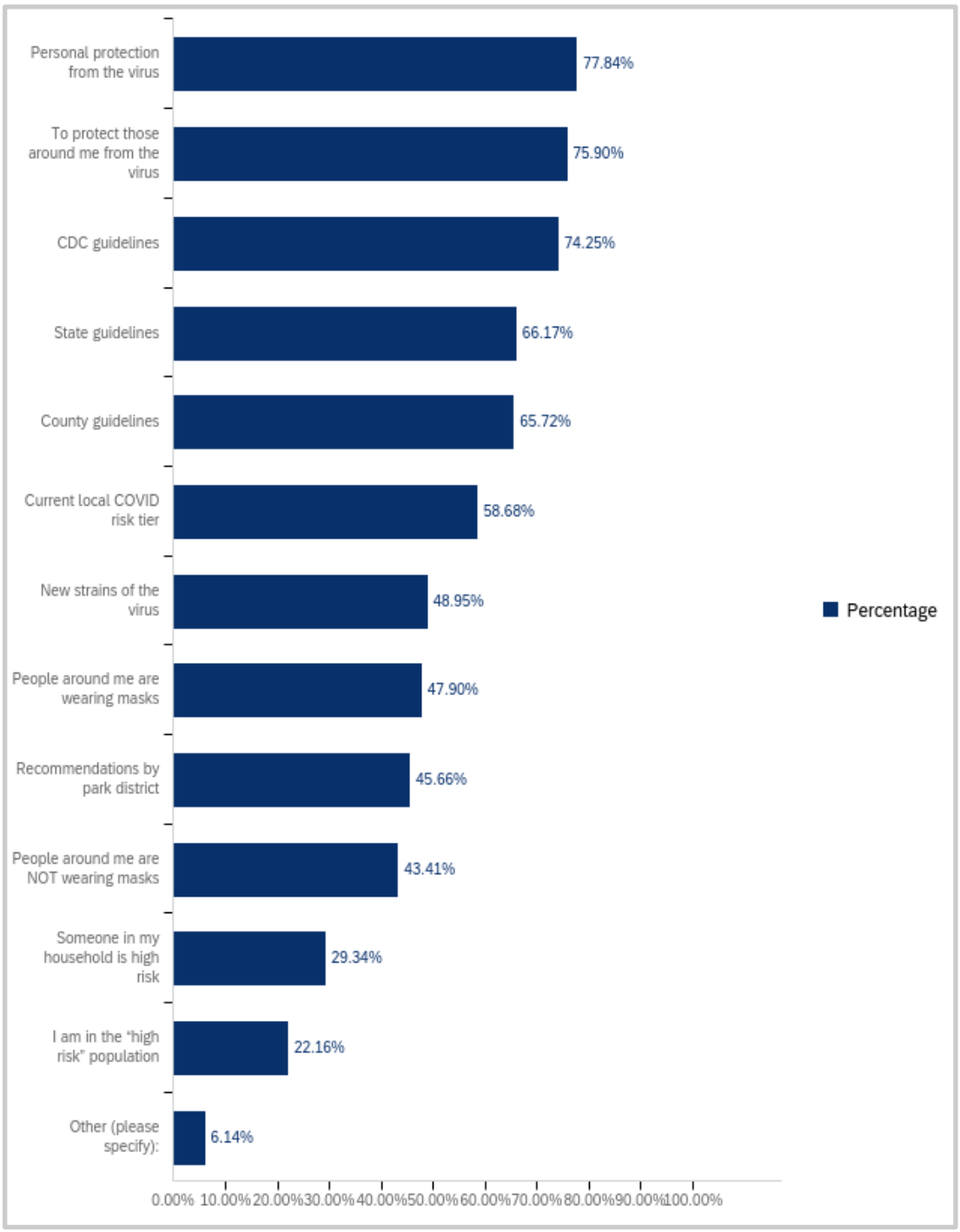

Figure 11. Motivations for mask wearing in outdoor recreational spaces. This figure illustrates the percentages of responses for mask wearing in these spaces, *n*=4432.

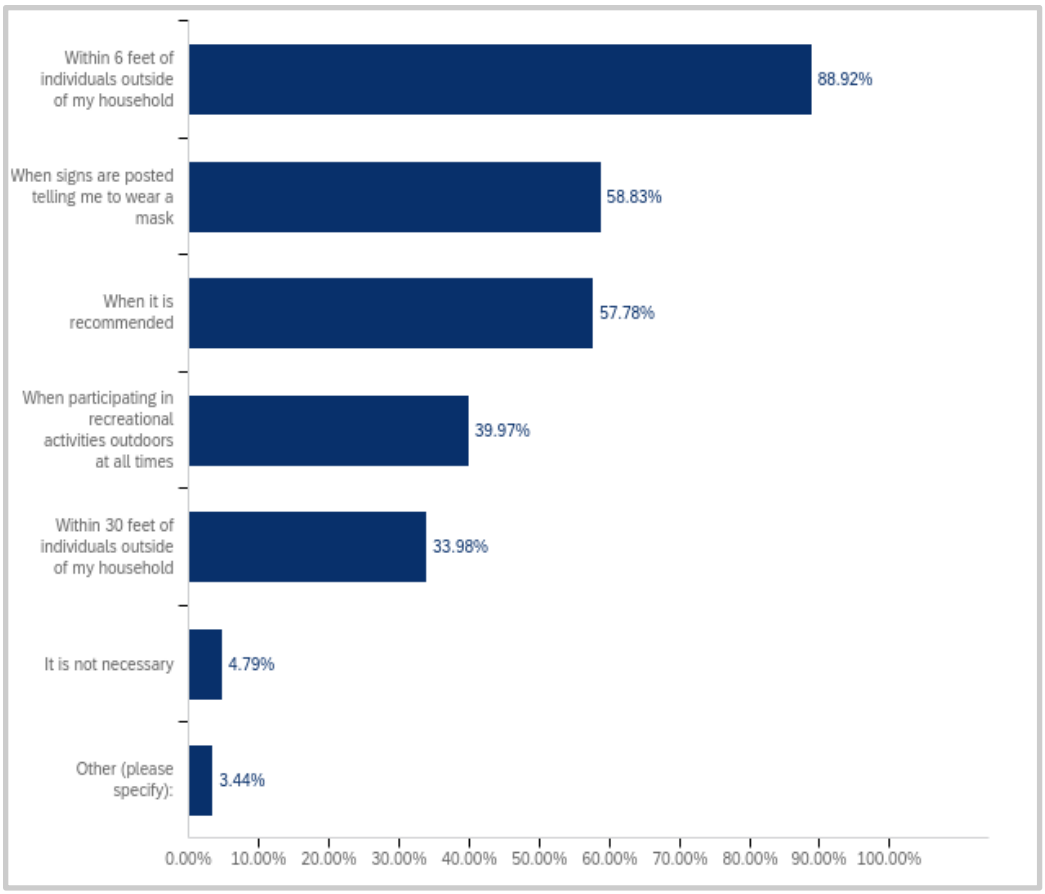

Figure 12. Situations for reported mask wearing in outdoor spaces. This figure illustrates the choice response percentages reported mask wearing in outdoor spaces, *n*=1922.

Preliminary demographic analysis

The preliminary analysis results between the respondents' demographic variables (age, gender, ethnicity, income, and household size) and the main variables of interest in the survey (their personal risk, vaccination status, their rated importance to parks, their visitation patterns, how well they believed others were complying) found a strong statistically significant association between age group and vaccine and antibody status, χ^2 (24, N = 667) = 171, $p < 0.001$. Those in the age 65 and up category were more likely to have the vaccine or antibodies to the virus compared to those in the age group 64 years old and below. There was also a statistically significant relationship between age group and self reported personal risk to the virus, χ^2 (40, N = 667) = 69.4, p = 0.003, with age weakly and negatively correlated with personal risk, $r(112) = 0.60$, p = 0.012). Those in the age categories from 35-54 are more likely to rank their personal risk as

medium compared to other groups. Results of the ANOVA tests indicated that there were no significant differences in age groups between the compliance rating of others ($F(14, 666) = 0.104$, $p = 0.136$), between visitation frequency during the pandemic ($F(14, 666) = 0.172$, $p = 0.191$), and between the rated importance of parks ($F(14, 666) = 0.106$, $p = 0.161$).

The preliminary analysis results looking at gender and the other main variables only found a statistically significant relationship with reported COVID-19 vaccine and antibody status, χ^2 (9, $N = 668$) = 43.3, $p < 0.001$. Female respondents were more likely than their male counterparts to report having received the COVID-19 vaccine or having antibodies to the virus. Between the other main variables in the survey, there were no other statistically significant relationships and associations with gender. The option of ethnicity allowed for multiple options to be decided, so no further analysis was done with this demographic variable.

When conducting the preliminary analysis on reported annual household income with the other main variables, there was a statistically significant relationship between this demographic information and and with the reported overall level of safety in recreational spaces, ($F(18, 667) = 0.266$, $p < 0.001$), with this demographic variable being weakly and positively correlated with safety ratings, r=0.177, $p < 0.001$, N= 668. Those who earned higher annual household incomes tended to report higher levels of overall safety in outdoor recreational spaces. Annual household income also had a statistically significant relationship with how they rated the importance of parks during the pandemic, (χ^2 (36, N = 668) = 67.9, p = 0.003), and how respondents rated the compliance of others for mask wearing and social distancing, ($F(14, 667) = 0.244$, $p < 0.001$), as well as a weak, positive correlation with compliance ratings, r=0.177, p = 0.004, N= 668. Those who earned higher annual household incomes also tended to rate compliance of others higher and rate parks during the pandemic as more important than those with lower annual household incomes. Visitation to outdoor recreational spaces had a statistically significant relationship with annual household income, ($F(15, 667) = 0.210$, $p < 0.001$), and was weakly positively correlated as well, r=0.108, p = 0.005. During the pandemic, those who reported higher annual household incomes were more likely to report more frequent visits to outdoor recreational spaces. No statistically significant relationships were found between annual household income, (χ^2 (27, N = 668) = 38.0, p = 0.078), and between ratings of personal risk to the virus, ($F(15, 667) = 0.101$, p = 0.259).

To determine if household size was related to any of the main variables from the survey, the preliminary analysis found a very weak, negative correlation with the rated feelings of overall safety in outdoor recreational spaces, (r= -0.10, p = 0.011, N= 668), and positively correlated with personal risk ratings, rs= -0.091, p = 0.019, N= 668). There were no other statistically significant relationships between household size and any of the other variables not previously mentioned. There were also no statistically significant relationships between the presence of children in the household and visitation habits during the pandemic, $F(8, 667) = 0.046$, $p = 0.524$), and for the rated importance of parks, $F(7, 667) = 0.022$, $p = 0.863$.

Analysis of the main survey variables of interest

Visitation. For the analysis of visitation to outdoor recreational spaces during the pandemic, I compared the relationships between the several survey variables of interest including the ranked importance of the parks, vaccination and antibody status to COVID-19, and how the respondent rated other's compliance towards mask wearing and social distancing guidelines in these spaces. I analyzed how the sample population's overall park and recreational space visitation and use changed before the pandemic and during the pandemic, and found that there was a statistically significant difference between visitation to these spaces before the start of the pandemic (M= 4.11) and during the pandemic (M= 3.98) conditions, $t(25)$=0.13, p = 0.030, d = 0.08. Visitation before the pandemic tends to be larger than visitation during the pandemic for the sample population therefore they are visiting parks less often than they were before the start of the pandemic.

I tested the correlations between rated importance of parks with visitation frequency during the pandemic and found that visitation during the pandemic was strongly and negatively correlated with the rated importance of parks, r= -0.67, $p < 0.001$, N= 668. Those who visited the parks more frequently during the pandemic tended to rate parks as more important than those who ranked the parks as not important. To see if others' compliance to mask wearing and social distancing was related to park visitation during the pandemic, I found that there was a weak and positive correlation between the two variables, r= 0.197, $p < 0.001$, N= 668. Vaccination and antibody status also had no statistically significant relationship with visitation frequency to the parks during the pandemic, $F(9, 667) = 0.051$, $p = 0.670$.

Personal risk. Analysis of rating of personal risk to COVID-19 tested relationships between visitation during the pandemic and vaccination and antibody status and found there to be a weak and negative correlation with park visitation, r= -0.09, p= 0.024, N= 668. There is also a statistically significant relationship between personal risk ratings and visitation to the parks during the pandemic, $F(9, 667) = 0.137$, $p = 0.046$. Those who rated their personal risk lower tended to visit parks during the pandemic more frequently than those who rated their personal risk as higher. Vaccination and antibody status also had no statistically significant relationship with rating of personal risk to COVID-19, $F(9, 667) = 0.078$, $p = 0.613$.

Safety rating. Overall feelings of safety in outdoor recreational spaces were analyzed for relationships between vaccination and antibody status, reported personal risk, and by the rating of the compliance of others to mask wearing and social distancing guidelines and found that between reported personal risk and overall safety ratings had a statistically significant relationship, ($F(15, 667) = 0.259$, $p < 0.001$), and were negatively correlated, rs= - 0.202, $p < 0.001$, N= 668. Those who rated their feelings of overall safety higher were more likely to report lower personal risk to COVID-19. Vaccination and antibody status had no statistically significant relationship with overall feelings of safety at parks during the pandemic, ($F(15, 667) = 0.086$, $p = 0.242$), but there was a statistically significant relationship between the rating of overall safety and how well others were complying with social distancing and mask guidelines as provided by the state, ($F(15, 667) = 0.408$, $p < 0.001$). Although vaccination and antibody status had no significant relationship with how safe the respondents' felt in outdoor recreational spaces, those who rated higher levels of overall safety tended to also rank the compliance of others for face masks and social distancing as high compared to those who ranked the compliance of others as low. The safety ranking was also positively correlated with the compliance of others for mask wearing and social distancing, r= 0.355, $p < 0.001$, N= 668.

Motivations and behaviors causing unsafe feelings. In response to the open-ended question about behaviors and other factors that caused them to feel unsafe in outdoor recreational spaces, 62.16% of the 518 respondents stated that improper mask use contributed to these feelings and 32.43% of respondents mentioned that social distancing or lack thereof also made them feel unsafe. Visitor density and the presence of large groups and gatherings in outdoor spaces were reported

by 30.5% of respondents as another factor that caused feelings of discomfort and insecurity. Physical spaces in the outdoor environment was reported by 16.6% of respondents as a factor with 47.67% of respondents in that category that specifically reported that characteristics of park trails caused them to feel unsafe and 34.88% of respondents in that category specifically mentioned the unknown sanitation and cleanliness of surfaces and locations around the park contributed in causing feelings of unsafety. The behavior of others during the pandemic were cited as causing these feelings by 13.7% of respondents and 2.5% of survey respondents' answers fell under the other factors category. Although the majority of the survey respondents expressed at least one behavior or factor that concerned them in outdoor recreational spaces during the pandemic, those whose responses were unconcerned with COVID-19 in the outdoors constituted 4.82% of respondents.

DISCUSSION

A combination of high community mask compliance and social distancing have been critical tools in combating the community spread of COVID-19 (Lyu and Wehby 2020). Although in California there are specific guidelines requiring face mask use in the outdoors when within distance of others outside of one's household, these guidelines are not always adhered to by all people with this study finding that improper face mask use and lack of social distancing considerations were reported to be the primary behaviors that caused visitors to feel unsafe in outdoor recreational spaces. These results suggested that compared to one's vaccination and antibody status' relationship with overall personal safety, mask wearing and social distancing behaviors by others was more significant. At Lake Chabot Regional Park, these sentiments were exemplified with the overall mask compliance being relatively high and a strong association between the total number of people present and compliance. Understanding the motivations of mask wearing in recreational outdoor spaces and how compliant people are to those guidelines can help target future COVID-19 campaigns in order to ensure equitable access to outdoor spaces where people can feel safe.

Drivers of overall safety in outdoor recreational spaces

The more compliant others were adhering to social distancing and mask guidelines in recreational spaces tended to make other park visitors feel safer. How compliant others were to social distancing and mask wearing was more significant in influencing how safe someone felt while outdoors compared to one's immunization status. An individuals's vaccination and antibody status to COVID-19 had no statistically significant relationship with the overall safety levels in outdoor recreational spaces by the respondents, further suggesting that those who rated higher levels of overall safety tended to also rank the compliance of others for face masks and social distancing as high compared to those who ranked the compliance of others as low. Therefore, the actions of others, especially when it pertains to risk reduction, was more important than the personal protection provided from a vaccination and antibodies to the virus. At the time that the survey was conducted, vaccination rates were low and mask use was still required, but as of May 16, 2021, the CDC advised that fully vaccinated individuals can resume activities that were done before the pandemic and except when it goes against any state, federal, or local rules and regulations (CDC 2020a). As of current, there is no relevant literature that can support this information from this finding so more research needs to be conducted to determine how overall perceived safety has changed throughout the course of the pandemic.

Mask compliance at Lake Chabot Regional Park

Mask compliance overall at the study site was 77.96%, with no significant differences between trails and between individual observational sites except between two sites on the East Shore Trail. The overall compliance, which is near the near universal mask adoption scenario of 80% compliance as described in one study, suggest that mask use at Lake Chabot Regional is relatively high and in this scenario have curtailed community transmission (Eikenberry et al. 2020). On the East Shore Trails, there was a difference between compliance percentages between the site closest to the main entrance and picnicking areas and between the site 1 mile in on the trail that was the farthest site observed. The results suggest that compliance tended to be higher closer to the entrance of the trail compared to the compliance observed further in on the trail, where fewer people were present. This result was also observed in the correlation between higher compliance

rates when there were more people present, suggesting that the more individuals there were present on the trail tended to have higher percentages of mask compliance compared to trails with fewer individuals. The results of this are similar to the mask compliance values observed in an outdoor mask wearing study on university campuses (Barrios et al. 2021). This study and my own had similar study designs for observing and counting proper mask use, but this study also categorized the type of masks that were used. While there are studies now being published on mask compliance, there is not much literature on the compliance across various outdoor spaces especially in public greenspaces and recreational areas, therefore more research may need to be conducted to evaluate outdoor community mask wearing.

Visitation and use of outdoor recreational spaces

Visitation before the pandemic and during the pandemic clearly differed in frequency with more frequent visitation to outdoor recreational spaces reported before the pandemic than during the pandemic therefore the respondents tended to visit parks less often. Although this result suggests lower overall visitation during the pandemic, this phenomenon may be as a result of variables that were not tested or collected from the survey, especially because this information was self reported. As fewer people are visiting outdoor recreational spaces, my study suggests that fewer people are benefitting from the mental and physical health benefits that greenspaces provide during the pandemic. In Barton and Rogerson (2017), the researchers used community mobility statistics to detect patterns or changes in greenspace mobility at the beginning of the COVID-19 pandemic in 5 different cities around the world and found that the differences varied between cities. So while visitation was different in this sample population, visitation may look different in cities across the country. However, in comparison to the year prior to the pandemic, a study by Geng et al. (2021) found park visitation increased during the pandemic and was correlated with restrictions and closures put in place during COVID-19 (Geng et al. 2021). Their results were measured through the analysis of collected mobility data going outdoors and was conducted on an almost global scale. In comparison to this study, they looked at various factors that could influence park visitation during the pandemic as well as the demand for greenspaces through the use of observed data, while this study only used data reported by the respondent and focused more on the

overall differences in visitation. More data and time is needed to determine how the COVID-19 pandemic has influenced use and visitation of greenspaces as conditions change.

Although park visitation during the pandemic decreased overall, the respondents that visited responded did report the parks more frequently were also more likely to rate parks as more important and also reported having overall lower personal risk to the virus compared to those who did not visit as frequently or almost never visited. This result suggests that there may be a possible relationship between visitation to parks and the influence of personal interests and affinity towards greenspaces and natural landscapes, but more data and analysis would be required to determine that relationship. Previous studies also used surveys to analyze the relationship between park visitation and proximity to parks as well as affinity to nature spaces and found that there is indeed a positive association between park visitation and how strongly they valued nature (Lin et al. 2014)**.** More data would need to be collected in order to determine the other factors that could have influenced visitation to parks during the pandemic.

Limitations

With many factors that can influence an individual's behavior, drawing scientific inference was limited to correlations and statistical differences. The survey that was distributed to measure motivations for mask wearing, behaviors that caused feelings of unsafety, and compliance of others was non non-probability sample and therefore generalizability was limited the sample was not truly representative of the true population. The survey was also cross-sectional, therefore it only captured the thoughts and beliefs of the reponspednet in the moment that they filled it out. Generalizing the beliefs and feelings collected during the study is difficult because since the distribution of my survey, conditions during the pandemic changed and may not be reflective of present values and beliefs surrounding mask use especially as vaccination is more widespread. Although the design of the study was adequate when addressing mask compliance observed at Lake Chabot Regional Park, it was not as adequate in terms of addressing the hypothesis about mask motivations as collected in the survey. A more adequate survey distribution would be randomly sampling Lake Chabot Regional Park visitors in the space who were wearing masks properly as initially planned, but due to the severity of the pandemic in my area at the time of data collection, an online survey was more adequate. The design of my survey did not take into account

the influence that social norms and expectations had on mask motivations as well as if politicization was at all of any influence to mask wearing in outdoor settings. The COVID-19 pandemic has also been heavily politicized from its inception (Sherling and Bell 2020). From the origins and even the legitimacy and severity of the virus itself to the effectiveness of mask wearing and COVID related closures, the pandemic has been found to be split along party lines and ideologies. It is also interesting to note that without prompting about the politicization of mask use or politics in my survey, its mention still occurred through the open ended responses. While free responses that contained themes of politicization of mask wearing were mentioned in the original 851 responses that were collected by the survey, none of the responses were included in analysis because all of the respondents who mentioned these themes did not fully complete the survey and were therefore excluded.

Future directions

Based on the findings presented in this study, gaps in research on mask wearing compliance in recreational spaces were found. While the findings in this study measured mask compliance in one recreational space, other areas mentioned in the open-ended survey responses suggest that there are areas outside of the Bay Area where mask compliance is mandated and has been for a duration of the pandemic. Mask compliance, behaviors, and attitudes around mask use and mask use in the outdoors may differ geographically and politically and more research into these differences can help public health entities better target and tailor their initiatives to ensure that masks are used correctly to the extent that they are most effective for the wearer and those around them. As there were differences in mask compliance at different parts of the park, mask campaigns can target areas where compliance was not as high to remind others of the guidelines. As public health measures change with the course of the pandemic, analyzing the drivers and motivations of mask wearing can also aid in ensuring that certain demographics receive the appropriate information.

Broader implications

Mask use has been imperative in the fight against the COVID-19 pandemic and the findings of this study suggest that mask use is one of the primary ways respondents protect themselves and others from the virus and mask use of others influences how safe an individual feels in an outdoor setting, even over their own personal protection. It is critical to understand and continue to research the motivations and drivers for public health measures, such as mask use, in order to better target public health initiatives, especially in areas with low support for these measures and low compliance. As mask compliance was directly observed and measured, the park districts can use this feedback to target mask wearing in areas where compliance is lower. As mask wearing guidelines continue to change with current COVID-19 conditions, it is important to continue to consider how these guidelines impact communities and the general public and continue the widespread use of face masks. It is important as a community to not let our guard down and to remain vigilant, even as the vaccine is becoming more available, especially with an increasing amount of new variants, wearing masks while in these recreational spaces are important for the continued safety of our communities.

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APPENDIX A: Survey Questions

Face Covering/ Mask Use in Recreational Spaces

Start of Block: Eligibility

Q1 Are you 18 years of age or older?

- Yes
- No

Skip To: End of Survey If Are you 18 years of age or older? = No

Q2 Are you currently residing in California?

- Yes
- No

Skip To: End of Survey If Are you currently residing in California? = No
End of Block: Eligibility

Start of Block: COVID and personal

Q3 What do you think your personal risk of contracting COVID-19 is?

- Very Low
- Low
- Medium
- High
- Very High
- Don't Know

Q4 How would you rate your knowledge of preventing the spread of COVID-19?

- Not knowledgeable at all
- Slightly knowledgeable
- Moderately knowledgeable
- Very knowledgeable
- Extremely knowledgeable

Q5 Have you received the COVID-19 vaccine or have antibodies for COVID-19?

- Yes
- No
- Don't Know
- Prefer not to state

End of Block: COVID and personal

Start of Block: Block 5

Q27
My name is Miracris Villanueva. I am a senior majoring in Environmental Sciences at UC Berkeley. This survey should take no more than 10 minutes. It is an important part of my senior thesis research project on mask wearing in recreational spaces. Your answers are completely anonymous and all collected information will be for confidential academic uses only. If you have any questions, please feel free to email me at miracris_villanueva@berkeley.edu.

End of Block: Block 5

Start of Block: COVID and Mask Wearing

Q6 Which of the following recommended actions have you taken, if any, to protect yourself from COVID-19? Please select all that apply.

- Social distancing (6 feet away from people outside of household)
- Avoiding public transportation/ride sharing
- Sheltering in place
- Working from home (if possible)
- Maintaining a “social bubble”
- Wearing a face covering/mask
- Wearing medical/surgical mask
- “Double masking”
- Washing hands with soap frequently
- Cleaning surfaces frequently
- Using hand sanitizer frequently
- None of the above
- Other (please specify):

_____

Q7 Based on your understanding of masks, do you think wearing a mask or face covering helps reduce the spread of COVID-19?

- Yes, masks reduce the spread
- Yes, somewhat reduce the spread
- Unsure
- No, masks don't do anything
- No, masks worsen the spread
- Don't know
- Prefer not to state

Q8 How do you feel about the following situations regarding mask and face covering mandates?

	Approve	Depends on the situation	Disapprove	Prefer not to state
Requiring people to wear face masks when they come within 6 feet of others in public places INDOORS	•			
Requiring people to wear face masks when they come within six feet of others in public places OUTDOORS	•			
Pass a federal mandate that requires people to wear a mask in public places	•			

End of Block: COVID and Mask Wearing

Start of Block: COVID and recreational spaces

Q9 How important have parks and recreational spaces been to you during the COVID-19 pandemic?
NOTE: Parks and recreational spaces will be used interchangeably and are defined here as outdoor areas used for leisure, recreational (ex: parks, playgrounds, lake areas, etc)

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

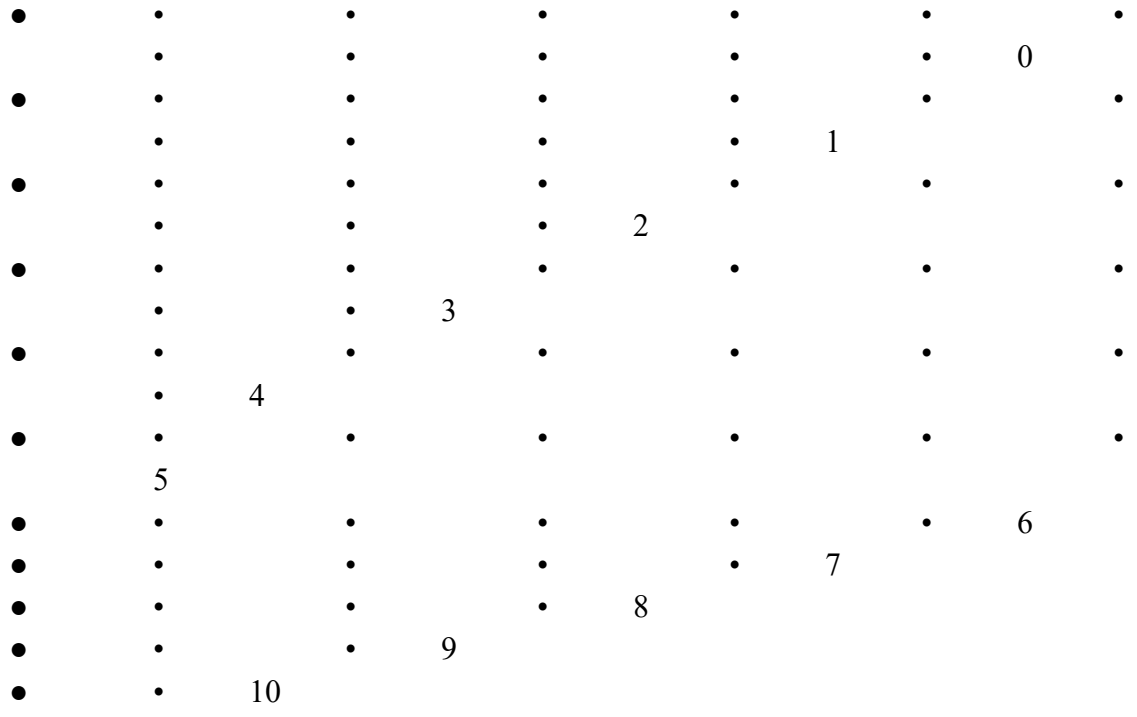
Q10 Before the COVID-19 pandemic, on average, how often do you visit a park or recreational space?

- Almost daily
- About once a week
- About 2-3 times a month
- About once a month
- About several times a year
- Almost Never

Q11 Since the start of the COVID-19 pandemic, on average, how often do you visit a park or recreational space?

- Almost daily
- About once a week
- About 2-3 times a month
- About once a month
- About several times a year
- Almost Never

Q12 During the pandemic, how safe do you feel at parks or recreational spaces while visiting on a scale of 1-10?



Q13 What behaviors or factors, if any, cause you to feel unsafe outdoors during the pandemic

_____

Q14 How important are the following factors in influencing your choice to visit parks or recreational spaces during the pandemic?

	Not important	Moderately important	Extremely important
Outdoors	●		
Social distancing (6 ft) possible	●		

Physical health benefits	●		
Mental health benefits	●		
Social interaction	●		
How crowded it is	●		
Face coverings are worn by all visitors	●		
Weather conditions	●		
Local COVID-19 conditions	●		
Availability of hand sanitizing stations	●		
Other (Please specify):	●		

Q15 Please pick which of the following reasons you chose to wear a mask at the park or while outdoors in recreational spaces (check all that apply)

- CDC guidelines
- State recommendations
- County guidelines
- Current local COVID risk tier

- Recommendations by park district
- People around me are wearing masks
- People around me are NOT wearing masks
- Personal protection from the virus
- New strains of the virus
- To protect those around me from the virus
- Someone in my household is high risk
- I am in the “high risk” population
- Other (please specify):

_____

Q16 In which of the situations are you likely to wear a mask or face covering while outdoors (check all that apply)?

- Within 30 feet of individuals outside of my household
- Within 6 feet of individuals outside of my household
- When participating in recreational activities outdoors at all times
- When it is recommended
- When signs are posted telling me to wear a mask
- It is not necessary
- Other (please specify):

_____

Q17 When visiting parks and outdoor recreational spaces, how well do you feel other visitors are following mask wearing and social distancing guidelines?

- Not well at all
- Slightly well
- Moderately well
- Very well
- Extremely well

Q28 Please state your concerns, if any, about mask wearing in recreational spaces:

_____

End of Block: COVID and recreational spaces

Start of Block: Demographic information

Q18 What is your zip code:

_____

Q19 I identify my gender as

- Male
- Female
- Non-binary / third gender
- Other (please specify):

  _____
- Prefer not to say

Q20 Ethnic origin: Please specify your ethnicity and select all that apply

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Hispanic/Latino
- Native Hawaiian or Pacific Islander
- Other
- Prefer not to state

Q21 What age group are you in?

- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- 65 - 74
- 75 - 84
- 85 or older
- Prefer not to state
- 10

Q22 Including yourself, how many people live in your household?

_____

Q23 Are there children in your household?

- Yes
- No
- Prefer not to state

Q24 Please check your annual household income

- Less than $20,000
- $20,000 - $39,999
- $40,000 - $59,999
- $60,000 - $79,999
- $80,000 - $99,999
- $100,000 - $119,999
- $120,000 - $139,999
- $140,000 - $199,999
- More than $200,000
- Prefer not to state

Q25 What Is the highest grade or level of school you completed?

- Less than high school
- High school graduate
- Some college
- 2 year degree
- 4 year degree
- Professional degree
- Doctorate
- Prefer not to state

Q26 Anything else you would like to add:

_____
_____
_____
_____
_____

End of Block: Demographic information