

Intersecting identities: Investigating effects of multiple hierarchy stratification perspective on
visitor activity participation

by

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Abstract

This study uses a multiple hierarchical stratification perspective to investigate the probability of activity participation among 1,774 Joshua Tree National Park visitors who responded to a visitor survey in 2019. According to the multiple hierarchy stratification perspective, an individual's demographic characteristics interact and affect their social position and therefore their access to services or resources. The purpose of the study is to gain a deeper understanding of how the combination of visitors' demographic characteristics affects the probability of activity participation in a U.S. National Park. Binary logistic regression models were employed to determine how the multiplicative effects of four status characteristics, age, gender, race/ethnicity, and education, impact the probability of visitors' participation in 20 various activities. Additionally, the high diversity of California is accounted for with the inclusion of California residency as a moderating variable. The results indicate differences in the probability of participation in specific activities like camping, rock scrambling, technical climbing, and picnicking as well as significant effects of residing in California on specific activities. Overall, there were few clear linear trends present for the models, but the results provide validity to the use of a data analysis tool that can be employed to identify activity participation trends with an intersectional approach at a popular U.S. National Park. The methods can be incorporated into existing monitoring procedures using demographic data routinely collected by public land managers and organizations that support public lands and/or visitors.

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Chapter 1 - Introduction

Despite the Organic Act's explicit declaration that the National Park Service's (NPS) fundamental purpose is to conserve parks for the enjoyment of future generations, it has historically alienated non-male and non-White visitors (Rose et al., 2022; Scott & Lee, 2018; Weber & Sultana, 2013). Humans have camped for thousands of years but the Romanticism movement of the mid-19th century, led by John Muir and Henry David Thoreau, resulted in an increase in camping and outdoor recreation among well-educated White men who had the time and financial resources to do so (Taylor, 2000; Virden & Walker, 1999). In the latter half of the 19th century, the U.S. military deliberately removed Native tribes from their lands to create national parks in the West (DeLuca & Demo, 2001; Spence, 1999). With the signing of the Organic Act in 1916 and the creation of the NPS, the agency enacted a complete ban on all subsistence hunting and fishing on federal lands and inconsistent permission for the subsistence gathering of plants (Norris, 2001). Later on, during the Great Depression, at least 500 families living in Appalachia and described as poor, were forcibly evicted from their land to create Shenandoah National Park (Homa, 2021; Horning, 2001). The policy of forced removal was, in part, a result of the Romanticism movement of the 19th century. Events in the 20th century continued to solidify Eurocentric standards of outdoor recreation.

In 1906, Henry Ford's manufacturing revolution resulted in the automobile becoming affordable for middle-class people to purchase (Shaffer, 2001; Young, 2009). Over the next few decades, outdoor recreation became more accessible as automobiles enabled travel without railroads (Shaffer, 2001; Young, 2009). However, it was still difficult for non-white collar employees to participate in outdoor recreation due to hourly pay and could not afford to take time off work or were forbade by their employers (Young, 2009). Black visitors who could

afford to take time off began to seek out outdoor recreation activities for extended vacations (Young, 2009). Despite the South having the highest population of Black people in the country, the national parks were segregated in states that enforced Jim Crow laws, preventing Black visitors from using the same facilities (i.e., bathrooms, campgrounds, picnic grounds, etc.) as White visitors until 1942 (Weber & Sultana, 2013). Discriminatory and marginalizing practices against all people of color, not just Black people, are hypothesized as one reason for lower outdoor recreation activity participation rates compared to White people (Krymkowski et al., 2014).

Although outdoor recreation was not uncommon for white women after the Romanticism movement, women were treated unequally by the NPS for decades. Women were exclusively hired to do secretarial work until the 1964 Civil Rights Act formally outlawed hiring discrimination based on gender or race (Zeipher, 2019). However, discrimination continued and women were forced to wear skirts and heels as a part of their uniform. In addition, they were not allowed to be park rangers, rather they could be hired as naturalists or educators. It was not until 1979 that women were granted the right to wear the same uniform as men and be hired as park rangers (Zeipher, 2019).

These instances of racism, classism, and sexism in the NPS are not all-encompassing and only serve to illustrate how historic inequities and ongoing discrimination can consequently create differences in participation for people with demographic characteristics deemed as less than by Eurocentrism (Krymkowski et al., 2014).

Studying visitor activity participation is fundamental for understanding why people do or do not participate in outdoor recreation and evaluating potentially existing issues of social equity in parks and protected areas. Outdoor recreation exploded in popularity after World War II so

researchers began conducting simple visitor use counts (Manning, 2022). Studies became more complex and by the late 1950s, researchers began gathering visitor demographics to assess how they may impact activity participation (Manning, 2022). Demographic variables which have previously been shown to impact activity participation through outdoor recreation studies include age, race, place of residence, education, income, and stage of the family cycle (Manning, 2022). Typically, effects are assessed based on single demographics rather than the combination of them and may inhibit true understanding of visitors' activity participation. An example of this is intersectionality. Intersectionality identifies the interconnectedness of individuals' demographic characteristics and how that creates overlapping systems of discrimination for affected individuals (Cole, 2009; Watson & Scraton, 2013). This study seeks to employ the multiple hierarchy stratification perspective (MHSP) to investigate intersectionality and its impact on visitor activity participation in a popular national park which receives approximately three million visitors per year. The purpose of this study is to identify another method for proactively evaluating visitor use as a step for ensuring high-quality experiences.

Chapter 2 - Manuscript: Leisure Sciences

Introduction

The Organic Act of 1916 established the U.S. National Park Service (NPS) and its mandate to conserve historical and natural landmarks for the enjoyment of all, in perpetuity (National Park Service Organic Act, 1916). That same year, women could not vote, minority groups did not have equal rights or treatment under the law, and Native removal from parklands was regarded as a necessary policy (Kantor, 2007; Young, 2009). Historically, national parks in the United States primarily represented the histories and recreational preferences of White males (Deluca & Demo, 2001; Kaufman, 1996; Krymkowski et al., 2014; Tarrant & Cordell, 1999; Taylor, 2000; Weber & Sultana, 2013; Young, 2009). In response to growing calls for social justice and equity in outdoor recreation, efforts to expand access and increase representation within the NPS have occurred, like Director's Order #16B which set clear goals and policies for supporting diversity and the creation of the NPS Office of Relevancy, Diversity, and Inclusion (RDI) in 2013. Yet, there remain problematic approaches to existing park management practices and infrastructure (Archer, 2020; Jones et al., 2017; Rodriguez & Roberts, 2002; Rose et al., 2022; Schultz et al., 2019; Sonken, 2020). For example, Jones et al. (2017) point to the tendency of researchers and management practices to protect public parklands from people rather than viewing them as stewards and engaging with them as such (2017). Additionally, Archer (2020) calls attention to the inequities perpetuated by the interstate highway system, which is still the primary mode for accessing national parks (2020). Finally, Rodriguez & Roberts (2002) and Rose et al. (2022) state that without explicit declaration of equity and inclusive access as identified outcomes, park planning frameworks will fall short of achieving necessary institutional

reform (2002; 2022). As of 2021, the current guidance does not address the needs or strategy for a park's planning portfolio to be more equitable and broaden access (Rose et al., 2022).

In the last few decades, identity-related inequities in access to resources and services have become a prominent research focus in many social science fields, including outdoor recreation. One approach to social oppression research is intersectionality, which refers to the interconnectedness of identities such as race/ethnicity, socioeconomic status, gender, age, and sexual preference and the societal costs for those belonging to multiple disadvantaged categories (Cole, 2009; Watson & Scraton, 2013; Colley et al., 2022). Intersectional approaches establish relational context and allow for complexity within an individual's multiple identities or demographics.

Methodologically, a research framework that can be employed as one step to using more inclusive approaches to understanding intersectionality is the multiple hierarchy stratification perspective (MHSP). This perspective demonstrates how multiple advantaged or disadvantaged demographic statuses exacerbate inequities in access to resources and/or services (Lee et al., 2001). The MHSP has previously been used to evaluate outdoor recreation access and participation based on the combined effects of race/ethnicity, age, gender, socioeconomic status, proximity to recreation site, and/or rural or urban residence (Powers et al., 2020). To further test MHSP, this article examines the combined effects of race/ethnicity, age, gender, education, and on the probability of activity participation in a U.S. national park. To further test the strength of the causal relationship between the identity variables and participation, a moderating variable, or a variable that may affect the strength and relationship of our dependent and independent variables, will be included as well. The study site, Joshua Tree National Park, is in California. California has the second highest percentage of diversity index in the United States, behind

Hawaii (69.75 and 76%, respectively) (U.S. Census Bureau, 2020). The higher rate of diversity compared to the rest of the U.S. (61%) may contribute to a more diverse visitor population compared to other National Parks. To provide additional context to the effects of living in a highly diverse state, CA residency is included in the first test to compare effects to the identity variables included. This will allow a more nuanced understanding of the potential effects of the identity variables on participation. This intersectional approach can provide government agencies and future researchers with better insight into understanding underserved populations and allow for more targeted engagement and outreach (Powers et al., 2020; Winter et al., 2020).

That said, before proceeding, a few points of clarification and guiding ontologies are important to highlight. First, gender does not exist in a binary and all expressions of gender are welcome in U.S. National Parks. Due to the availability of data, which was collected following the U.S. Office of Management and Budget's guidelines for gender on National Park Service social science surveys, males and females are the only two genders discussed in this article (National Park Service, 2016). Second, the terms minority, underserved, and disadvantaged can have several meanings depending on the context, but for this paper, they refer to females, non-White/Hispanic visitors, those with no bachelor's degree, and/or people who are older. Finally, race and ethnicity are two terms with different meanings that are frequently used interchangeably in the United States. Following, Krymkowski et al., (2014), race/ethnicity is used as a singular term to represent both race and ethnicity.

With these assumptions in mind, the following pages present a background of this research, inclusive of literature detailing visitor activity participation, barriers and constraints research, and an overview of the MHSP. Next, the methodology guiding this study is shared, including an overview of the selected site of Joshua Tree National Park, followed by a

presentation of results. The implications of these data are then discussed in length, both for their impact to potential management at Joshua Tree and other parks seeking to understand and include diverse visitors in accessing the important recreation opportunities they provide.

Visitor Activity Participation

Multiple previous studies explored whether differences in activity participation exist based on visitor demographics. Specifically, a 1980 nationwide survey of participation in 30 activities found demographic characteristics to be related to a statistically significant degree, especially for specific activities (Kelly, 1980, as cited in Manning, 2022). For example, age exhibited a strong inverse relationship with activities that require strength and endurance like rock climbing, while race was strongly related to activities that require equipment like camping or skiing (Kelly, 1980, as cited in Manning, 2022). Additionally, gender was related to activities stereotypically associated with masculinity, like hunting (Kelly, 1980, as cited in Manning, 2022). However, the results did not indicate significantly less overall participation between demographic groups (Kelly, 1980, as cited in Manning, 2022). Shinew et al. (1995) researched the effects of combining gender, race, and social class to influence leisure preferences and found race and social class yield an effect, irrespective of gender (1995). Moreover, Xiao et al.'s (2022) recently investigated the constraints on visitation to U.S. National Parks through a national general population survey and found Black, Hispanic, and lower-income respondents to be least likely to visit NPS sites (2022). Furthermore, other scholars illustrate minority groups are more likely to recreate with family and friends rather than alone compared to Whites (Shores et al., 2007), more specifically Latinx/Hispanic visitors (Flores & Sánchez, 2020; Madsen et al., 2016) and Asian visitors (Lee & Stodolska, 2017), and women are more likely to recreate with others than men (Lee et al., 2007). Regarding where visitors prefer to recreate, previous studies have

shown that minority groups prefer to recreate closer to home and make less use of distant national parks compared to Whites (Dwyer & Hutchinson, 1990; Flores & Sánchez, 2020. McDonald & Hutchinson, 1986). Thus, decades of research establishing differences in activity participation between diverse demographic groups led to an increasing desire among researchers and public agencies to understand why these differences exist.

Barriers and Constraints

Subsequently, many studies demonstrated that minority groups typically experience different potential barriers or constraints to access and participate in outdoor recreation than majority group visitors (Flores & Sánchez, 2020; Krymkowski et al., 2014; Lee & Stodolska, 2017; Virden & Walker, 1999; Lee et al., 2001; Lee et al., 2007; Powers et al., 2020; Scott & Lee, 2018; Stodolska et al., 2011; Wang et al., 2005; Weber & Sultana, 2013; Winter et al., 2020). There are three hypotheses for why these differences exist. The first, the marginality hypothesis posits minority groups have suffered from historical inequalities that have led to barriers, like financial cost and transportation, that inhibit recreation participation (Dwyer & Hutchinson, 1990; Floyd et al., 1994; Krymkowski et al., 2014; Lee & Scott, 2011; Lee et al., 2016; Scott & Lee, 2018; Shinew et al., 1995; Stodolska et al., 2011; Winter et al., 2020). Next, the ethnicity hypothesis posits that differences in participation are a product of differences in subcultural values (Krymkowski et al., 2014; Lee & Scott, 2011; Lee et al., 2016; Scott & Lee, 2018; Stodolska et al., 2011; Weber & Sultana, 2013; Winter et al., 2020). Lastly, the race relations or discrimination hypothesis assumes institutional and/or personal discrimination inhibits participation in outdoor recreation (Krymkowski et al., 2014; Winter et al., 2020). Collectively, these three hypotheses explain the existence of barriers and constraints for underserved visitors.

Study site location contributes to differences in visitation and participation as well. Known for its racial and ethnic diversity, California is the location of numerous studies investigating disparities among visitors and/or non-visitors to parks and protected areas. In a study of park use and constraints for Latinx recreationists in Los Angeles, Byrne (2012) found that despite their desire to recreate and spend time outdoors, many constraints create barriers to visitation (2012). These constraints include distance to parks from their homes, traveling through predominantly White neighborhoods to access parks, lack of access to park information, lack of information provided in Spanish, lack of time, and concerns about the types of other visitors they may encounter (Byrne, 2012). In a more recent study, Flores & Sanchez (2020) found that younger members of the Latinx community are overcoming barriers to visitation by recreating in large groups, having communal experiences, and recreating close to home (2020). Finally, Winter et al., (2020) investigated the disparities in visitation frequency and recency of visitation to National Forests in California and found non-White, older males were significantly more likely to have visited more in their lifetime and more recently compared to Latinx/Hispanic people (2020). They also found that despite an increase in diversity for CA, patterns of inequity continue (Winter et al., 2020).

Barriers and constraints are not only linked to race/ethnicity. A meta-analysis of constraints publications found that older people are more likely to experience the constraints of lack of partner, transportation, fear, and health than younger people (Doucouliagos & Hall, 2010). Additionally, they reported that non-White people are more likely to experience transportation, cost, fear, and knowledge as constraints than White people (Doucouliagos & Hall, 2010). Further, a 2014 study used the National Survey on Recreation and the Environment to investigate constraints to outdoor recreation (Ghrime et al., 2014). The authors found people with

lower levels of education reported experiencing eight of the 17 constraints included in the survey (Ghrime et al., 2014): personal health, inadequate transport, crowded activities areas, poor maintenance, physical limiting condition, member disability, feeling unwelcome, and language barriers. The only constraint experienced by respondents with higher levels of education was a lack of time (Ghrime et al., 2014). In addition, previous research illustrates women experience significantly more constraints to outdoor recreation than men (Doucouliagos & Hall, 2010; Ghrime et al., 2014; Virden & Walker, 1999). Ghrime et al. (2014) found that men experienced one constraint, language barriers, while female respondents experienced nine constraints including "not enough time, not enough money, personal health, no companion, personal safety, inadequate facilities, inadequate information, outdoor pests, and afraid in natural settings" (2014, p. 58). In sum, for numerous demographic groups, lack of participation does not necessarily mean a lack of interest or motivation but can speak to barriers or constraints people with multiple disadvantaged statuses may experience.

In (2002), Rodriguez & Roberts published a State-of-the-Knowledge report which investigated the intersection of race/ethnicity, gender, and class in nine National Park Units by interviewing key personnel like park managers to understand gaps in implementation (2002). They concluded that management plans do not currently, but must emphasize direct outreach to minority communities in order to have an impact in reaching diverse voices, and increases in funding and resources should occur (Rodriguez & Roberts, 2002). In preparing these plans, I argue it is vital to use an intersectionality approach. There is ample previous research exploring how single demographic characteristics influence visitation in national parks (Floyd, 1999; Scott & Lee, 2018; Xiao et al., 2018) or multiple demographics in settings outside of national parks, like state parks or general participation in outdoor recreation, influence visitation (Floyd et al.,

1994; Arnold & Shinew, 1998; Johnson et al., 2001; Lee & Scott 2011; Lee et al., 2016; Pouta et al., 2009; Powers et al., 2020; Roberts & Drogin, 1996; Scott & Jackson, 1996; Winter et al., 2020). To date, no published research could be found that explores the intersection of multiple demographic characteristics and how that impacts the probability of visitor activity participation using a visitor survey in a national park. For these reasons, this study explored the potential effects of combining visitors' status characteristics using the intersectional approach of MHSP on their probability of activity participation in Joshua Tree National Park, which is in Southern California.

Multiple Hierarchy Stratification Perspective

MHSP is a theoretical perspective that has been used since 1990 in social science, health, and aging studies to explain differences in access to resources and services (Arnold & Shinew, 1998; Lee & Scott, 2011; Lee et al., 2016; Markides et al., 1990; Pouta et al., 2009; Powers et al., 2020; Schieman & Plickert, 2007; Shinew et al., 1995; Shores et al., 2007). It is an extension of the double jeopardy hypothesis, which has been studied since 1970 (Beale, 1970). The double jeopardy hypothesis posits that the interaction of an individual's two social characteristics, namely gender and race, impact their access to services or resources (Beale, 1970 as cited in Shores et al., 2007). MHSP sought to expand on this theory by examining the interaction of four social status characteristics (Lee et al., 2001; Shinew et al., 1995). The most commonly used are socioeconomic status (SES), typically represented by education and income, gender, age, and race/ethnicity (Lee et al., 2001; Shinew et al., 1995). When researchers combine these characteristics, it provides a more complete picture of an individual's life, including their social position and access to resources (Lee et al., 2001; Lee & Scott, 2011; Lee & Stodolska, 2017; Shores et al., 2007). MHSP involves stratifying respondents into strata based on their social

characteristics and comparing the first stratum to the last. People in the first stratum include younger White males with high SES because they have the most advantaged status characteristics in our society due to centuries of discrimination and inequality (Lee et al., 2001; Powers et al., 2020; Shores et al., 2007). In contrast, people in the last stratum include older women of color with low SES. Previous leisure and recreation studies have employed MHSP to explain participation in various activities and constraints to visitation for state and city parks (Arnold & Shinew, 1998; Lee et al., 2001; Lee & Scott, 2011; Shores et al., 2007; Lee et al., 2016; Powers et al., 2020). Lee et al. (2016) employed MHSP to investigate differences in fishing participation using a nationwide survey (2016). They found that MHSP effectively explained differences in the probability of participation, particularly between men and women (Lee et al., 2016). In another study, Powers et al. (2020) investigated if MHSP can be used to explain disparities in park visitation and program participation. Their results revealed that members of the first stratum were almost three times more likely to visit their local parks and twice as likely to participate in programming compared to members of the last stratum (2020). However, the linear trend was less clear for participation than for visitation (Powers et al., 2020). Shores et al., (2007) tested the MHSP framework when they investigated the constraints on visitors and non-visitors to Texas state parks (2007). The study revealed young, White males with higher levels of education participate in outdoor recreation at much higher levels than older, minority women without a college degree (Shores et al., 2007).

The results of these previous studies provide validity for using this theoretical perspective in this study to inform visitor use management efforts in national park sites.

Visitor Use Management

The Interagency Visitor Use Management Framework (IVUMF) was created in 2016 by six federal agencies, the U.S. Forest Service, the National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, the Bureau of Land Management, the National Park Service, and U.S. Fish and Wildlife Service. It established a more dynamic, proactive, and consistent way of monitoring and management of these publicly funded institutions (Interagency Visitor Use Management Council, 2019). These agencies routinely gather information on recreation use and users to identify trends (Manning, 2022). One conventional method for gathering this information is visitor surveys. Survey questions generally ask visitors their demographic information, activity participation, visitor use history, and their opinions about a wide variety of topics related to their visit experience (Manning, 2022). Visitor use surveys are an extension of step four, Implement, Monitor, Evaluate, and Adjust, in the IVUMF. It is necessary for the accountability and functionality of the NPS to solicit the experiences of the public to understand their preferences and needs from diverse perspectives (Cahill et al., 2018). In the last two decades, the NPS shifted more effort and focus more effort toward amplifying these perspectives through many avenues including surveying (National Park Service, 2018a; Xiao et al., 2018), RDI initiatives (National Park Service, 2021), partnerships with tribal groups (Schultz et al., 2019), and more holistic interpretation of park unit histories including Native removal, segregation, and chattel slavery (Moresi, 2004; National Park Service, 2014).

However, much of visitor use management research is based on White normative, or Eurocentric, standards of recreation established during the Romanticism movement (Taylor, 2000; Deluca & Demo, 2001; Perry et al., 2021, as cited in Manning, 2022). As the population of the United States continues to increase in diversity, long-standing inequities have been

increasingly recognized in U.S. societal norms. As a result, there remain many more opportunities to explore for equity improvement, which survey data collection and its interpretation can elucidate.

Purpose of Study

This article aims to demonstrate the utility of MHSP to predict the probability of visitor activity participation based on the effects of the combination of their status characteristics. To further understand the nuances of visitors' activity participation, California residency will be a moderating variable used for explaining possible differences in activity participation aside from status characteristics. The results may provide park and protected area (PPA) managers with a tool for monitoring and evaluating visitor use.

1. Question: How does the MHSP explain the probability of visitor activity participation in Joshua Tree National Park?
 - a. Hypothesis: Based on previous studies employing MHSP, visitors in the highest stratum will have a higher probability of participation in 20 activities compared to visitors in the lowest stratum.
2. Question: How does the moderating variable, California residency, contribute to explained variance in activity participation among visitors?
 - a. Hypothesis: Due to the high diversity index in California, including CA residency as a moderating variable will improve the model with significant effects on activity participation and increases in explained variance.
3. Question: How does the MHSP explain the probability of California residency for visitors to Joshua Tree National Park?

- a. Hypothesis: Due to the high diversity index in California, visitors in the lowest strata will have a higher probability of California residency compared to visitors in the highest strata.

Materials and Methods

Study Area

Joshua Tree National Park (JOTR) is located in southern California, on the boundary of the Mojave Desert and the Colorado Desert. This gives it the unique properties of both higher elevation and lower elevation deserts, comprising 46 reptile species, 57 mammal species, over 250 bird species, and over 800 plant species, including the park's namesake, the Joshua Tree (*Yucca brevifolia*), which can exclusively be found in this geographic area. Humans have lived in the area within JOTR's present-day location for at least 5,000 years. Four Native tribes call the area encompassed within the park boundaries their ancestral lands, including the Serrano tribe, the Chemehuevi tribe, the Cahuilla tribe, and the Mojave tribe (Cultural Systems Research, Inc, 2002). In 1936, it was designated as a national monument to protect it from encroaching land development and cacti poachers who arrived in southern California in the 1920s. Nearly 60 years later, in 1994, it was elevated to national park status as part of the Desert Protection Bill (National Park Service, 2018b). In 2019, when the data used for this study was gathered, there were 2,988,547 visitors to the park. The most recent visitor statistics from 2021 show 3,064,400 people visited the park.

Data Collection

The MHSP visitor survey was developed collaboratively by the research team and the JOTR management team. Intercept locations and time of day were intentionally varied to avoid sampling bias. IRB approval was received from Clemson University before the start of sampling.

The Office of Management and Budget control number for the survey and data collection is 1024-0224. During one week in June 2019 and one in November 2019, the research team intercepted adult (18+) visitors with an invitation to participate in a survey using a stratified sampling approach (Vaske, 2008). Visitors were intercepted at park exit stations, campgrounds, and popular rock-climbing sites to ensure a variety of recreation opportunities (see Figure 1 for recreation activities queried) and potential demographics were represented. During each intercept, a trained research technician approached the vehicle/visitor group and greeted them with a short script about the study. The visitors were asked if they were willing to complete a short online survey after their park visit. Willing participants were asked for their group size, group type, birth year, and email address. Unwilling participants were also asked for the group size, group type, and year of birth to control for non-response bias. The technician then distributed a postcard with a unique survey link and QR code. Then, the participant's initial responses were logged along with the unique ID from the postcard and the time of intercept. To increase the response rate, a list of incentives was included on the postcard (e.g., framed print of JOTR, binoculars, GoPro camera, sunglasses, YETI cooler) and one winner was randomly chosen from the list of respondents' email addresses. Visitors who provided email addresses were contacted up to three times after their park visit, following a modified Dillman approach (Dillman, 2011). Once they completed the survey, they were removed from the follow-up contact list. The survey was closed to responses six weeks after the final intercept day. Figure 1 includes the survey question and response choices for measuring visitor activity participation.

Figure 1 Activity participation question from JOTR survey.

Q5a. On this visit, in which activities did you and your personal group participate within Joshua Tree NP? *Mark all that apply.*

- | | |
|---|--|
| ☐ Attended field classes or other guided activities | ☐ Picnicking |
| ☐ Attended ranger-led programs | ☐ Rock scrambling (without specialized gear or skills) |
| ☐ Backpacking overnight | ☐ Seeking spiritual connection |
| ☐ Bicycling | ☐ Sightseeing |
| ☐ Bouldering (using pads and bouldering guides) | ☐ Slacklining |
| ☐ Camping | ☐ Stargazing / viewing night sky |
| ☐ Created content for social media / blogs | ☐ Technical climbing (with specialized gear or skills) |
| ☐ Day hiking | ☐ Trail running |
| ☐ Enjoyed nature | ☐ Viewed plants and/or wildlife |
| ☐ Exercised to promote physical fitness | ☐ Visited historical or archaeological sites |
| ☐ Family / friend gathering or celebration | ☐ Visited visitor center(s) |
| ☐ Horseback riding | ☐ Walking self-guided nature trails (with brochures/signs) |
| ☐ Photography / videos | ☐ Other (Please specify)
_____ |

In June 2019, a total of 2,007 visitor groups were intercepted and 94.9% agreed to participate. In November 2019, 3,424 visitor groups were intercepted and 96.3% agreed to participate. A total of 5,431 visitor groups were intercepted over the two weeks in JOTR. Following iterative email reminders, at the close of sampling, the effort resulted in a total of 2,199 surveys completed (40.5% response rate). Non-respondents trended younger (38.84 years old) than respondents (43.70 years old). Group size did not vary significantly between respondents and non-respondents.

Data Analysis

Numerous steps were completed to prepare and conduct MHSP analyses. All analysis was performed using SPSS. First, any responses that did not include age, gender, and/or race/ethnicity demographic data were removed (-85). Then, international respondents were removed (-340). In total, 1,774 respondents (-425) were included in the analysis. Next, two analyses were conducted to test MHSP. Following previous studies that test MHSP, binary logistic regression was used for the first analysis to test the combined effects of independent variables on the dependent variables from their provided coefficients (Shores et al., 2007; Lee & Scott, 2011; Lee et al., 2016). The first analysis included the null model and how the combined effects of the independent variables impact their activity participation. The prediction equation used for this logistic regression model is expressed as:

$$\text{Logit}(\pi) = \alpha + \beta_1 X_1 + \dots + \beta_k X_k$$

In the equation, α represents the intercept, $\beta_1 X_1$ is the first independent variable, with each subsequent independent variable added accordingly. The first block entered includes the respondents' age, education, gender, and race/ethnicity. The second block entered includes California residency for comparing the model with and without the variable. The dependent variables are the visitors' responses to the activity participation question. Attended field classes, attended ranger-led programs, horseback riding, and slacklining was not included in the analysis due to low participation rates ($n < 100$). "Other" activity responses were also not included in the analysis.

The independent variables were dichotomized into two categories, "0" representing the disadvantaged status and "1" representing the advantaged status. Age was split into three variables, 18-44, 45-64, and 65+ to potentially detect more nuanced significance, to replicate Lee & Scott (2011). Education was divided into having a bachelor's degree or higher and not having

a bachelor's degree. Gender was split into male and female. Race/ethnicity was also split into three categories, Latinx/Hispanic or Not, Asian or Not, and White/non-Hispanic or Not, to replicate Powers et al. (2020). California residency was split into resident or not based on the zip code provided. All dichotomization guidelines were based on previous tests of MHSP (Lee et al., 2001; Lee & Scott, 2011; Powers, et al., 2020; Shores et al., 2007). The disadvantaged statuses were used as the reference categories (Powers et al., 2020). The dependent variables were separated by activity participation for a total of 20 dependent variables and 20 models. Following Lee and Scott (2011), the dependent variables were dichotomized into two categories as well, "0" for did not participate and "1" for did participate.

The second analysis is the most direct test of MHSP. The coefficient values of the independent variables are used to predict the probability of activity participation. The equation used is sourced from Agresti & Finlay (1997) and Hamilton (1992):

$$\pi = \frac{e^{\alpha + \beta_1 X_1 + \dots + \beta_k X_k}}{1 + e^{\alpha + \beta_1 X_1 + \dots + \beta_k X_k}}$$

To simplify the interpretation of results, we further dichotomized age and race/ethnicity by combining 45-64 and 65 and older into one category and Latinx/Hispanic and Asian were added to the minority category. The four independent variables representing status characteristics can be combined to create 16 stratum. The first stratum represents all advantaged status characteristics, White, male, bachelor's or higher, and less than 45 years old. As you move down the stratum, one advantaged characteristic is replaced with a disadvantaged characteristic. The last stratum represents minority women older than 44, without a bachelor's degree.

Results

Characteristics of Respondents

Table 1 displays the demographic characteristics of respondents, which are used as independent variables in the logistic regression models. Due to low representation American Indian or Alaska Native, Black or African American, Hawaiian or Pacific Islander, and Other are not included as a separate independent variable.

	<i>Characteristic</i>	<i>n</i>	<i>Valid Percent</i>
<i>Binary Gender</i>	Male	892	50.3%
	Female	882	49.7%
<i>Age</i>	18-44	1012	57%
	45-64	540	30.4%
	65+	222	12.5%
<i>Race/Ethnicity</i>	White/Non-Hispanic	1054	59.4%
	Asian	335	18.9%
	Latinx/Hispanic	321	18.1%
<i>Education</i>	Bachelor's or higher	1372	77.3%
	Non-bachelor's	402	22.7%
<i>CA Resident</i>	Yes	854	48.1%
	No	920	51.9%

Table 1. Characteristics of logistic regression independent variables.

Individual Effects of Characteristics

Table 2 displays the combined effect of the independent variables. As an example, the predicted equation for “visited visitor center” (Model 11 in Table 2) is expressed as:

$$\text{Logit}(\pi) = 1.610 - .256 \text{ gender}(1) + .076 \text{ Asian}(1) + .397 \text{ Latinx}(1) - .062 \text{ White}(1) - .543 \text{ age18-44}(1) - .312 \text{ age45-64}(1) + .260 \text{ education}(1) - .539 \text{ CA residence}(1).$$

Models	<i>Backpack overnight</i>	<i>Bouldering</i>	<i>Camping</i>	<i>Exercised for physical fitness</i>	<i>Family / friend gathering</i>	<i>Photography / Videography</i>	<i>Picnicking</i>	<i>Rock scrambling</i>	<i>Seeking spiritual connection</i>	<i>Star gazing / night sky viewing</i>	<i>Technical climbing</i>	<i>Visited historical/ archaeological sites</i>	<i>Visited Visitor Center</i>
<i>Intercept</i>	-4.765*** (.009)	-2.373*** (.093)	-1.165*** (.312)	.206 (1.109)	-.983*** (.374)	1.724*** (5.609)	-1.045*** (.352)	-.400* (.670)	-.661** (.516)	.431* (.650)	-3.073*** (.046)	-.328 (.721)	1.610*** (5.001)
<i>I=Male</i>	.500** (1.650)	.364** (1.439)	.243** (1.276)	-.127 (.880)	-.232** (.793)	-.081 (.922)	-.043 (.958)	.121 (1.129)	.026 (1.027)	.070 (1.073)	.299** (1.348)	-.230** (.794)	-.256** (.774)
<i>I= Asian</i>	.151 (1.163)	.180 (1.197)	.302* (1.352)	-.240 (.787)	.255 (1.291)	.269 (1.309)	.537** (1.711)	.053 (1.054)	-.515** (.597)	.174 (1.190)	.001 (1.001)	-.267 (.766)	.076 (1.079)
<i>I = Latinx or Hispanic</i>	.625* (1.869)	.133 (1.142)	.457** (1.579)	.201 (1.222)	-.086 (.918)	.302 (1.352)	.658*** (1.930)	.358* (1.431)	-.051 (.950)	.243 (1.275)	.104 (1.109)	-.093 (.911)	.397* (1.488)
<i>I = White</i>	.206 (1.229)	-.209 (.812)	.235 (1.265)	-.196 (.822)	-.003 (.997)	-.097 (.907)	.220 (1.246)	-.004 (.996)	-.552*** (.576)	-.089 (.915)	.011 (1.011)	-.308* (.735)	-.062 (.939)
<i>I = 18-44</i>	1.032** (2.807)	.622** (1.864)	.678*** (1.969)	.238 (1.269)	.387** (1.473)	.054 (1.055)	-.026 (.974)	.913*** (2.491)	.348* (1.417)	.535*** (1.707)	1.431*** (4.181)	-.058 (.943)	-.543** (.581)
<i>I = 45-64</i>	.794* (2.212)	.233 (1.262)	.344* (1.410)	.308* (1.360)	.124 (1.132)	.184 (1.203)	-.014 (.936)	.525*** (1.691)	.259 (1.296)	.173 (1.189)	1.093*** (2.983)	-.112 (.499)	-.312 (.732)
<i>I = bachelor's or higher</i>	.467* (1.594)	.004 (1.172)	.050 (1.051)	.176 (1.193)	.022 (1.022)	-.135 (.873)	-.184 (.832)	-.014 (.986)	.083 (1.086)	.052 (1.054)	.027 (1.027)	.271** (1.312)	.260* (1.297)
<i>I = California Resident</i>	.513** (1.670)	.159 (1.172)	.300*** (1.349)	.206* (1.229)	.386*** (1.471)	-.347** (.707)	.056 (1.058)	.117 (1.125)	.250** (1.284)	.146 (1.157)	.318** (1.372)	.087 (1.091)	-.539*** (.583)
<i>No-CA Nagelkerke R²</i>	0.035	0.028	0.032	0.013	0.017	0.008	0.022	0.04	0.021	0.026	0.039	0.011	0.021
<i>W/ CA Nagelkerke R²</i>	0.044	0.03	0.039	0.016	0.028	0.015	0.022	0.041	0.025	0.028	0.045	0.012	0.04
<i>Omnibus Chi- Square/df</i>	30.053/8***	30.520/8***	52.083/8***	21.820/8**	37.079/8***	16.438/8*	27.896/8***	54.692/8***	32.911/8***	37.118/8***	49.146/8***	15.806/8*	49.288/8***
<i>Chi- square/df (HL test)</i>	6.847/8	7.568/8	8.428/8	10.584/8	3.828/8	5.633/8	1.718/8	8.960/8	4.076/8	10.969/8	9.690/8	12.681/8	6.223/8
<i>% Correctly predicted</i>	93.6	84.6	56.8	60.1	64.1	82.1	70	62.7	64.8	56.4	81.7	62.4	73.7

Table 2. Logistic regression estimates of combined effects of independent variables on activity participation.

Logistic regression coefficient ***p < or = .001, **p < .01, *p < .05. Odds ratio in parentheses.

No- CA Nagelkerke R² = variance explained without California variable, W/ CA = variance explained with California variable.

Of the 20 models, seven did not outperform the null model. Those activities include created content for social media / blogs, day hiking, enjoyed nature, sightseeing, trail running, viewed wildlife / plants, and walked self-guided nature trails. The 13 multiple regression models that outperformed the null model are represented in Table 2. These models are all significant with limited variance explained by each model. Table 2 also includes the amount of variance explained before the addition of the CA residence variable and after to compare as a test of the second hypothesis. The inclusion of CA residence increased variance explained in all 13 models except picnicking, with the highest increase in backpacking, family / friend gathering, and visited the visitor center. Despite the limited amount of variance explained, the models do indicate that the independent variables had varying effects on activity participation.

The key finding of the first analysis is the independent variables have a greater effect on specific activities rather than on each activity equally. The backpacking, camping, and visited visitor center models have the greatest number of independent variable effects. Age exhibited the most significant effects and predicted participation in 10 of the 20 activities analyzed, followed by gender and race/ethnicity which predicted participation in seven activities. Education was a significant predictor for three of the 20 total activities. In comparison, the moderating variable, California residency, predicted participation in 10 activities, equal to age and more than any other status characteristic.

Age not only effects half of the activities but has the strongest effects as well. Specifically on activities associated with strength and endurance. For instance, visitors 18-44 are 2.8 times more likely to participate in backpacking than those who are older, visitors 45-64 are 2.2 times more likely to participate than those who are older. Additionally, 18–44-year-olds are

4.2 times more likely to participate in technical climbing than those who are older, and 45–64-year-olds are 3 times more likely to participate than those who are older than 64.

There are some interesting results from the race/ethnicity variables as well.

Latinx/Hispanic visitors are 1.9 times more likely to participate in picnicking than non-Latinx/non-Hispanic visitors, and Asian visitors are 1.7 times more likely to participate in picnicking compared to non-Asian visitors. Additionally, Latinx/Hispanic visitors are 1.9 times more likely to participate in backpacking and 1.6 times more likely to participate in camping than non-Latinx/non-Hispanic visitors.

Out of the 10 models that CA residency had effects on, all were positively correlated with resident status expect photography / videography and visited visitor center which showed non-CA residents to have a stronger prediction for participation.

Multiple Hierarchy Stratification Perspective

After the effects of the combined independent variables were tested, the probability of participation in each activity using MHSP was investigated. Table 3 presents the probability of participation for the 13 models which outperformed the null model in the first analysis. MHSP did reveal disparities in the probability of activity participation. For easier interpretation, the models have been separated into active and passive recreation for the Table 3, Figure 2, and Figure 3. Active recreation refers to any activity requiring physicality while passive recreation does not. This aids in visualizing the data and to make comparisons between similar activities, like rock scrambling and bouldering or picnicking and friend / family gathering.

Stratum	Minority Status	Gender	Age	Education	Active					Passive							
					Backpacking overnight	Bouldering	Technical climbing	Exercised for physical fitness	Rock scrambling	Camping	Star gazing / night sky viewing	Seeking spiritual connection	Visited historical or archaeological sites	Visited Visitor Center	Photography or Videography	Family / friend gathering or celebration	Picnicking
1	Majority	Male	<45	Bachelor's+	0.11	0.18	0.24	0.57	0.66	0.54	0.55	0.34	0.35	0.68	0.79	0.35	0.26
2	Majority	Male	<45	Non-bachelor's	0.06	0.18	0.23	0.53	0.66	0.53	0.54	0.33	0.30	0.62	0.80	0.34	0.30
3	Majority	Male	45+	Bachelor's+	0.06	0.12	0.15	0.56	0.53	0.43	0.45	0.31	0.35	0.75	0.80	0.28	0.26
4	Majority	Male	45+	Non-bachelor's	0.04	0.12	0.15	0.53	0.53	0.42	0.43	0.30	0.29	0.69	0.82	0.28	0.30
5	Minority	Male	<45	Bachelor's+	0.11	0.24	0.25	0.62	0.70	0.58	0.62	0.42	0.39	0.72	0.83	0.38	0.33
6	Majority	Female	<45	Bachelor's+	0.06	0.13	0.19	0.60	0.63	0.48	0.53	0.33	0.40	0.74	0.80	0.40	0.27
7	Majority	Female	45+	Bachelor's+	0.04	0.09	0.11	0.59	0.50	0.37	0.43	0.30	0.40	0.80	0.82	0.33	0.27
8	Minority	Male	45+	Bachelor's+	0.08	0.17	0.16	0.61	0.58	0.47	0.52	0.38	0.38	0.78	0.84	0.31	0.33
9	Minority	Female	<45	Bachelor's+	0.07	0.18	0.20	0.65	0.68	0.52	0.61	0.41	0.44	0.77	0.85	0.43	0.34
10	Minority	Male	<45	Non-bachelor's	0.08	0.24	0.25	0.58	0.71	0.57	0.61	0.41	0.33	0.66	0.85	0.38	0.37
11	Majority	Female	<45	Non-bachelor's	0.04	0.13	0.19	0.56	0.64	0.47	0.52	0.33	0.34	0.68	0.82	0.39	0.31
12	Minority	Female	45+	Bachelor's+	0.05	0.12	0.12	0.64	0.55	0.41	0.50	0.37	0.44	0.82	0.86	0.36	0.34
13	Majority	Female	45+	Non-bachelor's	0.02	0.09	0.11	0.56	0.50	0.36	0.42	0.29	0.34	0.75	0.83	0.32	0.31
14	Minority	Male	45+	Non-bachelor's	0.05	0.17	0.16	0.58	0.58	0.46	0.51	0.37	0.33	0.73	0.86	0.31	0.37
15	Minority	Female	<45	Non-bachelor's	0.05	0.18	0.20	0.61	0.68	0.51	0.59	0.40	0.38	0.72	0.86	0.43	0.38
16	Minority	Female	45+	Non-bachelor's	0.03	0.12	0.12	0.60	0.55	0.40	0.49	0.36	0.38	0.78	0.87	0.36	0.38
Stratum 1- Stratum 16					0.08	0.06	0.12	-0.03	0.11	0.14	0.06	-0.02	-0.02	-0.10	-0.08	-0.01	-0.12

Table 3. Probability of activity participation within multiple hierarchy stratification perspective.

Figure 2 presents the probability of participation among the 16 stratum for the six active activities.

Figure 2. Probability of activity participation in “active” recreation.

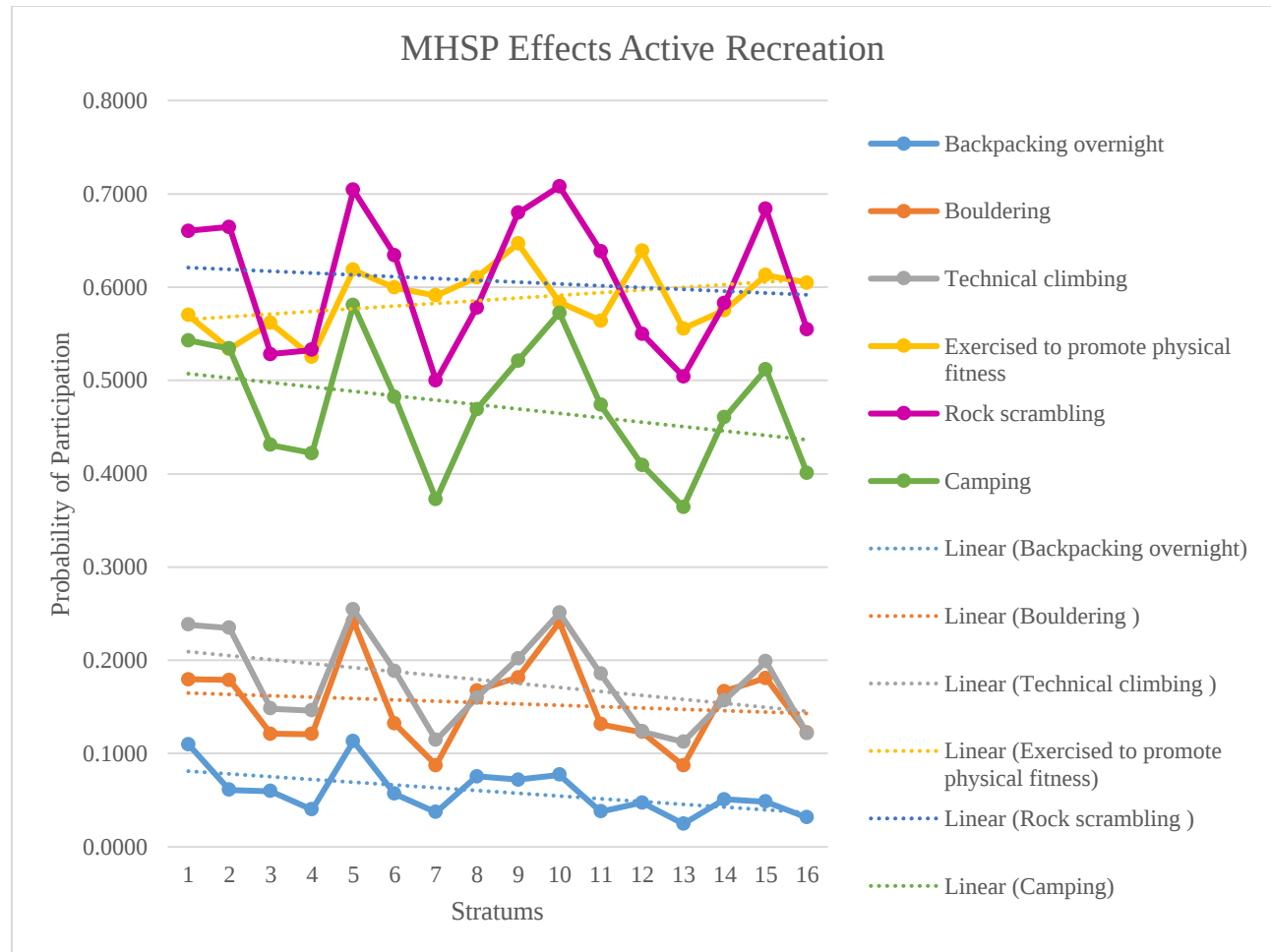


Figure 2 demonstrates that there is a slight downward trend for five of the six active models from only the backpacking model demonstrates this (Figure 2). Interestingly, stratum five and 10, which represent minority males of both age and education categories, and stratum 15 which represents minority females younger than 45 with no bachelor’s degree, show spikes in probability of active recreation participation. Moreover, stratum seven and 13, or majority females 45 and older with and without bachelor’s degrees have the greatest dips in probability of

participation for active recreation. Exercised to promote physical fitness does not follow the same trend as the other active recreation activities and shows a slight increase from stratum one to stratum 16.

Next, Figure 3 presents the probability of participation for the seven passive recreation activities.

Figure 3. Probability of activity participation in “passive” recreation.

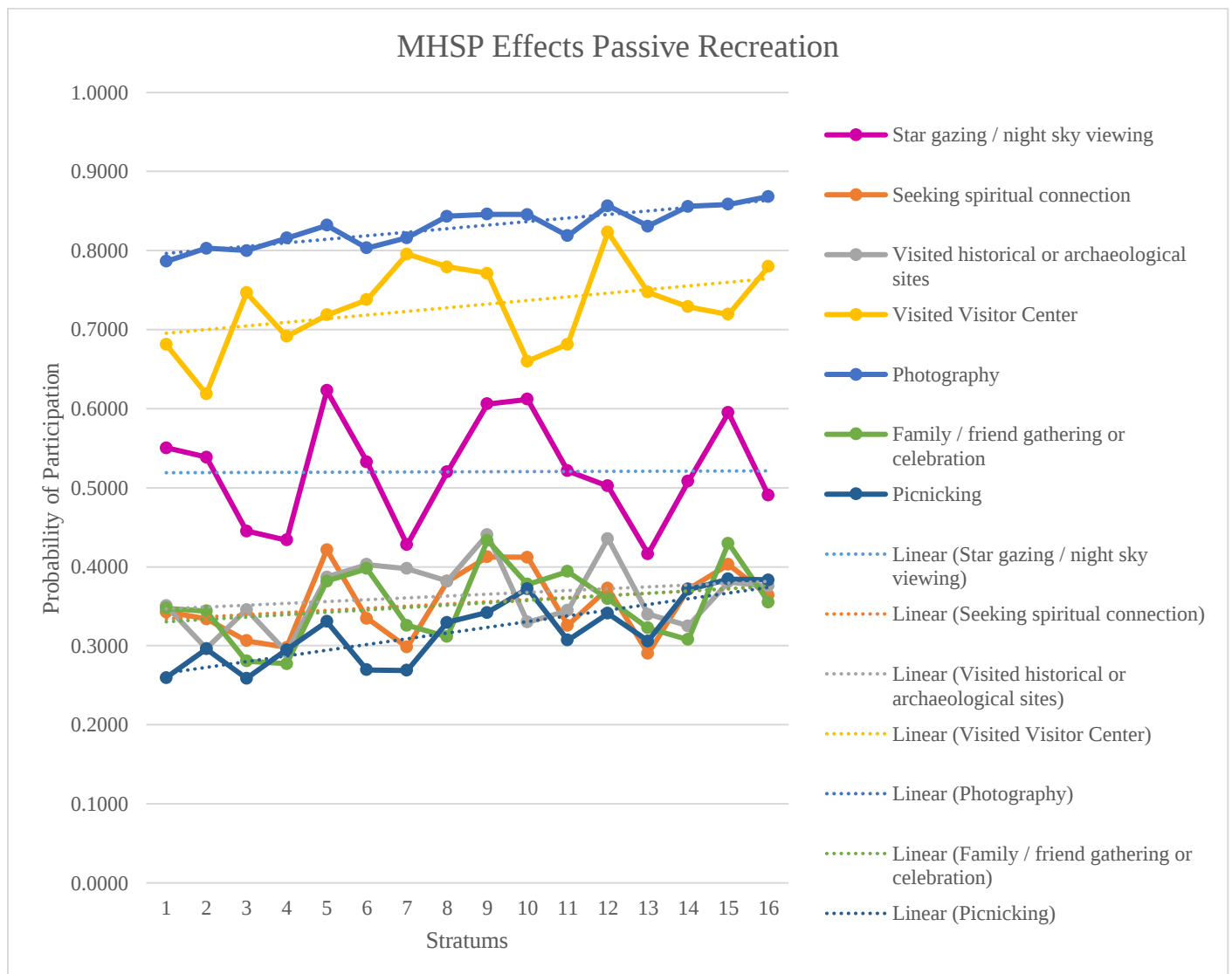


Figure 3 demonstrates an inverse of MHSP with an upward trend from stratum one to stratum 16 for photography/videography and picnicking, and a slight upward trend for visited visitor center. For family / friend gathering and visited historical or archaeological participation, there is a suggestion of an upward trend, but it is much less clear. There is no linear trend for stargazing / night sky viewing.

Table 4 presents the probability of participation averaged across each stratum for the 13 models that outperformed the null model in the first analysis as well as the average probability for each stratum for all 20 models.

<i>Stratum</i>	<i>Minority Status</i>	<i>Binary Gender</i>	<i>Age</i>	<i>Education</i>	<i>Average probability for 13 models</i>	<i>Average probability for 20 models</i>
1	Majority	Male	<45	Bachelor's+	0.4322	0.5099
2	Majority	Male	<45	Non-Bachelor's	0.4183	0.4989
3	Majority	Male	45+	Bachelor's+	0.3872	0.4792
4	Majority	Male	45+	Non-Bachelor's	0.3762	0.4700
5	Minority	Male	<45	Bachelor's+	0.4775	0.5454
6	Majority	Female	<45	Bachelor's+	0.4286	0.5126
7	Majority	Female	45+	Bachelor's+	0.3871	0.4816
8	Minority	Male	45+	Bachelor's+	0.4313	0.5128
9	Minority	Female	<45	Bachelor's+	0.4735	0.5438
10	Minority	Male	<45	Non-Bachelor's	0.4648	0.5356
11	Majority	Female	<45	Non-Bachelor's	0.4172	0.5032
12	Minority	Female	45+	Bachelor's+	0.4294	0.5141
13	Majority	Female	45+	Non-Bachelor's	0.3770	0.4746
14	Minority	Male	45+	Non-Bachelor's	0.4202	0.5031
15	Minority	Female	<45	Non-Bachelor's	0.4621	0.5359
16	Minority	Female	45+	Non-Bachelor's	0.4194	0.5066

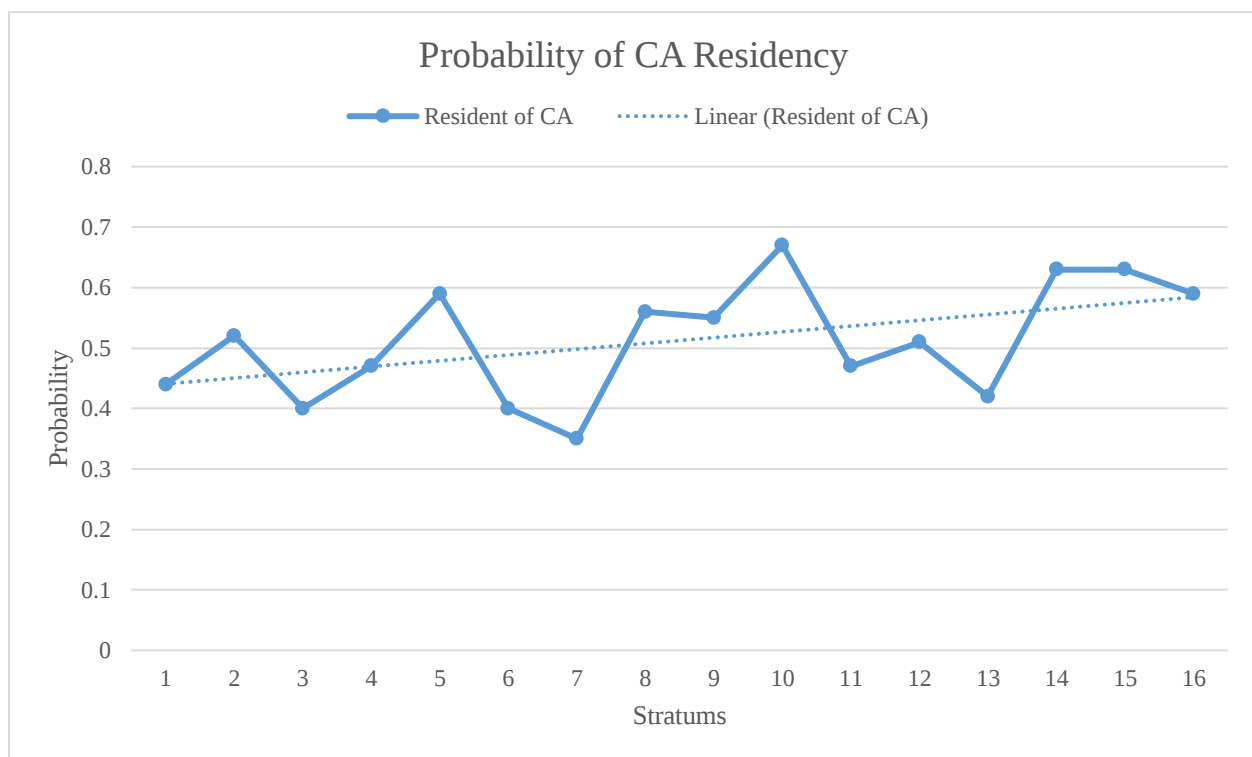
Table 4. Averaged probability of activity participation for all stratum.

Stratum one and stratum 16 have very similar average participation probabilities at 43.2% and 41.9%, respectively. Stratum five, representing minority males younger than 45 with a bachelor's degree, and stratum nine, representing minority females younger than 45 with a bachelor's degree, have the overall highest probability of participation across all stratum at

47.8% and 47.3%, respectively. Additionally, stratum four, representing majority males older than 44 without a bachelor's degree, and stratum 13, representing majority females older than 44 without a bachelor's degree, have the lowest average probability of participation with 37.6% and 37.7%, respectively. When participation for all 20 models, including those which did not outperform the null model in the first analysis, is averaged for each stratum, the difference between stratum one and stratum 16 is even smaller with a difference of less than half a percent.

Figure 5 graphs the probability of all strata being a resident of California demonstrates the test of the final hypothesis.

Figure 4. California residency probability using MHSP.



Stratum one has a 44% probability of being a CA resident while stratum 16 has a 59% probability of being a CA resident. Stratum 10, minority males younger than 45 without a bachelor's degree have the highest probability of being a resident of CA at 67%. In contrast,

stratum seven, majority females older than 44 with a bachelor's degree, have the lowest probability at 35%. Next, the presented results are discussed.

Discussion

The first analysis, binary logistic regression, accounts for the individual effects of each independent variable while holding constant the variation explained by the other independent variables in each model. Although not being directly tested by a hypothesis, there are some interesting individual independent variable effects to discuss.

The finding that age effected predicted participation in backpacking, bouldering, exercised to promote physical fitness, rock-scrambling, and technical climbing are more likely for visitors younger than 45 agrees with previous results which states participation to have an inverse relationship with age for activities requiring strength (Kelly, 1980). However, younger visitors were also more likely to participate in stargazing/night sky viewing, a passive recreation activity. This is likely at least partially due to age being a significant explanation of variance for camping as well and stargazing/night sky viewing can reasonably be assumed to happen concurrently. The respondents' activity participation overlap was analyzed to provide further validity for this explanation. Visitors who reported camping as an activity were 2.3 times more likely to also report stargazing/night sky viewing as an activity ($n = 849$) when compared to visitors who reported stargazing/night sky viewing as an activity but did not report camping ($n = 366$).

The demographic variable with the second greatest effect on activity participation is gender with effects on seven activities. The activities in which males are more likely to participate than women are backpacking, bouldering, camping, and technical climbing. However, for rock scrambling, no differences in gender participation were found which may be a result of

easier access to participation with no or minimal equipment required. Additional investigation into these differences is warranted. Additionally, females were more likely than males to participate in family/friend gatherings or celebrations, which is expected given women are more likely to participate with others in activities than alone compared to men (Lee et al., 2007). This somewhat contradicts Shinew et al., (1995) who did not find differences in participation related to gender.

The results show race/ethnicity to have an influence on participation for seven of the 13 activities that outperformed the null hypothesis. The activity with the greatest effect is picnicking where both Latinx/Hispanic and Asian were nearly twice as likely (1.7x and 1.8x, respectively) to participate than non-Latinx/Hispanic or non-Asian visitors. This reflects previous findings which found both Latinx/Hispanic and Asian visitors were more likely to participate in group or communal activities compared to activities that are more individualistic (Flores & Sanchez, 2020; Lee & Stodolska, 2017).

This study found very little influence at all of education on the probability of activity participation. This is very likely because the bachelor's or higher category was 77% of the total respondents included in the analysis, and of that 41.2% held a graduate or professional degree. This speaks to the overall homogeneity common in visitors to national parks and is a limitation of including visitors and excluding non-visitors in a study (Manning, 2022). Other studies illustrate education to be more significant when assessing constraints on visitors and non-visitors (Doucouliagos & Hall, 2010; Ghrome et al., 2014), and education should continue to be used as an independent variable when employing the MHSP in future studies.

The hypothesis testing can now be discussed. The results of this study demonstrate MHSP is only effective in explaining the probability of participation in some of the activities

included in this analysis. Therefore, the first hypothesis, and central focus of this thesis work, was partially disproven. Seven of the 20 models do not outperform the null model. This denotes that the combination of our independent variables does not have a significant effect on predicted participation with a 95% confidence level for day-hiking, enjoyed nature, created content for social media / blogs, sightseeing, viewed wildlife / plants, walked self-guided nature trails, or trail running. In other words, these are activities enjoyed (or not) similarly across demographic types.

Of the 13 models which did outperform the null hypothesis with a 95% confidence rate, seven of the models demonstrated an inverse of MHSP as there was a linear trend upward from stratum one to stratum 16 (Figure 2 and 3). Six models did demonstrate the expected downward trend of MHSP (Figure 2 and 3). Interestingly, the MHSP relationship occurred in five of the six activities categorized as active with exercised to promote physical fitness as the outlier (Table 3). In direct contrast, the inverse of MHSP occurred in six of the seven models categorized as passive with stargazing / night sky viewing as the outlier (Table 3). Overall, the explained variance, represented by Nagelkerke R^2 , is highest for active recreation types for both CA residents and non-CA residents (Table 2). Specifically, backpacking, camping, rock scrambling, and technical climbing (Table 2). However, explained variances for all models is small with less than 5% explained. This suggests that despite their being significant effects of the independent variables on many of the activities, there are other variables not included in the model that can potentially explain more variance.

To summarize the discussion of the first hypothesis, despite the limited variance explained, the combination of identity variables outperformed the null model in 13 of the 20 activities analyzed. However, the expected downward MHSP trend was present linearly, but with

departures from the linear trend for most models. In some models, no trend is present. This result of the first hypothesis mirrors the findings of two other studies which employed MHSP to explain differences in the probability of activity participation (Lee & Scott, 2011; Powers et al., 2020). The utility of MHSP to find greater significance in specific activities rather than overall activity participation is also concurrent with previous knowledge on variance in activity participation in sites with a range of outdoor recreation opportunities (Kelly, 1980; Manning, 2022).

The second hypothesis related to the addition of CA residency to improve the binary logistic regression model could not be disproven. Apart from the picnicking model, all models in explained variance after CA residency is added. Given the diversity found in CA and CA residents accounting for 48.1% of the sample, it is unsurprising that more diverse visitors are participating in activities in JOTR. However, the results should not be interpreted that higher visitor diversity at JOTR means a decrease in social inequities in visitation or participation as the CA resident sample was less diverse than the proportion of racial/ethnic diversity index for the state and suggests continuing disparities in recreation for minority group visitors. CA residency significantly affected eight of the 13 models which outperformed the null model. Including residency of states or regions with exceptionally diverse or exceptionally homogenous populations to account for its effects on the other independent variables is necessary for more accurate data interpretation and discussion (Winter et al., 2020). This finding also helps to illustrate the context of individual park unit locations and why results should not be extrapolated across geographic regions. However, future studies of equitable access and investigations to improve equity, regardless of state or region, can be informed by these results and discussions.

Finally, the last hypothesis could not be disproven as there is a linear trend upward from stratum one to stratum 16 as predicted likely due to the high diversity index of California compared to the rest of the United States (U.S. Census Bureau, 2020). Using MHSP to demonstrate how state diversity effects stratified visitors provides additional information for parks and protected area managers for more targeted management decision making. It also helps to illustrate why national parks in diverse regions or states may report higher rates of diverse visitor populations compared to national parks in more remote location and/or with less diverse populations in the state/region.

Limitations and Future Research

Like any research effort, numerous limitations deserve mention. Other identity variables that have been included in previous MHSP studies and could be considered for inclusion in future models to potentially increase explained variance are household income and rural or urban residence (Lee & Scott, 2011; Powers et al., 2020). Additionally, future MHSP efforts can investigate activity participation for visitors' and non-visitors, as well as motivations for participating or potential barriers to participating. According to Manning (2022), hyper-focus on participation may result in overlooking visitor motivations for participation or lack thereof, which is more meaningful information for land agency management and outside organizations with a vested interest. For example, the results from this effort showed women were more likely to participate in family/friend gatherings and celebrations than men. Many previous studies have found fear or security a strong motivator for participating in group activities (Ghrime et al., 2014; Virden & Walker, 1999), but other studies show women tend to be more social (Lee et al., 2017). Their motivations and preferences for visiting national parks and participating in activities with others could be explored with future research.

Similarly, as Madsen et al. (2016) illustrated, specific racial/ethnic groups like Latinx/Hispanic have recreational preferences that determine park visitation and activity participation (2016). Family/friend gatherings and picnicking are two activities that are more inclusive of Latinx/Hispanic preferences, like spending quality time together and having communal meal experiences (Madsen et al., 2016). In other words, the activities respondents could select on this survey are primarily limited to Eurocentric activities, like camping and technical climbing. This limits the scope of possible participation based on White normative standards, the very same which contributed to inequities in access since the founding of the NPS (Perry et al., 2021). Some suggestions for additional non-Eurocentric activities to be included in future surveys are storytelling, traditional music/dance, visual and/or performance art, and connecting to the land.

Conclusion

The major takeaway from this study for public land agency managers is that the linear downward trend expected for MHSP is not clear for activity participation. Overall, our models indicate the uneven effects of independent variables like age compared to education results in nonlinear trends for visitor activity participation. Despite the lack of clear trends, stratifying visitors based on intersectional demographics provides trends that can elucidate insights on park and protected areas visitors. It can be added as an intersectional data analysis tool for future monitoring and evaluation of trends among visitors to national parks or more broadly, parks and protected areas. Monitoring visitor use, including activity participation, is an important step in the IVUMF process. Consistent monitoring is necessary for identifying trends in use and recognizing areas for improvement. Moreover, the consistent use of intersectional monitoring and interpretation methods can provide relevant information for managers to share with the

public as a part of accountability and normalizing more diverse visitors' outdoor recreation and activity participation (Winter et al., 2020). Another application of this tool for land agency managers is the use of MHSP to investigate differences in even more topics, like potential management scenarios or possible detractors from the visitor experience. Additionally, organizations interested in increasing inclusivity and opportunities for underserved populations can utilize this data analysis tool to target and engage with minority groups in a geographic area and/or at a single park (Winter et al., 2020). Potential results can be used to identify parks, activities, and/or barriers and constraints that are of significant interest or consequence.

Since this data was collected three years ago in 2019, the United States has been confronted with social justice movements like Black Lives Matter and the world has faced the COVID-19 pandemic. These events continue to impact people and how they recreate and behave in outdoor spaces. Now more than ever, it is necessary to reflect inclusive voices rather than continuing to reflect homogenous voices (Rose et al. 2022). This effort utilized an intersectional approach to investigate visitor participation in 20 activities in a popular U.S. National Park in California. These findings can be used to guide future research that seeks to investigate participation differences in recreation.

Chapter 3 - Reflection

At the time of writing this, almost two years ago to the day, I applied for a graduate research assistant position for the Park Management and Conservation (PMC) program at Kansas State University (KSU). The last two years have brought immense growth to me personally and professionally. I would like to take this opportunity to reflect on my graduate school experience.

After spending the previous year working in the restaurant industry during the COVID-19 pandemic, I was eagerly searching for an entry point to a career where I could pursue bringing more people "into" the outdoors. I was exposed to the concept of environmental justice almost a decade ago during undergrad. Ever since, I felt passionate that increasing equity and reducing harm to underrepresented people is imperative, especially as the global effects of climate change are increasing in severity. I did ample research, had conversations with Drs. Ryan Sharp and Jessica Fefer, and as a result became unshaken in my belief that this program was for me. I fervently waited for a position to be announced and when it did, I was hopeful my passion and commitment would be apparent. Fortunately for me, Dr. Ryan Sharp offered me the position, and needed an extra student for survey sampling in the summer so I was able to begin two months before the original announcement's start date.

The summer of 2021 was the beginning of an exciting chapter in my life. I moved from the Kansas City suburbs to Manhattan, KS, and immediately fell in love with the small city. After living in Kansas for 14 years, I found many new reasons to appreciate our State because of the pride of the community and the surrounding beauty and history of the Flint Hills. My mentors and peers hail from many places I have yet to visit and taught me more than they know. Through spending time together, I gained many fresh perspectives, and I am inspired by their

intellect and determination. I have made friendships that I hope to have for the rest of my life. Many began en route to the latest data collection effort.

I was fortunate to have started in the program just as on-site sampling became possible again after a long period of inability because of the aforementioned pandemic. Every data collection trip has been a gift. From the tallgrass prairies of Kansas to the hallowed ground of Harpers Ferry; From the caves of Kentucky to the historic trails and towpaths along the Potomac River; From the distinctive French-Colonial architecture of Sainte Genevieve to the elusive Mojave Desert Tortoise of Joshua Tree, I have come to know much more about not only park management and conservation but also about myself. Having mostly been limited to the more romantic and idealistic stories of conservation history, I learned how drastically history can change depending on who is doing the retelling. Despite the wrongs of the past, many of which still long to be righted, I learned of hard-fought battles for wildlife or landscapes that could not speak for themselves and human histories which had gone largely untold until recently. I learned what it means to conduct social science research and now appreciate the labor that goes into each experiment or study that contributes to the ever-growing knowledge base. I have become more confident and sure-footed. I no longer feel I must be an expert to contribute an idea or begin developing a research question. Instead, having the willingness to learn and possibly be wrong is enough to begin. Fundamentally, I learned progress and innovation happen as a result of multi-dimensional perspectives, thus being an authentic individual is the most valuable contribution I can make.

As I look to the next chapter in my life, I see how my graduate school experience has opened countless doors, many of which I have yet to walk through. When I do, I will carry these lessons and memories with me.

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