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DO SOCIO-CULTURAL TRAITS AND OTHER DEMOGRAPHICS AFFECT OUTDOOR RECREATION CONSTRAINTS? THE CASE FOR MESA COUNTY, COLORADO

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ABSTRACT

Physical activity from outdoor recreational pursuits is well known to be beneficial and has been encouraged by the US Surgeon General. Specific constraints, often reflected in sociocultural issues, can be impediments to individuals participating in outdoor recreational activities. Data were collected in conjunction with the Bureau of Land Management and the Mesa County Health Department in Colorado via surveys involving 580 residents of Mesa County regarding access to outdoor recreation. Ordinal logistic regression was used to test whether ten different constraints to outdoor recreation were important to the respondents, given their age, sex, education, race/ethnicity, native language, and residential density. The results indicated that the probability of experiencing outdoor constraints increased with lower education, Hispanic ethnicity, native Spanish speaking, and young age. A second model, albeit with fewer respondents, was tested to include income. The results of the second model were similar to the first model and also showed that lower incomes were associated with a higher probability of outdoor constraints. The results of the two models indicated that socioeconomic status was a driving factor behind constraints to outdoor recreation.

INTRODUCTION

Physical activity is known to be beneficial for one's health and wellness and has been encouraged by the US Surgeon General (US Department of Health and Human Services, 1996). One area where governmental agencies continue to strive to provide access for a safe and acceptable environment for physical activity is with outdoor recreation in parks and other governmentally controlled areas. In addition to physical activity, outdoor recreation is viewed as a quality-of-life factor (Frick, Degenhardt, & Buchecker, 2007; "Improving the Measurement...," 2012; Muller, 1999) and as a means for individuals "to regulate their physical and psychological resources" (Frick, Degenhardt, & Duchecker, 2007, p. 31), to improve their overall wellness. However, various constraints to leisure have been noted in the literature (Frick, Degenhardt, & Buchecker, 2007; Kaczynski et al., 2015; Jackson, 2005; Shores, Scott, & Floyd, 2007), and these constraints can often be predicted based on socioeconomic status. We embarked to investigate how the combinations of various sociocultural factors affected individuals' constraints to outdoor recreation. This paper contributes to the literature by furthering the research on the effect of socioeconomic status on the constraints to outdoor recreation. Further, an improved empirical methodology, using an ordinal logistic regression instead of a logistic

regression which allows for a more specific interpretation of the exact probability of socioeconomic characteristics on constraints, was employed.

REVIEW OF RELATED LITERATURE

Much of the literature regarding outdoor recreation constraints focuses on the role of socioeconomic status in perceived constraints. The American Psychological Association (n.d.) defines socioeconomic status as "the social standing or class of an individual or group... often measured as a combination of education, income and occupation." Lee, Scott, and Floyd (2001) used a logistic regression to test the multiple hierarchy stratification perspective - a theoretical view operating on the premise that each person has a specific status or position within society - with a large dataset from a Texas outdoor recreation survey. The results illustrated strong evidence for a multiple hierarchy stratification perspective where older, female minorities, without a college degree and who earn under $20,000 per year rank the lowest in outdoor recreation participation; conversely, young, white men with a college degree who make an income of more than $20,000 per year represent the highest rank of the hierarchy. One of the key ideas in multiple hierarchy stratification theory is that there should be different levels of socioeconomic status, and each of these levels will have different challenges with leisure constraints (Crompton, 1998).

Shores, Scott, and Floyd (2007) used a logistic regression to determine the importance of socioeconomic characteristics on constraints to outdoor recreation. They included nine constraints as dependent variables, with education, income, age, sex, and race as independent variables, and their results indicated that lower socioeconomic characteristics had higher probabilities of having constraints to outdoor activities. The probability was enhanced when an individual had more than one characteristic that may imply a higher probability of constraints.

This empirical analysis of the multiple stratification hierarchy approach has been applied to more specific outdoor activities such as wildlife watching. Lee and Scott (2011) found that race/ethnicity is the best predictor of wildlife watching activities, with white/non-Hispanics being 2.4 times more likely to engage in wildlife watching than other demographics. Being more educated, living in rural areas, having higher household incomes, being older, and being female were all associated with more outdoor wildlife watching. The results indicate support for the multiple hierarchy stratification perspective, or that socioeconomic status matters for outdoor constraints. Other studies find evidence that race, sex, income, and other variables used to analyze multiple stratification hierarchy perspective are primary determinants to outdoor recreation (Johnson, Bowker, & Cordell, 2001; Scott & Munson, 1994).

METHODS

The data for this study were collected via online and in-person surveys by the staff of the Mesa County Health Department during the period of October 2015 through July of 2016. Several staff members visited various public facilities including governmental agencies (e.g., schools, workforce centers) and community groups (e.g., churches, social organizations) throughout Mesa County, Colorado, to collect data. The survey was constructed from one used previously for the residents of Larimer County, Colorado ("Plug in to nature," 2012), and it employed a variety of questions to assess demographic information such as age, race/ethnicity, residential density, education, income, native language, and sex. The survey was available in both English and Spanish to ensure an adequate response rate for all area residents. Additionally, lower-income residents were targeted to have a sample size that reflected the true demographics of Mesa County, Colorado (See Table 1). The following 10 constraints to leisure were analyzed:

1. Being in nature makes me nervous. (Nervous)
2. The risks to a child while in nature exceed the benefits. (Risks)
3. My child would rather play with technology. (Technology)
4. Time. (Time)
5. Cost. (Cost)
6. Transportation. (Transportation)
7. Location. (Location)
8. I am aware of the programs we can attend in Mesa County. (Awareness)
9. I am uncomfortable with my family being in nature/outdoors because we don't see other people who share our culture. (Culture)
10. We would not attend a program if it was offered in a language different from the language we speak at home. (Language)

Table 1. Community survey demographics compared to census demographics.

	Total Surveys	Survey Respondents	Mesa County Census (2014)
White	480	82.76%	82%
Latino	81	13.97%	14.10%
Black or African American	3	0.52%	1%
American Indian or Alaska Native	7	1.21%	1.50%
Asian	4	0.69%	0.90%
Other	5	0.86%	N/A
Total	580	100%	100%

The response categories were “Strongly Disagree,” “Disagree,” “Neutral,” “Agree,” and “Strongly Agree.” For time, cost, transportation, and location, the response variables were slightly different using “No Influence,” “Minor Influence,” “Some Influence,” “A Lot of Influence,” and “Very Strong Influence. ” Each of these constraints served as a dependent variable that was regressed using an ordinal logit regression to determine the effect of the demographic and personal characteristics on the constraints to outdoor recreation. Of the 677 surveys completed, 580 (85.7%) were complete and usable, and 431 (63%) were submitted online.

The data were collected by the Mesa County Health Department in two phases. The first phase did not ask about income on the survey, but did have a Spanish version, which made it possible to survey native Spanish-speakers about constraints to outdoor recreation. The second phase of data collection included income in the survey, but did not capture any Spanish-speakers. Because of this, two models were tested in order to test the effect of being a native Spanish-speaker on constraints, and to test separately the effect of income on constraints. The two models are listed below:

Model 1: Ordinal Logit (π) = $\alpha + \Sigma$ (βrural, βedu, βage, βsex, βethnicity, βspanishspeaker)

Model 2: Ordinal Logit (π) = $\alpha + \Sigma$ (βrural, βedu, βage, βsex, βethnicity, βincome)

This study follows the general methodology of Shores, Scott, and Floyd (2007) and Lee, Scott, and Floyd (2001). Shores et. al. (2007) and Lee et. al. (2001) each use logistic regression. In the case of Shores et. al. (2007), the dependent variables had three response choices, and the authors chose to dichotomize the responses in order to perform a logistic regression, which requires two possible responses. We improved the empirical methodology of these two aforementioned studies by employing an ordinal logistic regression, which allows an infinite number of responses (in the case of this study, five). In the case where the choices of responses were value oriented and not perfect numerical scores, an ordinal logit provided the most efficient results. Ordinal logistic regression was a better fit than ordinary least squares (OLS) because in the case of an ordinally ranked dependent variable OLS does not necessarily minimize the variance, the assumption of homoscedasticity is likely to be violated, and distributional assumptions about the dependent variables are likely to be incorrect (Menard, 2010). It is a better model than the standard logit model because it does not force the response variables into two categories, hence allowing the researcher to view the exact probability of the respondent answering any of the response categories from the dependent variable.

RESULTS

Of the 677 surveys completed, 580 (85.7%) were complete and usable, and 431 (63%) were submitted online. Although there were 677 respondents, not all respondents answered each question. Only 580 individuals answered the demographic information questions. The regression analysis used requires that each row of data not have any missing data points, so for the purposes of the regression analysis below, 580 samples were used.

Table 2 presents the results of model 1. 1 Twenty out of the 60 coefficients were statistically significant at the 90% level. Rural was positive and significant for the risks constraint, but not significant for the other barriers, indicating that overall there is little difference in perceived risks between rural and non-rural residents. Education was significant in six of 10 regressions, showing the expected signs on the coefficients. Note that with the absence of income information, education can serve as a proxy for income. In the second model, education and income are both controlled for. Age was significant in five of 10 regressions, and the sign on the coefficient indicated that the higher the age, the less the effect of the constraint on recreation. With respect to the sex of the responders, it was significant in one regression only, indicating little evidence that sex played a role in outdoor recreation constraints. The ethnicity variable Hispanic was significant in three of 10 regressions, illustrating that persons of Hispanic culture have less awareness of outdoor activities, more concerns about cultural barriers, and concern about language as a barrier. This was true despite controlling for people who were native Spanish speakers. The native Spanish speaker variable was significant in four of 10 constraints, those being nervous, risk, awareness, and culture. The chi squared test for the statistical significance of the model is listed as the last row in Table 2 and Table 3. Seven of 10 regressions were statistically significant, with the three insignificant regressions being time, location, and transportation.

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1 Note that in Tables 1 and 2, the results are in log-odds units and cannot be interpreted as normal regression coefficients. In order to interpret them probabilities must be estimated (see the next section and Table 4 for predicted probabilities). These odds ratios are used to determine statistical significance, but not for interpretation. Note that the number below in parenthesis is the standard error of the odds ratio.

Table 2. Ordinal logit regression estimates of the individual effects of rurality, Education, age, sex, race/ethnicity, and being a Spanish speaker on outdoor recreation constraints for Model 1.

	Nervous	Risks	Technology	Time	Cost	Trans-portation	Location	Awareness	Culture	Language
Residential Density 1=Rural	-.011 (.214)	.382** (.185)	.151 (.175)	.023 (.172)	-.032 (.171)	.187 (.170)	.159 (.172)	-.056 (.169)	.152 (.195)	.197 (.169)
Education 1=college grad	.402** (.197)	-.365** (.172)	.189 (.156)	.216 (.155)	-.525*** (.157)	-.331 (.154)	.086 (.155)	.333** (.157)	-.355** (.180)	-.346** (.155)
Age	-.272*** (.007)	-.019*** (.006)	.014*** (.005)	-.003 (.005)	-.001 (.005)	-.003 (.005)	-.006 (.005)	.031*** (.005)	-.011* (.006)	.006 (.005)
Sex 1=male	-.655** (.259)	-.309 (.209)	.200 (.182)	-.104 (.178)	-.184 (.180)	.209 (.176)	.245 (.181)	.180 (.178)	.134 (.213)	.020 (.180)
Race/ Ethnicity 1=Hispanic	.059 (.334)	.049 (.294)	.123 (.285)	-.214 (.288)	.378 (.293)	-.056 (.298)	.240 (.283)	-.525* (.296)	.924*** (.305)	-.469* (.279)
1=Native Spanish Speaker	1.55*** (.452)	1.59*** (.406)	-.1767 (.418)	-.049 (.408)	-.571 (.403)	.308 (.410)	-.473 (.390)	1.13*** (.423)	1.25*** (.415)	-.047 (.385)
Chi squared p-value	.000***	.000***	.025**	.666	.005***	.179	.579	.000***	.000***	.089*

*** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$

The abbreviations for the columns' headings are defined as follows: Being in nature makes me nervous. (Nervous); The risks to a child while in nature exceed the benefits. (Risks); My child would rather play with technology. (Technology); Time. (Time); Cost. (Cost); Transportation. (Transportation); Location. (Location); I am aware of the programs we can attend in Mesa County. (Awareness); I am uncomfortable with my family being in nature/outdoors because we don't see other people who share our culture. (Culture); We would not attend a program if it was offered in a language different from the language we speak at home. (Language)

Because of the two phases of data collection, Model 2 had a smaller sample size than model 1. Model 1's sample used the maximum number of data points that were usable (N=580), while model 2 used only the datapoints that had income attached to the survey (N=91). Consequently 13 of 60 coefficients were statistically significant, which was less overall significance than in Model 1. Once income was controlled for, rural had no statistical significance in any of the constraints. Education was significant in the cost and location constraints, and age maintained its linear relationship with constraints and was statistically significant in four of 10 regressions. Sex was not statistically significant, and the ethnicity Hispanic was significant in only one regression. The income variable was significant in five of 10 regressions, including technology, cost, transportation, location, and culture. The coefficient on these variables indicated that as income increased,

each statistically significant constraint decreased. The chi-squared variables indicated that six out of 10 of the constraint regressions were statistically significant at the 90% level.

Table 3. Ordinal logit regression estimates of the individual effects of rurality, education, age, sex, race/ethnicity, and being a Spanish speaker on outdoor recreation constraints for Model 2.

	Nervous	Risks	Technology	Time	Cost	Trans-portation	Location	Awareness	Culture	Language
Residential Density 1=Rural	.006 (.539)	1.39 (.509)	-.157 (.482)	-.351 (.464)	-.388 (.443)	-.276 (.460)	-.272 (.454)	.650 (.468)	.219 (.509)	.763 (.495)
Education 1=college grad	-.649 (.421)	.207 (.428)	.203 (.387)	-.514 (.396)	-1.01** (.399)	-.390 (.395)	-1.02** (.405)	.151 (.399)	.354 (.459)	-.697* (.404)
Age	-.053* (.029)	.000** (.028)	.021 (.023)	-.011 (.025)	-.048* (.026)	-.000 (.026)	-.012 (.025)	.087*** (.026)	.027 (.027)	.014 (.024)
Sex 1=male	-.321 (.752)	-1.06 (.760)	.466 (.640)	.083 (.620)	.342 (.645)	-.278 (.632)	.641 (.600)	-.247 (.563)	-.363 (.751)	-.073 (.600)
Race/ Ethnicity 1=Hispanic	-.133 (.607)	.354 (.588)	-.388 (.541)	-.928* (.545)	-.694 (.564)	-.368 (.570)	.055 (.574)	.485 (.597)	.712 (.638)	-.661 (.565)
Income 1=Greater than $50,000	-.085 (.485)	-.597 (.509)	-1.08** (.482)	-.657 (.464)	-.933** (.462)	-1.46*** (.477)	-.856* (.456)	-.647 (.479)	-1.21** (.519)	-.330 (.490)
Chi squared p-value	.208	.050**	.389	.296	.002***	.020**	.009	.010*	.229	.299

*** indicates p <.01; ** indicates p <.05; * indicates p <.10

The abbreviations for the columns' headings are defined as follows: Being in nature makes me nervous. (Nervous); The risks to a child while in nature exceed the benefits. (Risks); My child would rather play with technology. (Technology); Time. (Time); Cost. (Cost); Transportation. (Transportation); Location. (Location); I am aware of the programs we can attend in Mesa County. (Awareness); I am uncomfortable with my family being in nature/outdoors because we don't see other people who share our culture. (Culture); We would not attend a program if it was offered in a language different from the language we speak at home. (Language)

PREDICTING CONSTRAINT PROBABILITIES

Using an ordinal logit allows for the calculation of the probability of a constraint affecting a person given specific demographic characteristics. Tables 4 and 5 (provided at the end of the paper) illustrate the probability of experiencing barriers to outdoor recreation by selected characteristics. Table 4 represents model 1, which has Spanish speaking but does not have income, and Table 5 represents Model 2, which has income but not Spanish speaking. The predicted probabilities in Tables 4 and 5 each has three stratum for both Model 1 and Model 2. Stratum 1 uses selected characteristics that would tend to have a higher probability of constraints based on the results of previous literature. In other words, "lower" socioeconomic status variable was used to

calculate stratum 1. Stratum 2 was the probability of constraints for the average response for each characteristic. Stratum 3 used characteristics that would tend to have a lower probability of constraints, or higher socioeconomic status characteristics. The three strata can be compared to understand the distinct differences of perceived constraints to outdoor activities between different socioeconomic characteristics.

The results for model 1 (see Table 4) of the predicted probabilities of constraints based on socioeconomic status (multiple stratification hierarchy analysis) illustrate that for five of the 10 constraints (i.e., nervous, risks, costs, transportation, culture, and language) that Stratum 1 had a higher probability of constraints than Stratum 2 or 3, providing evidence that high socioeconomic characteristics perceive less constraints than individuals with low socioeconomic characteristics. This trend was not present for technology, time, location, and awareness. Table 4 can be interpreted as follows: Provided the characteristics in the left columns, the probability of answering "strongly disagree" for the nervous constraint is 18.7% for low socioeconomic status (stratum 1), compared to 73.1% for medium socioeconomic status (stratum 2) and 90.1% probability for high socioeconomic status (stratum 3). For the same constraint, 17.6% of low socioeconomic status respondents strongly agree that going outdoors makes them nervous, compared to medium socioeconomic status (1.7%) and high socioeconomic status (0.5%).

Table 5 illustrates Model 2, which includes income but not Spanish speaking. Nervous, risks, costs, transportation, location, culture, and language all follow the trend that lower socioeconomic status people have a higher probability of constraints to outdoor recreation. Technology and time do not follow this trend, and awareness seems to increase as a constraint for higher socioeconomic status.

Table 4. Model 1 probability of experiencing restraints to outdoor recreation by selected characteristics.

	Variables						Barriers									
	Rural	Sex	College Grad	Age	His-panic	Spanish Speaker	Nervous	Risks	Tech-nology	Time	Cost	Trans-portation	Location	Aware-ness	Culture	Language
Stratum 1	Rural	F	Non-College	20	Yes	Yes	SD=.187 D=.250 N=.258 A=.127 SA=.176	SD=.098 D=.146 N=.110 A=.156 SA=.487	SD=.289 D=.234 N=.334 A=.106 SA=.035	NI=.071 MI=.093 SI=.305 AL=.326 VS=.203	NI=.090 MI=.165 SI=.338 AL=.204 VS=.201	NI=.128 MI=.171 SI=-.286 AL=.236 VS=.176	NI=.109 MI=146 SI=.305 AL=.246 VS=.193	SD=.060 D=.223 N=.374 A=.245 SA=.094	SD=.126 D=.230 N=.243 A=.223 SA=.177	SD=.239 D=.183 N=.237 A=.185 SA=.154
Stratum 2	Non-Rural	F	College Grad	43	No	No	SD=.731 D=.170 N=.062 A=.017 SA=.017	SD=.574 D=.225 N=.071 A=.056 SA=.071	SD=.213 D=.209 N=.379 A=.146 SA=.052	NI=.058 MI=.078 SI=.279 AL=.342 VS=.241	NI=.098 MI=.176 SI=.342 AL=.196 VS=.186	NI=.207 MI=.224 SI=-.283 AL=.176 VS=.108	NI=.101 MI=.139 SI=.300 AL=.258 VS=.205	SD=.043 D=.174 N=.357 A=.294 SA=.130	SD=.636 D=.233 N=.077 A=.034 SA=.017	SD=.193 D=.165 N=.239 A=.209 SA=.193
Stratum 3	Non-Rural	M	College Grad	60	No	No	SD=.907 D=.063 N=.019 A=.005 SA=.005	SD=.777 D=.134 N=.034 A=.024 SA=.028	SD=.147 D=.170 N=.402 A=.200 SA=.079	NI=.059 MI=.079 SI=.280 AL=.341 VS=.239	NI=.144 MI=.224 SI=.344 AL=.157 VS=.129	NI=.226 MI=.233 SI=.278 AL=.164 VS=.097	NI=.095 MI=.132 SI=.295 AL=.259 VS=.217	SD=.018 D=.084 N=.255 A=.375 SA=.265	SD=.747 D=.171 N=.049 A=.021 SA=.010	SD=.198 D=.167 N=.239 A=.206 SA=.188

The abbreviations for the columns' headings are defined as follows: Being in nature makes me nervous. (Nervous); The risks to a child while in nature exceed the benefits. (Risks); My child would rather play with technology. (Technology); Time. (Time); Cost. (Cost); Transportation. (Transportation); Location. (Location); I am aware of the programs we can attend in Mesa County. (Awareness); I am uncomfortable with my family being in nature/outdoors because we don't see other people who share our culture. (Culture); We would not attend a program if it was offered in a language different from the language we speak at home. (Language)

Table 5. Model 2 probability of experiencing restraints to outdoor recreation by selected characteristics.

	Variables						Barriers									
	Rural	Sex	College Grad	Age	Hispanic	Income	Nervous	Risks	Tech-nology	Time	Cost	Trans-por tation	Location	Aware-ness	Culture	Language
Stratum 1	Rural	F	Non-College	20	Yes	Under 50,000	SD=.293 D=.301 N=.266 A=.108 SA=.029	SD=.174 D=.238 N=.100 A=.123 SA=.362	SD=.262 D=.284 N=.332 A=.105 SA=.015	NI=.039 MI=.093 SI=.353 AL=.335 VS=.177	NI=.028 MI=.092 SI=.256 AL=.287 VS=.335	NI=.146 MI=.203 SI=.253 AL=.230 VS=.166	NI=.036 MI=.058 SI=.246 AL=.347 VS=.311	SD=.082 D=.263 N=.378 A=.216 SA=.058	SD=.412 D=.388 N=.107 A=.068 SA=.023	SD=.159 D=.090 N=.207 A=.310 SA=.231
Stratum 2	Non-Rural	F	College Grad	38	No	Over 50,000	SD=.597 D=.242 N=.117 A=.034 SA=.008	SD=.573 D=.243 N=.052 A=.047 SA=.082	SD=.231 D=.274 N=.354 A=.121 SA=.018	NI=.035 MI=.084 SI=.335 AL=.347 VS=.197	NI=.083 MI=.217 SI=.353 AL=.206 VS=.139	NI=.275 MI=.268 SI=.227 AL=.146 VS=.082	NI=.106 MI=.141 SI=.373 AL=.253 VS=.124	SD=.068 D=.233 N=.380 A=.246 SA=.070	SD=.666 D=.253 N=.046 A=.025 SA=.008	SD=.221 D=.111 N=.224 A=.274 SA=.168
Stratum 3	Non-Rural	M	College Grad	60	No	Over 50,000	SD=.899 D=.070 N=.023 A=.006 SA=.001	SD=.836 D=.108 N=.017 A=.014 SA=.023	SD=.118 D=.195 N=.420 A=.226 SA=.039	NI=.050 MI=.115 SI=.385 AL=.304 VS=.142	NI=.254 MI=.363 SI=.259 AL=.082 VS=.041	NI=.437 MI=.271 SI=.164 AL=.084 VS=.042	NI=.146 MI=.175 SI=.380 AL=.207 VS=.089	SD=.017 D=.076 N=.246 A=.418 SA=.240	SD=.665 D=.254 N=.046 A=.026 SA=.008	SD=.262 D=.122 N=.227 A=.248 SA=.138

The abbreviations for the columns' headings are defined as follows: Being in nature makes me nervous. (Nervous); The risks to a child while in nature exceed the benefits. (Risks); My child would rather play with technology. (Technology); Time. (Time); Cost. (Cost); Transportation. (Transportation); Location. (Location); I am aware of the programs we can attend in Mesa County. (Awareness); I am uncomfortable with my family being in nature/outdoors because we don't see other people who share our culture. (Culture); We would not attend a program if it was offered in a language different from the language we speak at home. (Language)

CONCLUSION AND IMPLICATIONS

We used an ordinal logistic regression to determine the characteristics of outdoor constraints for individuals in Mesa County, Colorado. This model was then used to predict the probability of having or perceiving an outdoor constraint. The constraints were viewed by demographic characteristics classified into socioeconomic status in order to understand if lower socioeconomic status had more constraints to outdoor recreation than high socioeconomic status. The results show that education, income, age, language, and ethnicity were the most statistically significant variables in determining the probability of outdoor constraints, while sex was statistically insignificant, and rural was significant in only one constraint. Age showed the expected signs and confirmed the authors' previous research (Perry & Casey, 2016), where a distinct negative linear relationship between age and each constraint had been documented. The language result illustrated that Spanish speakers were much more likely to deal with constraints to outdoor recreation. Spanish speakers may be worried about communication with others for information, directions, or in an emergency situation, and a language barrier possibly could create more risk.

The results of the predictive model illustrated that nervous, risks, costs, transportation, culture, and language all followed the trend that showed lower socioeconomic status had higher constraints, and vice versa. Model 2 differed from model 1 in that location was more impactful for low socioeconomic status, and after controlling for income, awareness seemed to be more of a constraint for high socioeconomic status. This predictive model thus provides researchers and policymakers with baseline expectations for predicting outdoor constraints based on demographics and socioeconomic status.

These results from this study largely confirmed the role of socioeconomic status in outdoor activities. The lower the socioeconomic status, the higher the constraints to going outdoors. This result was found in all of the papers covered in the literature review. The implications of this study are far reaching. Low socioeconomic residents have an assortment of constraints that high socioeconomic status residents do not have. Suggestions to bridge the socioeconomic gap would be to improve the offerings of outdoor programs, improve awareness of outdoor sites and activities, improve accessibility, and to help alleviate cost. For a comprehensive list of suggestions based on a much wider range of surveys, see Perry and Casey (2016).

Several limitations to this study must be noted. Although the survey has been used in previous studies (Plug into nature, 2012; Perry & Casey, 2016) to address outdoor constraints regarding public lands, the survey instrument's validity needs to undergo rigorous psychometric testing. Although the

survey was directed toward families, it is possible that individuals without children answered these questions. The first question in the survey asks the question, "How many children do you have under the age of 18 and who live in your home at least 50% of the time?" Although this question helps to understand if the respondent is a primary caretaker, it does not dismiss persons who may not have children. This could potentially bias the family-centric questions (i.e., risks to a child while in nature exceed the benefits and my child would rather play with technology). Note that it is a potential bias, and just because individuals do not have children of their own does not mean they cannot accurately assess the risk to other children in their lives. Another limitation was the lack of income in model 1. Although education can serve as a proxy for income, it is preferable to have the income variable for all survey responses, and not just part of them. Future researchers should consider more specific questions about individual constraints in order to narrow down and to measure the exact nature of these constraints.

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