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Short Communication

SAVING THE TOUGHEST FOR LAST: 50TH COMPLETERS' FINAL U.S. STATE HIGH POINTS

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Abstract
This paper finds that the most difficult U.S. state high point climbs are saved for the end. 50th completers are significantly more likely to save more difficult U.S. state high points for their final high point ascent. There is also some more limited evidence that 50th completers save more distant high points for their final ascent.

Keywords: altitude, Appalachian Trail, ascent, climbing, Denali, difficulty index, high point, highpointing, hiking, Mauna Kea, mount, mountain, mountaineering, peak, peak bagging, state high point, through-hike, trekking, Yosemite Decimal System

Introduction

In this paper, we look at whether high altitude climbers tackle the toughest climbs early or late using the unique data set of Mitchler et al. [1]. The so-called "50th completer" list tells us what the last U.S. State high point to be climbed was. The United States' state high points are the highest elevation natural points in each U.S. state. Denali in Alaska, elevation 20,320 feet, and Britton Hill in Florida, elevation 345 feet, are the highest and lowest U.S. state high points respectively, according to Wilson [2]. From July 1, 1966, to July 22, 2018, there were 305 individuals who summited all 50 state U.S. high points, according to Mitchler et al. [1].

A more popular list of mountains to summit are the so called "Seven Summits". Dick Bass in 1985 became the first person to summit all the highest peaks on the seven continents, when he climbed 29,028 feet tall Mount Everest on April 30, 1985, according to Jurgalski and Kikstra [3] and Stall [4]. Jurgalski and Kikstra [3] said between April 30, 1985, and November 6, 2016, 416 mountaineers climbed to the highest peak on the seven continents.

Wilson [2] finds that a U.S. state high points difficulty significantly reduces the number of summits. This paper finds that the last high point ascent is significantly more likely to be of a more difficult high point. There is some evidence that a high point's remoteness also makes it more likely to be the 50th ascent.

Data and Hypotheses

Mitchler et al. [1] listed 305 individuals from July 1, 1966, to July 22, 2018, who had summited all fifty U.S. state high points. We will refer to the 50th U.S. state high point ascent as a 50 completer ascent following the terminology of Mitchler et al. [1]. Mitchler et al. [1] listed the name and date of the last U.S. state high point ascended. We took note of the state of the fiftieth state high point and the month in which that U.S. state high point was completed. Figure 1 shows the fiftieth completer ascents by two-letter postal abbreviation for the state where they occurred. Six states had no 50th completions and were not the final summit of any 50th completer in the sample. Those six states were Massachusetts (MA), Mississippi (MS), New Hampshire (NH), New Jersey (NJ), Pennsylvania (PA), and West Virginia (WV). The median of the fifty state high points had two 50th completer ascents, with a range of zero to 77, according to table 1.

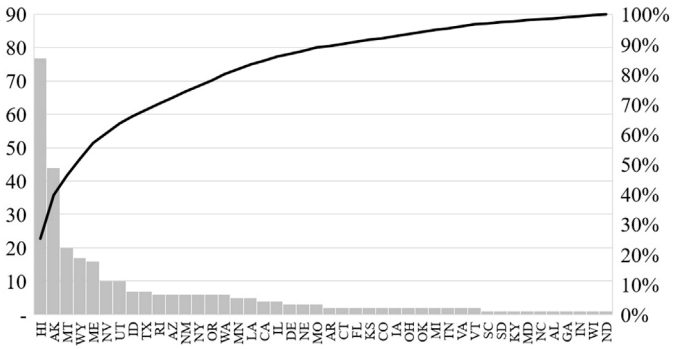


Fig. 1. 50th completer ascents by state

In figure 2, we look at the frequency of 50th completions by month in the sample. In figure 3, we look at the histograms of the 50th completer ascent months for the most popular five finishing states. In three of those most popular finishing states, summits happened in a three-month window. In Maine, no summits occurred outside the months between and inclusive of June to October. Only in Hawaii, the lowest latitude state in the sample, did ascents occur every month of the year.

The "winter ascents dummy" variable equaled 1 if any of the fiftieth state high point ascents were in the months of January, February, March, October, November, or December. If the high point had no fiftieth completer ascents or no ascents between October 1, and March 31, then its "winter ascents dummy" was

coded zero. According to table 1, half of the U.S. state high points had 50 completer winter ascents and half did not.

As a proxy for how hard a high point was to get to, we calculated the "distance" of all fifty state high points from the population center of the United States after the 2020 National Geodetic Survey. National Geodetic Survey [5] said that point was 37.415725 north latitude and 92.3465275 west longitude. That was near Hartville, Missouri. We used those coordinates and the latitude and longitude coordinates of the fifty U.S. state high points as reported by Google Maps. The list of names of the fifty U.S. State high points was obtained from Wilson [2]. Those two latitude and longitude points were entered into Williams [6] to find the great circle distance to the nearest nautical mile of each of the fifty U.S. state high points and the center of the U.S. population near Hartville, Missouri. Table 1 shows that the median U.S. state high point was 633.5 nautical miles from the center of the U.S. population in 2020. The range of great circle distances were 78 to 3423 nautical miles from a point near Hartville, Missouri. Mauna Kea, Hawaii was the most distant U.S. state high point.

The winter ascents dummy variable was multiplied by the "distance" from the U.S. population center. This is the definition of the "winter ascents dummy * distance" interaction term. Mitchler et al. [1] highlight the top five high points for 50th completer ascents. Some have very limited three-month climbing seasons as the Alaska's, Montana's, and Wyoming's high points. The Maine and Hawaii high points have longer climbing seasons with 50th completer ascents in the "winter" as defined above as being between October 1, and March 31.

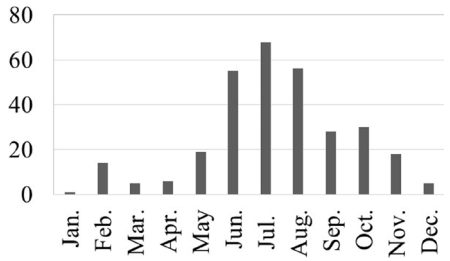


Fig. 2. Histogram of the months of the 50th U.S. state high point ascents

Table 1. Summary statistics of the 50 U.S. state high points and 50 completers

Statistic	Average	Median	Minimum	Maximum	Standard Deviation
Number of Ascents	6.10	2.00	0.00	77.00	12.48
Distance from Center of the U.S. Population in Nautical Miles	780.60	633.50	78.00	3,423.00	559.82
Winter Ascents Dummy (1 = some winter ascents & 0 = no winter ascents)	0.50	0.50	0.00	1.00	7.44
Winter Ascents Dummy * Distance	381.90	39.00	0.00	3,423.00	594.77
Difficulty Index (higher is more difficult)	16.93	5.66	0.10	100.00	23.52
Summit Technical Difficulty Rating (harder is higher)	1.08	1.00	0.00	4.00	1.07
Summit Outside Continental U.S. (1 = yes & 0 = no)	0.04	0.00	0.00	1.00	0.20
Last Stop on Appalachian Trail Dummy (1 = yes & 0 = no)	0.02	0.00	0.00	1.00	0.14
Date of 50th U.S. State High Point Completions	2/3/2005	8/20/2005	7/1/1966	7/22/2018	3,212.94

All statistics except the last, describe the fifty U.S. state high points. The sample size is 50 for all the statistics except "date of the 50th U.S. state high point completions". For the last statistic, the sample size is 305. 305 individuals completed their 50th state high point from July 1, 1966, to July 22, 2018, according to Mitchler et al. [1].

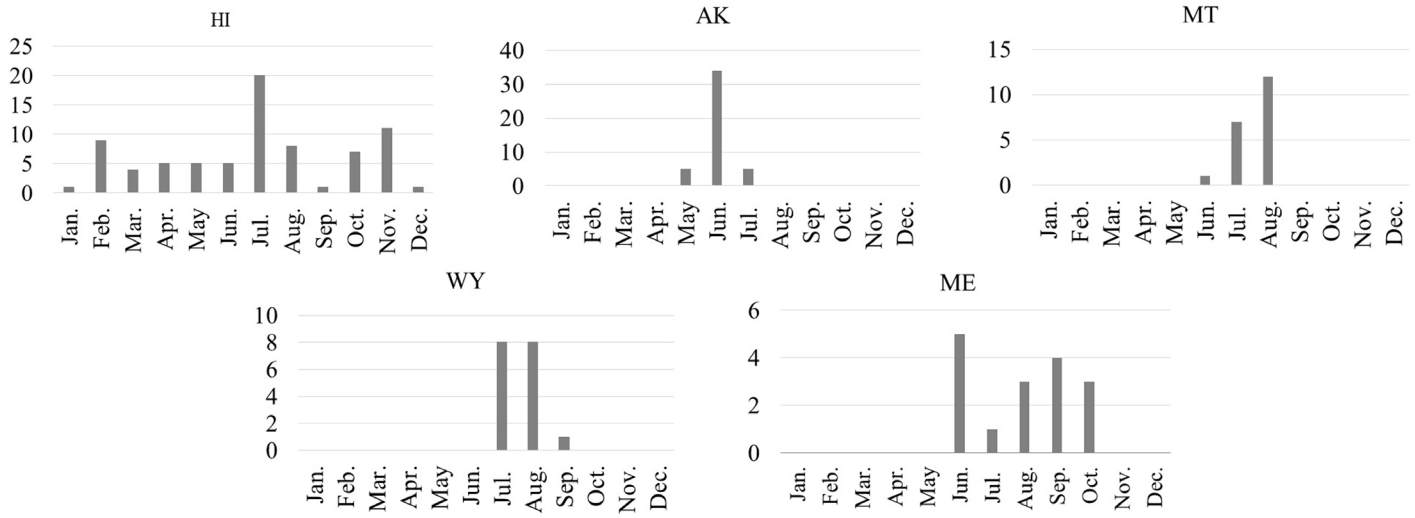


Fig. 3. Histograms of the months of 50th U.S. state high point ascents of the five most popular finishing high points

Wilson [2] table 4 listed a difficulty index rating with Denali in Alaska with a scaled score of 100 as the most difficult and Britton Hill in Florida as the least difficult with a scaled score of 0.10. The scaled scores were based on metrics for the easiest route's trail distance, elevation gain, technical difficulty, elevation, the presence of glaciers, and the north latitude of the peak above 30 degrees. The average difficulty of these high points was 16.9 with a median of 5.7.

The "summit technical difficulty rating" took on values of 0, 1, 2, 3, or 4 for the fifty U.S. state high points. It generally conforms to the Yosemite Decimal System (YDS) rating of the easiest route to the top of the high point. Rose [7] explains that class one is a trail, class two requires some route finding, class three requires some route finding and has limited fall risk, and class four has some deadly fall risk. Jha and Rizal [8] give the Yosemite Decimal System rating (YDS) classifications for climbs rated over class 1. If Jha and Rizal [8] classified a high point as class two or higher, we checked that high point's YDS rating at Summitpost.org. If Summitpost.org differed from Jha and Rizal [8], then we used Summitpost.org's class rating. If high points involved 0 miles walking roundtrip, according to Wilson [2], then that U.S. state high was given a zero YDS class rating. In this sample, the average high point had a technical difficulty rating of 1.1.

Wilson [2] found that "summit technical difficulty rating" was the only component of the "difficulty index" that was a significant predictor of how frequently a high point was summited.

A "summit outside the continental U.S." was coded 1 if it was located in Alaska or Hawaii or zero otherwise. This is another measure of how hard Denali and Mauna Kea were to visit because of their large distance from most of the American populace.

Wilson [2] found that stops on both the Appalachian Trail and the Pacific Crest Trail attracted significantly more summits. Mt. Katahdin is unique in it is the last stop on the Appalachian Trail. Thus, high pointers who wanted to both become 50 completers and Appalachian Trail through hikers at the same time may save Mt. Katahdin as their last of the fifty state high points. The "last stop on the Appalachian Trail dummy" equaled 1 if the fiftieth U.S. State high point was Maine or zero otherwise.

Hypothesis 1

50 completers will be more likely to save more difficult summits for their 50th U.S. state high point.

Wilson [2] found that the more difficult summits among the U.S. state high had significantly fewer ascents. We believe the last high point will be significantly more difficult as measured by the "difficulty index" and "summit technical difficulty rating."

Hypothesis 2

50 completers will be significantly more likely to save more distant U.S. state high points for their 50th ascent.

We measure distance in several ways in this paper. "Distance," "winter ascents dummy * distance," and "summit outside the continental U.S." are all proxies for how far a summit is from most of the potential U.S. state high point hikers and climbers. Borm et al. [9] found that 35 percent of climbers on Aconcagua (the highest point in South America) were from South America. That means South Americans on Aconcagua were overrepresented relative to the world population because South Americans make up only 6 percent of the world population, according to Worldometers [10]. Thus, proximity to a summit may make climbers more likely to attempt it. Wilson [2] found more populous states had more visitors to that state's high point, but that was only statistically significant with 90 percent confidence in one out of four regression models. Kedrowski [11] surveyed climbers of the Washington U.S. state high point Mount Rainer and residents of twenty-seven states responded. Of those twenty-seven states, residents of Washington state, all bordering states, and all states within two states away from Washington responded to the survey. Kedrowski [11] indicates that a state high point is more likely to be attempted by residents of closer states.

Results

Mitchner et al. [1] highlight that over half the 50 completers, 174 out of 305, finished their U.S. state high point summits with the high points in Hawaii, Alaska, Montana, Wyoming, and Maine. In table 2, we test if the top five, top 10 percent, state high points for 50 completer ascents differed significantly with respect to the bottom 90 percent. They were significantly more distant from the U.S. population center, more difficult, more technically difficult, more likely to be outside the lower 48, and more likely to be the last stop on the Appalachian trail with over 99 percent confidence. With 95 percent confidence, the interaction term of the "winter ascents dummy * distance" was significantly larger for these top five high points.

Table 2. T-tests of the differences of means of the top 10% U.S. state high points for 50 completer ascents and the bottom 90% of U.S. state high points for 50 completer ascents

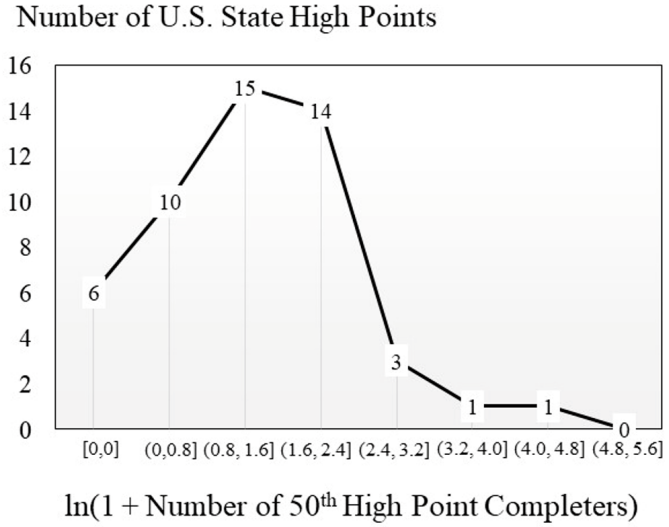
Statistic	Mean of Top 10% of Final High Point Ascents	Mean of Bottom 90% of Final High Point Ascents	Difference	T-Statistic	Two-Sided Significance
Number of Ascents	34.80	2.91	31.89	8.480***	0.000
Distance from Center of the U.S. Population in Nautical Miles	1790.00	668.44	1121.56	5.294***	0.000
Winter Ascents Dummy (1 = some winter ascents & 0 = no winter ascents)	0.40	0.51	-0.11	-0.463	0.646
Winter Ascents Dummy * Distance	916.80	322.47	594.33	2.201**	0.033
Difficulty Index (higher is more difficult)	56.52	12.53	43.99	4.767***	0.000
Summit Technical Difficulty Rating (harder is higher)	2.80	0.89	1.91	4.484***	0.000
Summit Outside Continental U.S. (1 = yes & 0 = no)	0.40	0.00	0.40	5.367***	0.000
Last Stop on Appalachian Trail Dummy (1 = yes & 0 = no)	0.20	0.00	0.20	3.286***	0.002
Observations	4	45			

While we believe the number of 50 completers per state high points is left censored with six states, which will bias the ordinary least squares (OLS) estimators, we present the OLS results in table 3. In table 4, we correct for the left censoring at zero, by conducting Tobit regressions of the number of 50th completer ascents per state.

Table 3. Ordinary least squares (OLS) regressions where the dependent variable is the number of 50th high point ascents per state

Coefficient	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-1.520	1.880	-1.501	-0.545	-1.238
t-statistic	*-0.988*	*0.877*	*-1.096*	*-0.376*	*-0.918*
p-value	(0.328)	(0.385)	(0.279)	(0.709)	(0.363)
Distance from Center of the U.S. Population (NM)	0.006***	0.003	0.001	0.001	0.001
t-statistic	*2.695*	*0.954*	*0.441*	*0.322*	*0.235*
p-value	(0.010)	(0.345)	(0.661)	(0.749)	0.816
Winter Ascents Dummy		-4.864**			
t-statistic		*-2.188*			
p-value		(0.034)			
Winter Ascents Dummy * Distance	0.004***	0.008***	0.006***	0.006***	0.006***
t-statistic	*2.829*	*3.445*	*4.540*	*4.284*	*4.391*
p-value	(0.007)	(0.001)	(0.000)	(0.000)	(0.000)
Difficulty Index				0.110***	
t-statistic				*3.076*	
p-value				(0.004)	
Summit Technical Difficulty Rating			2.514***		2.543***
t-statistic			*3.605*		*3.728*
p-value			(0.000)		(0.000)
Summit Outside Continental U.S.	37.529***	39.574***	41.839***	41.643***	43.516***
t-statistic	*6.612*	*7.150*	*8.055*	*7.734*	*8.416*
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Last Stop on Appalachian Trail Dummy					7.135*
t-statistic					*1.742*
p-value					0.088
Observations	50	50	50	50	50
Adjusted R-squared	0.871	0.880	0.897	0.891	0.902

In table 3, the dummy for the high point being outside the lower 48 is positive and significant in all five models. In addition, the interaction term of winter ascents and distance is also positive and significant in all five models, indicating distant high points that can be summited in the winter are significantly more likely to be saved for the final high point ascent of 50 completers. Interestingly, high points with winter ascents are less likely to be the 50th ascent according to model 2. Only models 3, 4, and 5, control for difficulty. Whether the broader difficulty index is used or the narrower difficulty rating of "summit technical difficulty" is used, we can be over 99 percent confident that more difficult high points are saved for the 50th ascent.



There were 305 fifty U.S. state high point completers from July 1, 1966, to July 22, 2018. Six U.S. state high points had zero 50th U.S. state high point completers. That is the censored part of the distribution on the right. The left tail of the graph moving left to right are the top five states in terms of U.S. state high point completers of Hawaii (Mauna Kea), Alaska (Denali), Montana (Granite Peak), Wyoming (Gannett Peak), and Maine (Mount Katahdin).

Fig. 4. Histogram of the natural log of one plus the number of 50th high point ascents per U.S. state

In figure 4, we show that the number of 50th completer ascents is approximately log normally distributed and left censored at zero. Taking the natural log of the 50th ascents per state plus one, we plot that number on the horizontal axis in 0.8 intervals. The frequency of the U.S. state high points in each interval is on the vertical axis.

Since it is not possible to have negative values for 50th completer ascents, we need a non-linear model that takes into account the censoring of the dependent variable at zero, such as Tobin [12] described. Let the estimation model be as follows:

$$\hat{Y} = B_0 + B_1X_1 + B_2X_2 + \cdots + B_mX_m$$

$\hat{Y}$ is the dependent variable. Let i = 1, 2, ..., m. Let B_0 be the intercept coefficient and B_i is the ith slope coefficient. Unfortunately, we only observe Y, which is non-linear:

$$Y = 0, \text{ if } \hat{Y} - e < 0 \ \& \ Y = \hat{Y}, \text{ if } \hat{Y} - e \geq 0$$

If e is a mean zero error term, we can estimate the intercept and slope coefficients in (1) using maximum likelihood techniques using the Tobit model.

In table 4 we present the Tobit model where the independent variable is the natural log of the number of 50 completers' final high point ascents plus one for each of the 50 state high points. Models 1, 2, 3, 4, and 5 have the same independent variables as the OLS results in table 3. In contrast to table 3, the proxies for summit distance of "winter ascents dummy*distance" and "summit outside the continental U.S." are not statistically significant in models 1 and 2 where we do not control for summit difficulty. Those two measures are positive and significant in

Table 4. Tobit regressions where the dependent variable is the natural log of one plus the number of 50th high point ascents per state

Coefficient	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.556**	0.148	0.570***	0.883***	0.616***
z-value	2.099	0.386	2.805	4.928	3.155
p-value	(0.036)	(0.699)	(0.005)	(0.000)	(0.002)
Distance from Center of the U.S. Population (NM)	0.001**	0.001***	-0.000	-0.001**	-0.000
z-value	2.203	2.673	-0.898	-2.343	-1.155
p-value	(0.028)	(0.008)	(0.369)	(0.019)	(0.248)
Winter Ascents Dummy		0.575			
z-value		1.461			
p-value		(0.144)			
Winter Ascents Dummy * Distance	0.000	-0.000	0.001***	0.001***	0.001***
z-value	0.573	-0.615	3.970	5.617	3.861
p-value	(0.567)	(0.539)	(0.000)	(0.000)	(0.000)
Difficulty Index				0.035***	
z-value				7.548	
p-value				(0.000)	
Summit Technical Difficulty Rating			0.594***		0.596***
z-value			5.604		5.888
p-value			(0.000)		(0.000)
Summit Outside Continental U.S.	0.558	0.303	1.595**	1.900***	1.870**
z-value	0.573	0.312	2.060	2.830	2.483
p-value	(0.567)	(0.755)	(0.039)	(0.005)	(0.013)
Last Stop on Appalachian Trail Dummy					1.193**
z-value					2.027
p-value					(0.043)
Observations	50	50	50	50	50
Wald Statistic	36.740***	40.134***	92.991***	140.478***	105.575***
Log Likelihood	-58.287	-57.229	-45.668	-38.194	-43.705
McFadden's Pseudo Adjusted R-squared	0.142	0.143	0.305	0.409	0.318

McFadden's psuedo adjusted R-squared is explained in McFadden [13] and UCLA: Statistical Consulting Group [14].

models 3, 4, and 5 with over 95 or 99 percent confidence when we control for summit difficulty. The highest log likelihoods are for models 3, 4, and 5 that control for difficulty of the state high point. Both measures of difficulty, the "difficulty index" and the "summit technical difficulty rating", are positive and significant with over 99 percent confidence. The Tobit regressions strongly support hypothesis 1 that 50 completers save the hardest high points for their last ascent. Hypothesis 2 has only partial support. Distance measures are significant of the predicted sign in some, not all, of the Tobit models presented.

The highest log likelihood and psuedo r-squared were in model 4 of table 4, which used the difficulty index in Wilson [2]. Thus, Wilson [2] broader measure of summit difficulty, which was based on several criteria beyond technical difficulty, has more predictive power in this sample than Yosemite technical difficulty ratings of the peaks, which is used in models three and five.

Conclusion

Measures of U.S. state high point difficulty are positive and significant predictors of a U.S. state high point being the last high point to be ascended by a given climber in all specifications. Measures of high point distance are sometimes positive and significant, but are not significant in all models. There is strong evidence that "50 completers" leave the most difficult summits for the end.

References

1. Mitchler J., Bird T., Dalsaso K. (2018). 50 Completers. *Apex to Zenith* 121, 24-26. Retrieved 26 November, 2023, from https://highpointers.org/tag/50-completers/
2. Wilson L. (2023). *Does difficulty affect U.S. State High Points Ascents?* Social Science Research Network Working Paper, (July 20, 2023). Retrieved 3 November, 2025, from https://ssrn.com/abstract=4516746 or http://dx.doi.org/10.2139/ssrn.4516746
3. Jurgalski E., Kikstra H. (2016). *Statistics, facts & figures of all 7 summiteers!* Retrieved 27 December, 2023, from https://7summits.com/7summits_statistics.php
4. Stall B. (1985). *Conquers Mt. Everest to fulfill dream: Millionaire first to climb summits of all continents,* L.A. Times, May 2, 1985. Retrieved 27 December, 2023, from https://www.latimes.com/archives/la-xpm-1985-05-02-mn-20109-story.html
5. National Geodetic Survey (2022). *U.S. Center of Population: 2020*. National Geodetic Survey October 6, 2022. Retrieved 27 November, 2023, from https://www.ngs.noaa.gov/commemorative/mark-2020-center-population.shtml
6. Williams E. (2023). *Latitude/longitude distance calculator, National Hurricane Center*. Retrieved 27 November, 2023, from https://www.nhc.noaa.gov/gccalc.shtml
7. Rose J. (2013). Terrain classification, climbing Exposure, and technical management. *Journal of Outdoor Recreation, Education, and Leadership* 5(3), 242-257. DOI: 10.7768/1948-5123.1176
8. Jha S., Rizal N. (2017). *A practical guide to 50 States Highpointing*. Retrieved 13 July, 2023, from https://artoftravel.tips/practical-guide-highpointing-hike-50-states-high-points/
9. Borm N., Van Roo J.D., Pesce C., Courtney D.M., Malik S., Lazio M.P. (2011). Prior altitude experience of climbers attempting to summit Aconcagua. *High Altitude Medicine & Biology* 12(4), 387-391. DOI: 10.1089/ham.2011.1017
10. Worldometers (2023). *South America Population*. Retrieved 1 December, 2023, from https://www.worldometers.info/world-population/south-america-population/
11. Kedrowski J.J. (2010). *Climber experience and environmental interaction on Mount Rainier*, WA, USA, Ph.D. Dissertation, Texas State University - San Marcos. ProQuest Dissertations Publishing, 3455572.

12. Tobin J. (1958). Estimation of relationships for limited dependent variables. *Econometrica* 26(1), 24-36.
13. McFadden D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (ed.), *Frontiers in Econometrics* (p. 122). New York: Academic Press.
14. UCLA: Statistical Consulting Group (2023). *FAQ: What are pseudo R-squareds? Introduction to SAS*. Retrieved 22 November, 2023, from https://stats.oarc.ucla.edu/other/multpkg/faq/general/faq-what-are-pseudo-r-squareds/

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