High Level Overview of Predictors of Climbing Skill

Data from /u/higiff and analysis by /u/fmeson, RDM

ACKNOWLEDGMENT

Thanks to /u/higiff for the data. It all comes from his survey he designed and carried out here: https://docs.google.com/forms/d/e/1FAIpQLSciYaa2iX79npcnPBltM7kx4EMS317jpLjTz0pgogQBmfn0DQ/viewform

OVERVIEW

It's well known that certain demographic and training habits predict climbing skill (as measured by best grade climbed 90%). Here, I look at the data from the climb harder survey to see to which variables best predict climbing skills. The number of years climbing experience, and biological gender strongly predicts climbing skill. Training frequency also strongly predicts climbing skill high skill climbers tend to climb more frequently, hang board around 2 times a week, campus around 1-2 times a week and may engage in some sort of strength training.

BMI, weight, height, arm span and APE index do not significantly predict climbing skill. Endurance training is also not a good predictor of climbing skill.

A more in depth look at each type of climbing training will be presented elsewhere.

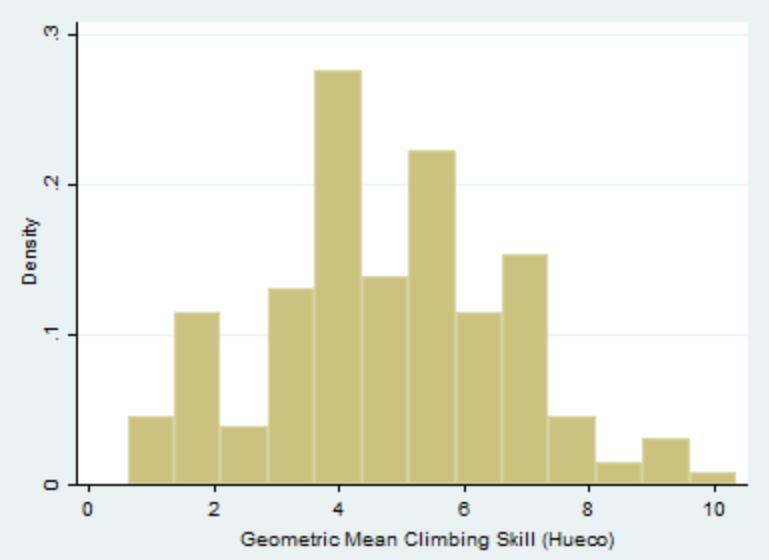
HOW DO I MEASURE CLIMBING SKILL

I use a made up variable, which is the geometric mean of route climbing skill and bouldering skill.

Geometric mean = sqrt([Vgrade]*[EWBank])

Then I map the results back onto a Hueco scale with a linear regression so that the numbers are more easily understood. This does result in a reduction of climbing grade at the high end.

This is not perfect by any means, and I will look at some better ways to measure it later, but it is simple and works well. The benefit to this is that it does not overly favor one discipline or another and it leads to easily interpretable results. This is what the variable break down looks like:



DEMOGRAPHIC PREDICTORS OF CLIMBING

Source	SS	df	MS		
				Number of obs	= 174
				F(7, 166)	= 8.36
Model	169.281719	7	24.1831028	Prob > F	= 0.0000
Residual	480.315639	166	2.89346771	R-squared	= 0.2606
				Adj R-squared	= 0.2294
Total	649.597359	173	3.75489803	Root MSE	= 1.701

geoMeanMappedToHu~o	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
climbingYearsDouble	.1646054	.0286937	5.74	0.000	.1079537	.2212571
female	-1.445718	.5471929	-2.64	0.009	-2.526073	-.3653639
height	.3536035	.564819	0.63	0.532	-.7615513	1.468758
armSpan	-.1514331	.5731618	-0.26	0.792	-1.28306	.9801934
weight	-.2849568	.2278166	-1.25	0.213	-.7347483	.1648346
BMICut	.8433538	.7167935	1.18	0.241	-.5718531	2.258561
armToHeightRatioCut	32.12068	100.1504	0.32	0.749	-165.6121	229.8535
_cons	-62.77716	99.01804	-0.63	0.527	-258.2742	132.7199

To see how training predicts climbing performance I wanted to first account for the demographic variables that predict performance. To do this I regress my climbing skill variable vs demographic variables and save the residual, or variance still not explained by the above variables.

What we see is that the number of years climbing and your biological sex predict climbing skill. The rest of the variables (BMI, height, APE index, arm span, weight) do not significantly. This is a bit surprising! Surely, BMI at least matters even if APE index doesn't. I think it does, but that our input data is not representative of the general population: what this means is that most of the climbharder respondents

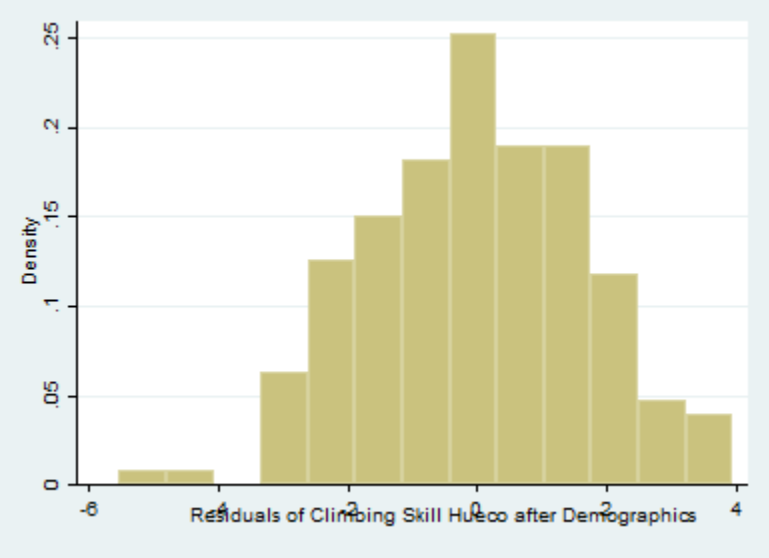
are all similar BMIs regardless of skill level. The peak of our BMI distribution is already 21, and the majority are under 25 (see demographics report for a plot).

This is the first example of where we need to think critically before claiming causation, since our sample is mostly of skinny people, we may not accurately show how BMI affects climbing ability.

Around 22% of the variance is predicted by these variables.

HIGH LEVEL OVERVIEW OF TRAINING

Now we can look at what training factors predict climbing ability with the residuals. After the above regression, we have these residuals:



So we still have a large amount of variance in skill not simply predicted by how long you have trained or other non-trainables.

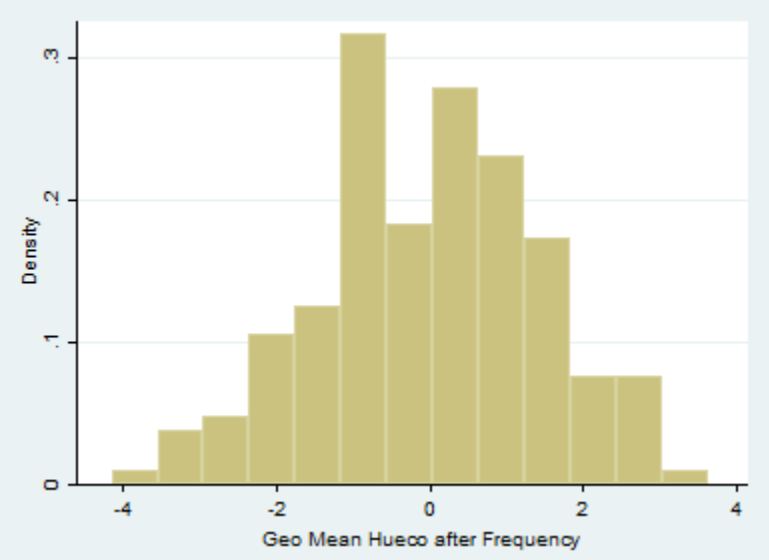
I regressed these residuals with how many times the respondent climbed, hangboarded, campused, did endurance workouts, or did strength training a week:

Source	SS	df	MS	Number of obs	=	174
				F(5, 168)	=	10.77
Model	116.590562	5	23.3181123	Prob > F	=	0.0000
Residual	363.725084	168	2.16503026	R-squared	=	0.2427
				Adj R-squared	=	0.2202
Total	480.315646	173	2.77639102	Root MSE	=	1.4714

geoMeanDemoHueco~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
climbingFrequency	.5254399	.1090937	4.82	0.000	.3100687	.7408111
hangboardFrequency	.2569706	.1159967	2.22	0.028	.0279716	.4859696
enduranceFrequency	-.1685271	.1500809	-1.12	0.263	-.4648146	.1277605
campusFrequency	.3322012	.1508806	2.20	0.029	.034335	.6300674
strengthFrequency	.0161807	.0822248	0.20	0.844	-.1461462	.1785076
_cons	-1.900918	.3312947	-5.74	0.000	-2.554956	-1.246881

Climbing Frequency, hang boarding frequency, and campusing frequency are all significant predictors of climbing skill. Endurance training and strength training is not. This does not mean that endurance training doesn't help, but it does suggest that it isn't a good predictor of climbing performance.

This explains roughly 22% of the remaining variance.



IN-DEPTH LOOK AT TRAINING FREQUENCY

I wanted to see what non-linear effects took place with regards to frequency however. Maybe training endurance one day a week is better than never, but 3 days a week is worse, hiding the effect in the linear regression. What we see is that the best climbers tend to climb more often, hangboard twice a

week, campus once or twice a week, may or may not do endurance training , and do strength training 2-3 times a week.