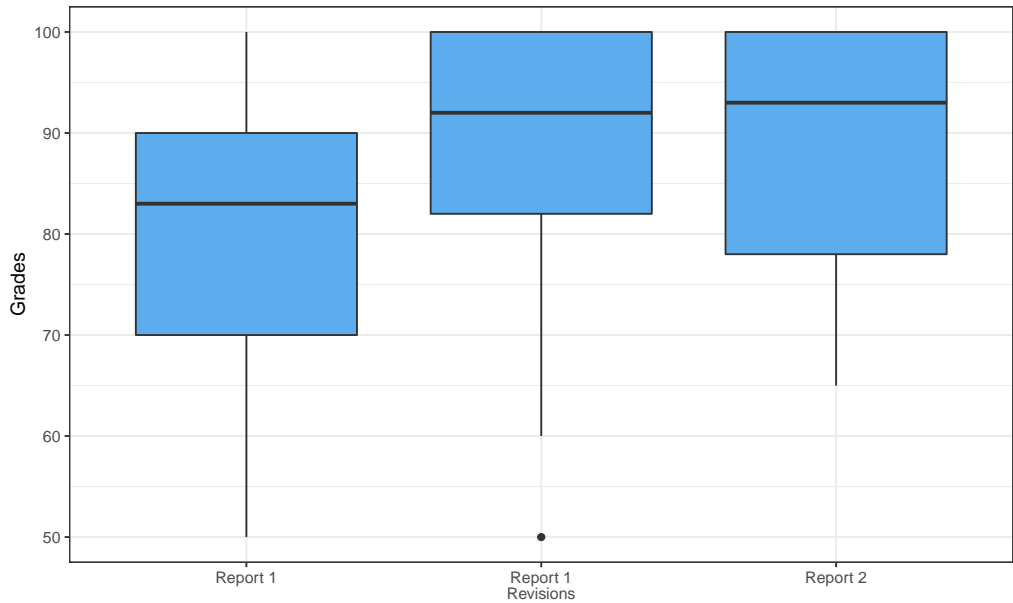
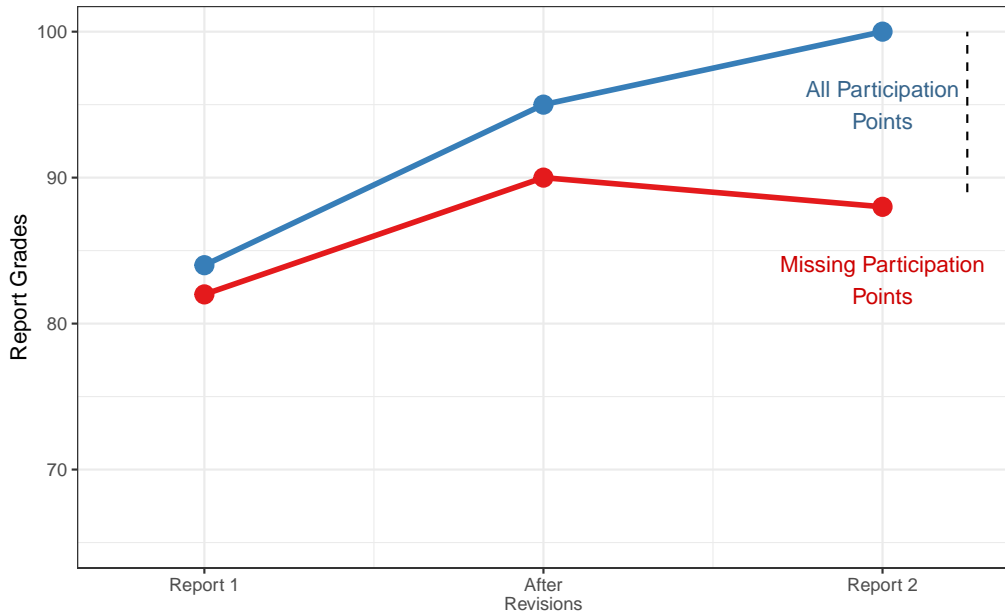


Today's Agenda

Practicing Multiple Linear Regressions (Adding marginal effects plots)

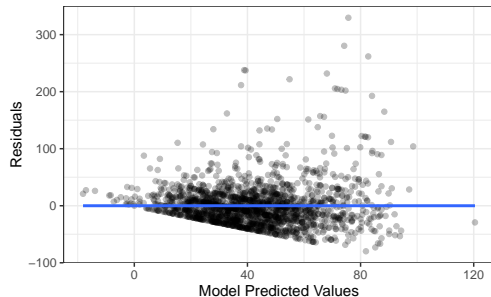
Justin Leinaweaver (Spring 2022)





	Earnings (2021 USD)
Age	0.47* (0.05)
Education	5.42* (0.35)
Exercise	0.95* (0.41)
Height	2.84* (0.24)
Constant	-241.27* (16.34)
Observations	1,813
Adjusted R ²	0.21
Residual Std. Error	37.43 (df = 1808)
F Statistic	118.04* (df = 4; 1808)

Note: *p < 0.05



	age	education	exercise	height
age	1	-0.15	-0.33	-0.14
education	-0.15	1	0.18	0.11
exercise	-0.33	0.18	1	0.22
height	-0.14	0.11	0.22	1

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Baseline: Age 25, Education 13,
Exercise 1, Height 67

Prediction	Low	Estimate	High
Baseline	-44.9	29.9	104.7
Finish College	-28.7	46.1	120.9
Finish Grad School	-17.9	56.9	131.7

Prediction	Low	Estimate	High
Baseline	-44.9	29.9	104.7
Exercise 1x / week	-42.2	32.6	107.4
Exercise >3x	-39.5	35.3	110.1

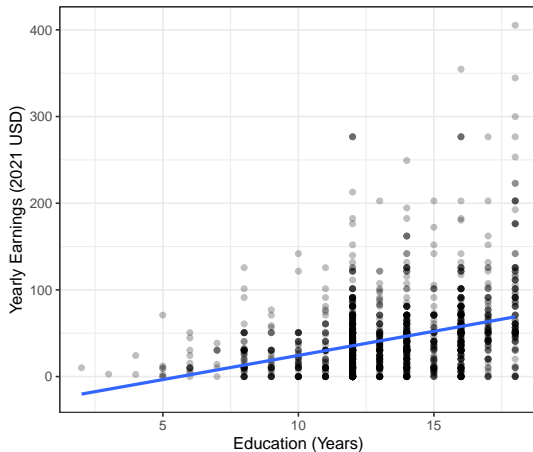
	Earnings (2021 USD)
Education	5.57* (0.36)
Constant	-31.34* (4.89)
Observations	1,813
Adjusted R ²	0.11
Residual Std. Error	39.50 (df = 1811)
F Statistic	235.79* (df = 1; 1811)

Note:

*p < 0.05

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Constant	-31.34* (4.89)
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Education	Prediction
12	
13	
14	
15	
16	\$46.1k
17	
18	\$56.9k

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Education	Prediction
12	\$24.5k
13	\$29.9k
14	\$35.3k
15	\$40.7k
16	\$46.1k
17	\$51.5k
18	\$56.9k

Education	Prediction
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12	\$24.5k
----	---------

13	\$29.9k
----	---------

14	\$35.3k
----	---------

15	\$40.7k
----	---------

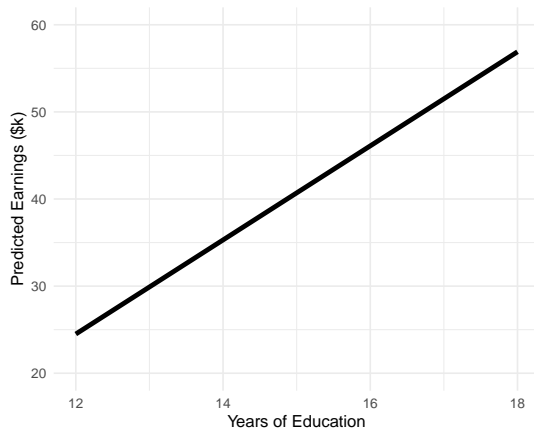
16	\$46.1k
----	---------

17	\$51.5k
----	---------

18	\$56.9k
----	---------

The Marginal Effect of Education on Earnings

Assumes a 25 year old who is 5ft 7in and doesn't exercise

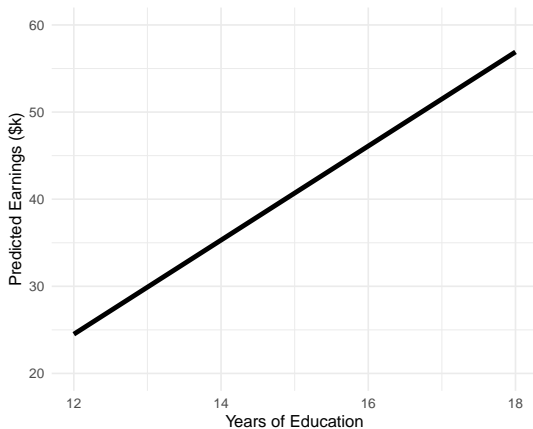


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The Marginal Effect of Education on Earnings

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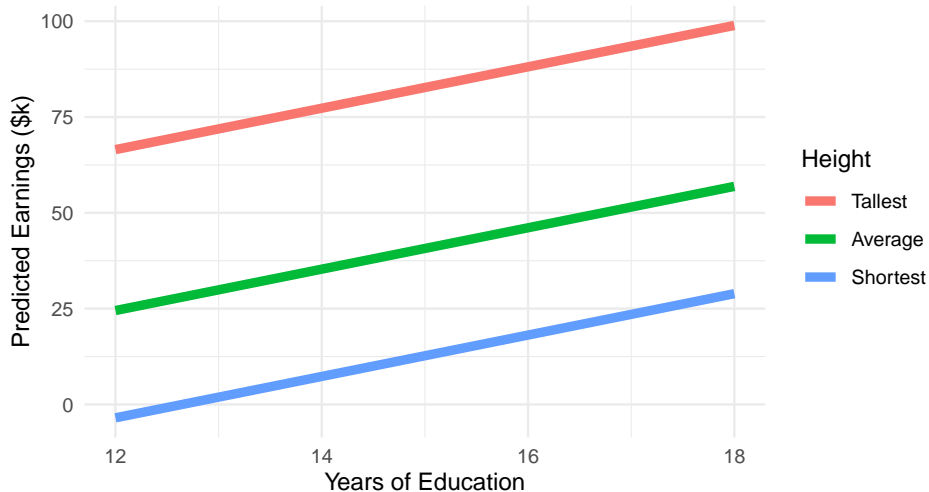


Create a marginal effects plot with THREE prediction lines

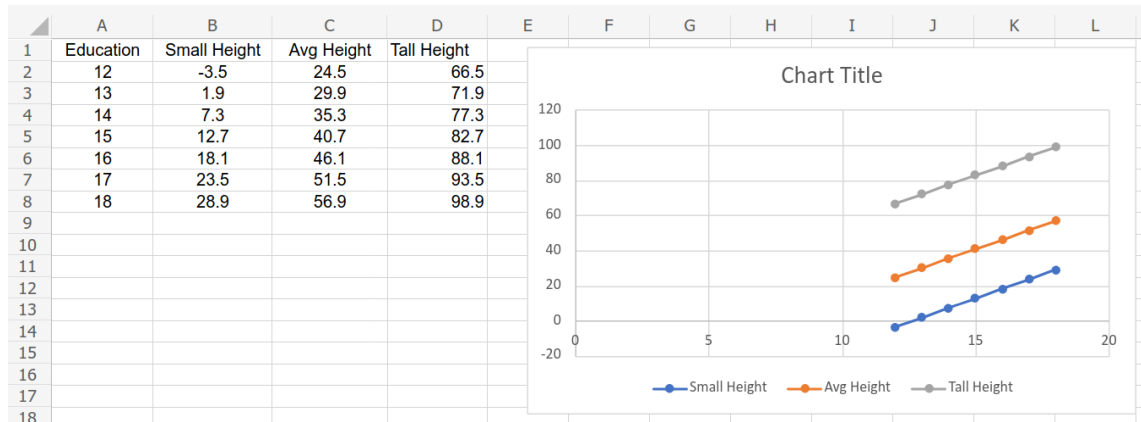
- 1 Predict the effect of education (12-18) for a 25 year old who doesn't exercise and is the shortest person in the sample (4'9")
- 2 Repeat above but assume a person of average height (5'7")
- 3 Repeat above but assume the tallest person in the sample (6'10")

The Marginal Effect of Education on Earnings

Assumes a 25 year old who doesn't exercise

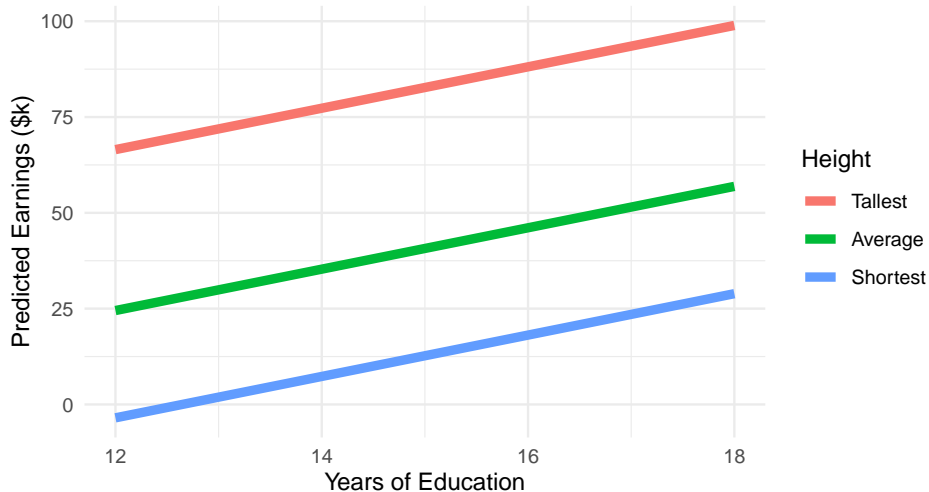


	A	B	C	D	
1	Education	Small Height	Avg Height	Tall Height	
2	12	-3.5	24.5	66.5	
3	13	1.9	29.9	71.9	
4	14	7.3	35.3	77.3	
5	15	12.7	40.7	82.7	
6	16	18.1	46.1	88.1	
7	17	23.5	51.5	93.5	
8	18	28.9	56.9	98.9	
9					

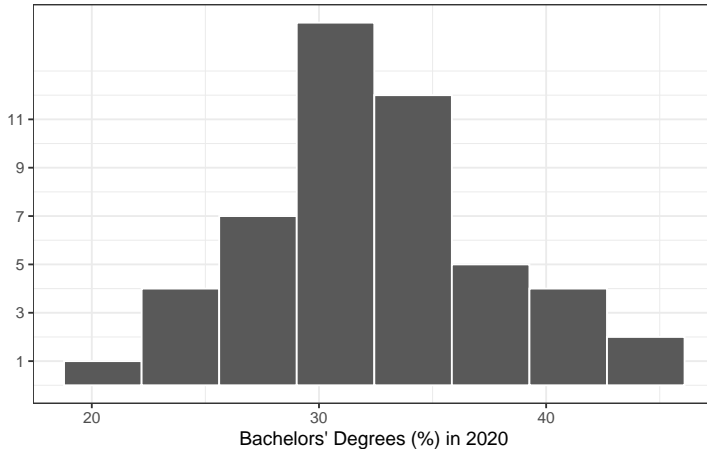


The Marginal Effect of Education on Earnings

Assumes a 25 year old who doesn't exercise



What is the "best" model of bachelor's degree completion in dataset 1?



What is the "best" model of bachelor's degree completion in dataset 1?

- 1 Choose the logical predictors
- 2 Fit a simple OLS regression to each predictor
- 3 Fit a multiple regression with the "best" of those
- 4 Evaluate the model using all five steps
- 5 Use the model to make predictions

What is the "best" model of bachelor's degree completion in dataset 1?

Outcome

- Bachelors' Degrees

Predictors to Consider

- GDP (Billions), GDP (Rate), Homeownership, Manufacturing employment, Minimum wage, Population, Rental Vacancy Rate, State Tax Rate on Wages, Unemployment

Common Regression Mistakes (Wheelan ch12)

- 1 Linear regression on nonlinear relationships
- 2 Correlation does not equal causation
- 3 Reverse causality
- 4 Omitted variable bias (too few variables)
- 5 Highly correlated explanatory variables (multicollinearity)
- 6 Extrapolating beyond the data
- 7 Data mining (too many variables)