Applied Statistical Analysis

EDUC 6050

Week 1

Finding clarity using data

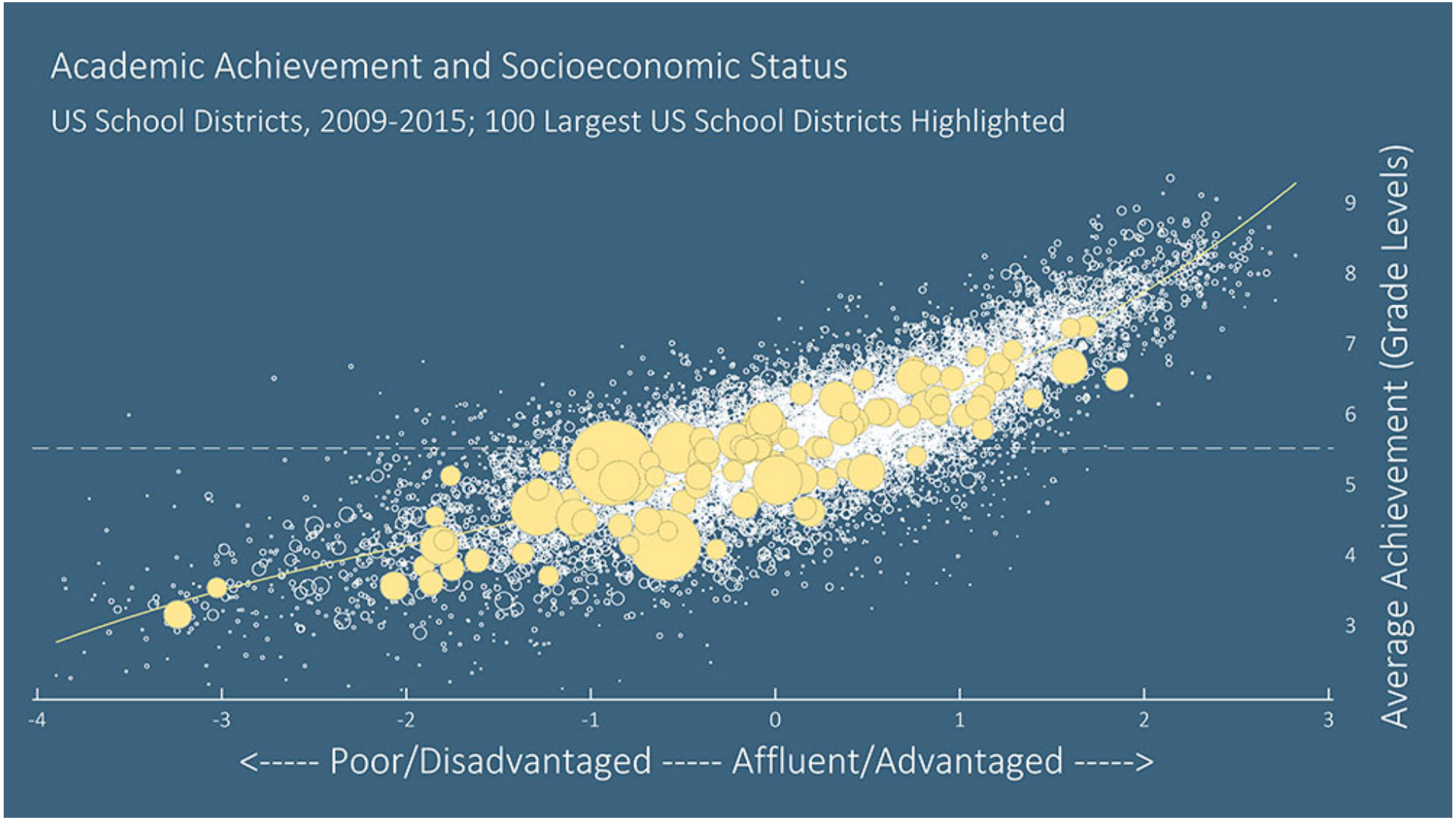
Welcome

1. What is quantitative research?
2. How does data inform our world?
3. How are data analyzed?

Data, Data, Data, Data, Data, ...

Tesla Autopilot

Data, Data, Data, Data, Data, ...



Data, Data, Data, Data, Data, ...

Health Care Policy and Cost

Data are/is Cool

“In God we trust. All others must bring data.”
W. Edwards Deming

“It is a capital mistake to theorize before one has data.”
Sherlock Holmes, “A Study in Scarlett” (Arthur Conan Doyle).

“You can have data without information, but you cannot have information without data.”
Daniel Keys Moran

Purpose of this course

Develop quantitative understanding and skills

Prepare you for:
1. Your thesis
2. Your career

What is expected of you

- Attend and participate in class
- Prepare for class (readings before class)
- Professional correspondence with colleagues
- Use assignments to learn
- Ask questions
- Communicate with me

Grading

I. Statistics Organizer, 20% of grade

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II. Research Portfolio, 20% of grade

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III. Assignments, 30% of grade

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Grading

Statistics Organizer

20% of Grade

You decide how it looks
-> Can use on Exams

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Grading

Research Portfolio

20% of Grade

10 journal articles in your area using quantitative research

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Grading

Assignments

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6 applied assignments using Jamovi (or SPSS)

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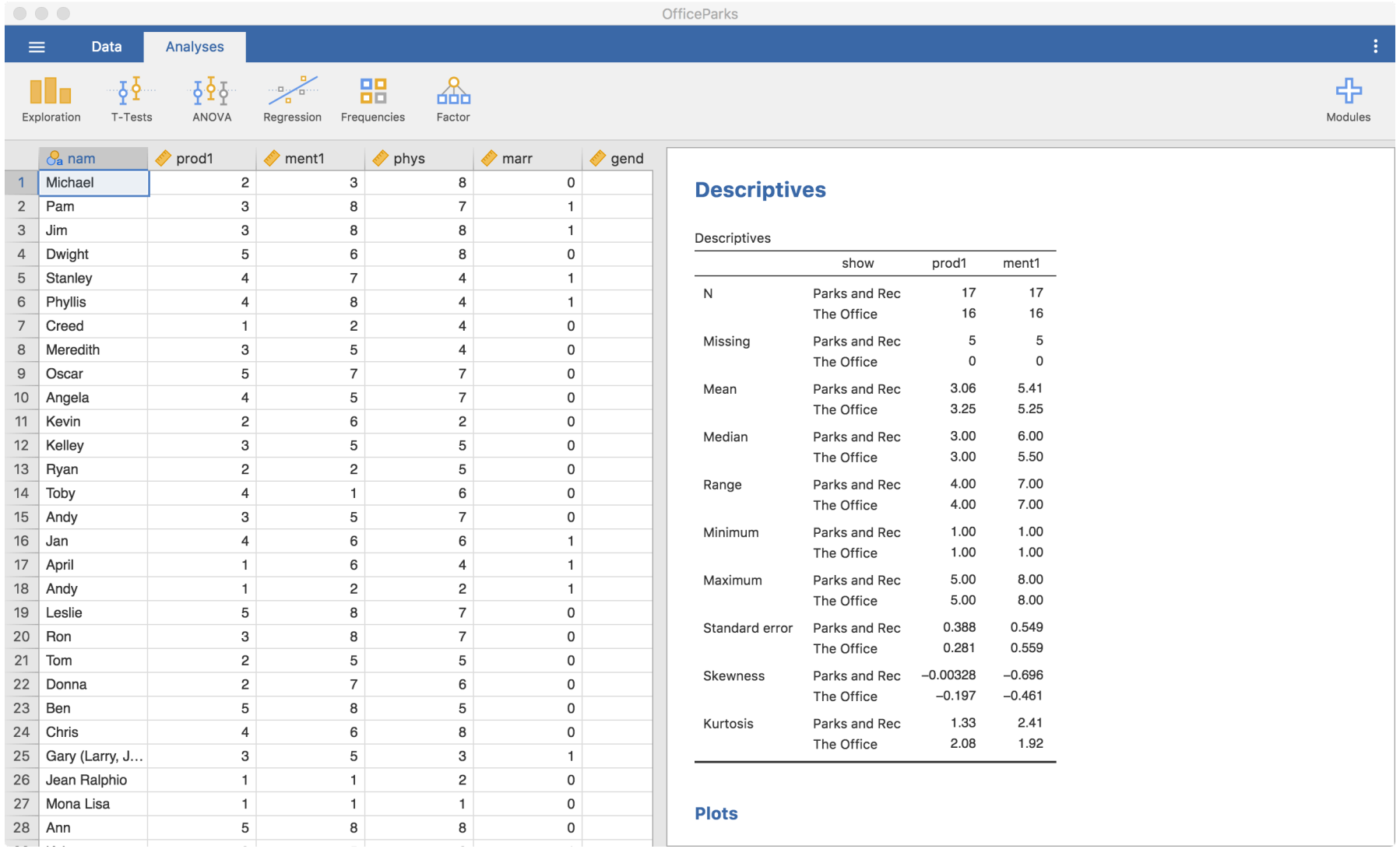
Jamovi



	nam	prod1	ment1	phys	marr	gend
1	Michael	2	3	8	0	
2	Pam	3	8	7	1	
3	Jim	3	8	8	1	
4	Dwight	5	6	8	0	
5	Stanley	4	7	4	1	
6	Phyllis	4	8	4	1	
7	Creed	1	2	4	0	
8	Meredith	3	5	4	0	
9	Oscar	5	7	7	0	
10	Angela	4	5	7	0	
11	Kevin	2	6	2	0	
12	Kelley	3	5	5	0	
13	Ryan	2	2	5	0	
14	Toby	4	1	6	0	
15	Andy	3	5	7	0	
16	Jan	4	6	6	1	
17	April	1	6	4	1	
18	Andy	1	2	2	1	
19	Leslie	5	8	7	0	
20	Ron	3	8	7	0	
21	Tom	2	5	5	0	
22	Donna	2	7	6	0	
23	Ben	5	8	5	0	
24	Chris	4	6	8	0	
25	Gary (Larry, J…	3	5	3	1	
26	Jean Ralphio	1	1	2	0	
27	Mona Lisa	1	1	1	0	
28	Ann	5	8	8	0	

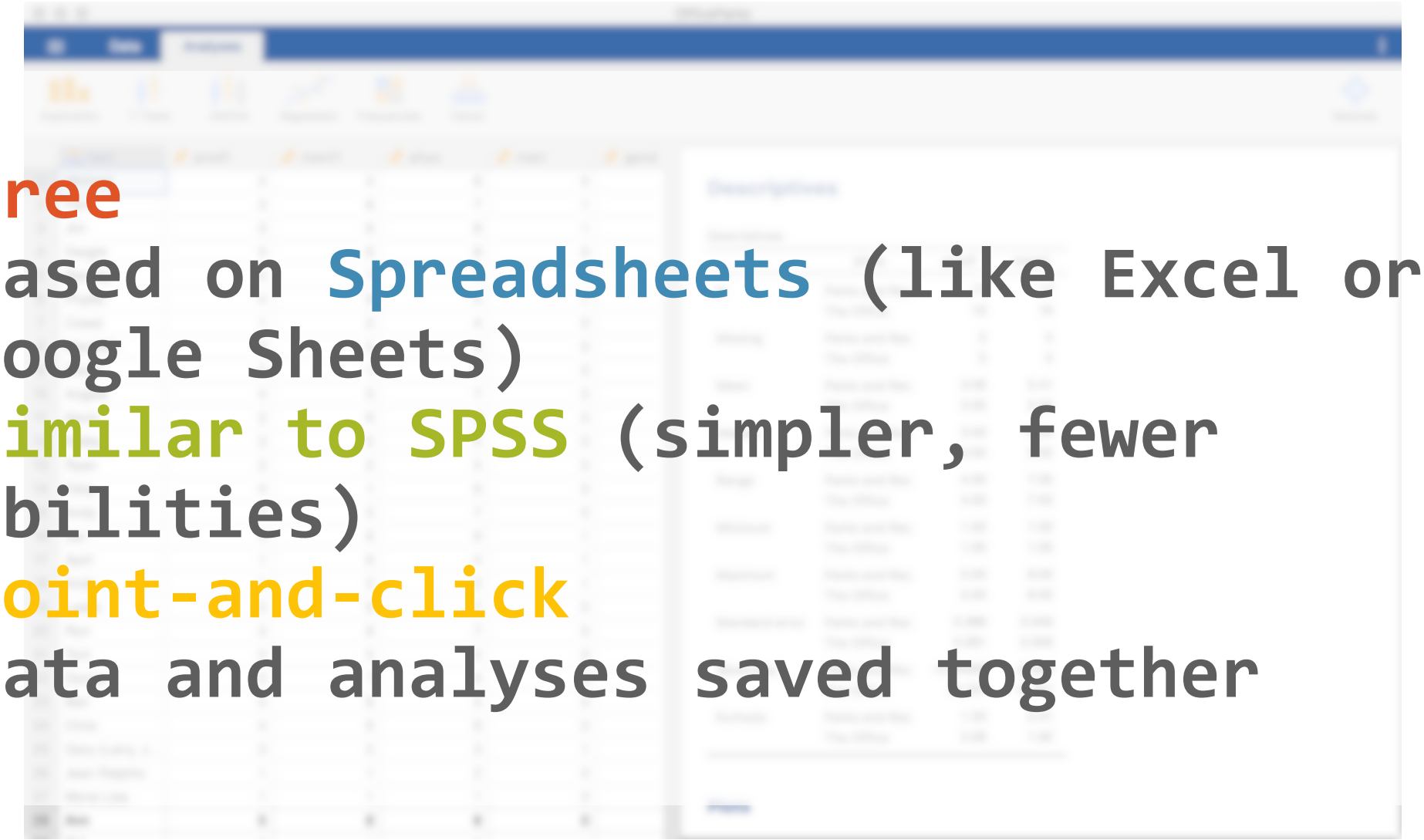
Descriptives

Descriptives

	show	prod1	ment1
N	Parks and Rec	17	17
	The Office	16	16
Missing	Parks and Rec	5	5
	The Office	0	0
Mean	Parks and Rec	3.06	5.41
	The Office	3.25	5.25
Median	Parks and Rec	3.00	6.00
	The Office	3.00	5.50
Range	Parks and Rec	4.00	7.00
	The Office	4.00	7.00
Minimum	Parks and Rec	1.00	1.00
	The Office	1.00	1.00
Maximum	Parks and Rec	5.00	8.00
	The Office	5.00	8.00
Standard error	Parks and Rec	0.388	0.549
	The Office	0.281	0.559
Skewness	Parks and Rec	−0.00328	−0.696
	The Office	−0.197	−0.461
Kurtosis	Parks and Rec	1.33	2.41
	The Office	2.08	1.92

Plots

Jamovi



- Free
- Based on Spreadsheets (like Excel or Google Sheets)
- Similar to SPSS (simpler, fewer abilities)
- Point-and-click
- Data and analyses saved together

Grading

Examinations

30% of Grade

2 open note exams

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Schedule

- Tentative
- Readings are due before class
- Assignment by the end of the day

Date	Readings and Such	Lecture Topic	Week	Assignment Due by 11:59pm
Jan 10	Broman et al. (2017)	Syllabus, Textbook, data, and create yo' survey	1	
Jan 17	http://r4ds.had.co.nz/tidy-data.html#introduction-6 (ignore the R code)	Working with and Analyzing Data, Overview of Statistics, Intro to Statistics Terminology, Introduction to Jamovi	2	
Jan 24	Ch 1, 2, 3 Start looking for published research in your area	Statistics terminology (Hypothesis, IV and DV, Measurement, Validity and Reliability, Correlation and Experimentation, Distributions, Central Tendency and Variability)	3	
Jan 31	Ch 4, 5, 6	Statistics terminology continued (hypothesis testing, populations and samples, descriptive and inferential statistics, effect sizes, confidence intervals, Type I and II errors)	3	Statistics Organizer #1
Feb 7	Ch 7	More on Jamovi (data manipulation, transformations, assumptions), Creating tables and figures for reports and manuscripts, Intro to t-tests	4	HW #1 (Central Tendency and Variability)
Feb 14	Ch 7, 9, 10	T-tests (student's, Mann-Whitney, Wilcoxon), Review of hypothesis tests	5	
Feb 21	Ch 11, 12	ANOVA (one-way, two-way), ANCOVA, Repeated Measures ANOVA, post-hoc analyses	6	HW #2 (t-tests) Statistics Organizer #2
Feb 28		Mid-Term Examination	7	HW #3 (ANOVA)
Mar 7	Spring Break!			
Mar 14	Ch 13	Correlations (Pearson, Spearman, partial)	8	
Mar 21	Ch 13	Linear Regression (hypothesis testing, prediction, assumptions)	9	
Mar 28	Ch 13	Multiple Regression (moderation, mediation)	10	HW #4 (correlations, regression)
April 4	Ch 14	Categorical Data Analysis (Chi-square, logistic, log-linear, odds ratios)	11	HW # 5 (multiple regression) Statistics Organizer #3
April 11	Ch 14	Categorical Data Analysis continued (logistic, odds ratios)	12	
April 18		Research Portfolio, Review for final	13	HW #6 (categorical data)
April 25		Review (get ready for the final)	14	Statistics Organizer #4
May 2		Final Examination		

Schedule

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Please read the syllabus in depth

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May 2		Final Examination		

Break Time

Tell us about yourself

During the break, please go to:

https://docs.google.com/spreadsheets/d/1JaggNgUtkdzQ9T-FTNDsvf0D6DRM1psMJZvcKuYSaxI/edit?usp=sharing

- first_name: your first name
- degree: the degree you're pursuing
- grow_up: what you want to do when you grow up
- hobby: one of your hobbies
- where_from: where are you from?
- where_end: where do you want to end up living
- would_rather: fly or money?

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We will practice with Jamovi next week using this data

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Data and spreadsheets

Get used to working with spreadsheets

- Excel, Google Sheets, Numbers, etc.

Good data practices

- Save a **master data file** that does not change after you have cleaned up the file
- Do NOT save subsetted data files (e.g., removed all ages < 20)
  - Instead **save the analyses**
- Save the master file on **multiple devices** (flash drive, cloud, computer)

Broman et al. (2017)

Good data practices

- **Double check** your work
  - Re-run the same analyses after closing down the file and software
- **Keep track** of all your data and analysis

Break Time

Assignments require your own data

You can use any data that you'd like, if:

- It has both **continuous** and **categorical** variables
- It has at least **20 participants**
- It is available for you to use in class (**de-identified**)

Assignments require your own data

Continuous is where the values of the variable can be a wide, continuous range

- It has both **continuous** and **categorical** variables
- It has at least **20 participants**
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Assignments require your own data

You can use any data that you'd like, if it:

Categorical is where the values of the variable can only be a few, predefined values

- It has both continuous and categorical variables
- It has at least 20 participants
- It is available for you to use in class (de-identified)

Create a survey

Use a survey to collect data that you can use for this class

- Needs to meet the requirements of the data

Example

Questions?

Next week:

1. Working with Data
2. Overview of Statistics
3. Intro to Statistical Terminology
4. Intro to Jamovi