

The Potential of Collecting Data on Student Sleep Habits

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Background

- Active collection and analysis of real-world or personally relevant data are primary GAISE recommendations for teaching introductory statistics
- Can be difficult to find easy-to-collect data with relevance to students
- Additionally, want data complex enough for students to have to think critically about all aspects of the collection and analysis process
- But not too complex...

Goals

- Broad applicability to course topics (useful all semester)
- Data from a simple, well-understood context
- Lead to more complex issues
- Rich enough to gain meaningful insights
- Opportunity to critically evaluate results

Assignment

- Students asked to collect nightly data on their sleep habits for the first five weeks of the semester
- Each student analyzes own data using methods learned throughout the semester
- Each part turned in as methods are discussed in class
- Final submission includes all previous parts, conclusion about their findings, and reflective questions about process

Student Learning Objectives

Students will:

- Apply statistical methods and reasoning to relevant and personal data
- See and grapple with complexity of data collection and analysis in a well-known context
- Use data to draw real-world conclusions

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Example Data

studyday	date	week	weekday	activity	bed	awake	sleeptime
1	8/10/2020	1	Mon	1	11.00	6.33	7.33
2	8/11/2020	1	Tue	1	11.25	5.00	5.75
3	8/12/2020	1	Wed	0	11.00	7.33	8.33
4	8/13/2020	1	Thu	0	12.75	7.00	6.25
5	8/14/2020	1	Fri	0	11.00	6.25	7.25
6	8/15/2020	1	Sat	0	11.00	6.50	7.50
6	8/16/2020	1	Sun	0	11.17	6.25	7.08
8	8/17/2020	2	Mon	0	11.50	6.67	7.17
9	8/18/2020	2	Tue	0	11.06	6.17	7.11

Student Data Collection Questions

- How to record minutes?
- How to record AM/PM?
- Easy way to compute sleep time?
- What if I miss a night?
- What if I wake up during the night?
- Can I use a Fitbit/other sleep tracker?

Assignment Questions – Study Design and Data Quality

- Do you think collecting data during this time, the first two weeks of the semester, would yield an accurate representation of sleep activity? Why or why not?
- What are some potential problems you see in having students collect their own data? State at least two problems and suggest a reasonable solution to one of them.
- Have you missed collected data on any days or nights? If so, is there something unique about those nights that lead missed data collection or was it essentially a random day? Depending on your answer, how might that affect your final analysis?

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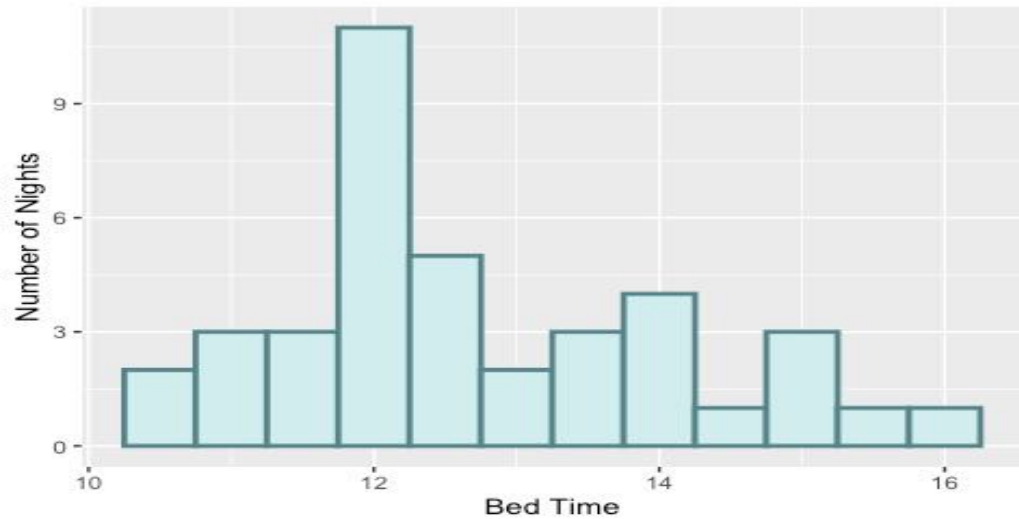
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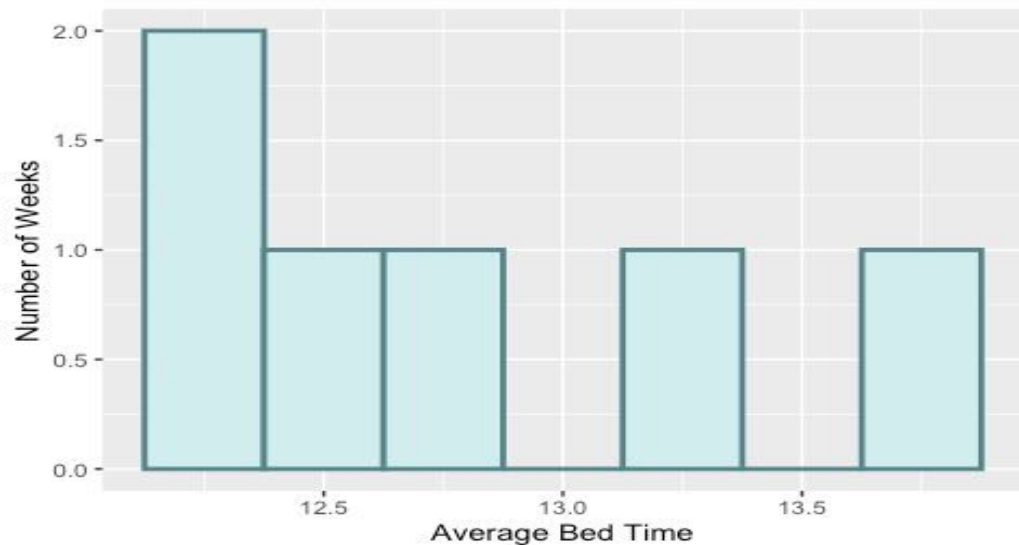
Assignment Questions – Weekly Averages

- Create a histogram showing the distribution of your nightly bed time. Compute the mean and standard deviation.
- Create a histogram of your weekly average bed time. Compute the mean and standard deviation.
- What can you say about your weekly averages relative to your nightly measurements? What similarities and differences do the distributions and summary statistics have?

Histogram of Recorded Bed Times



Histogram of Average Bed Time per Week of Study Per



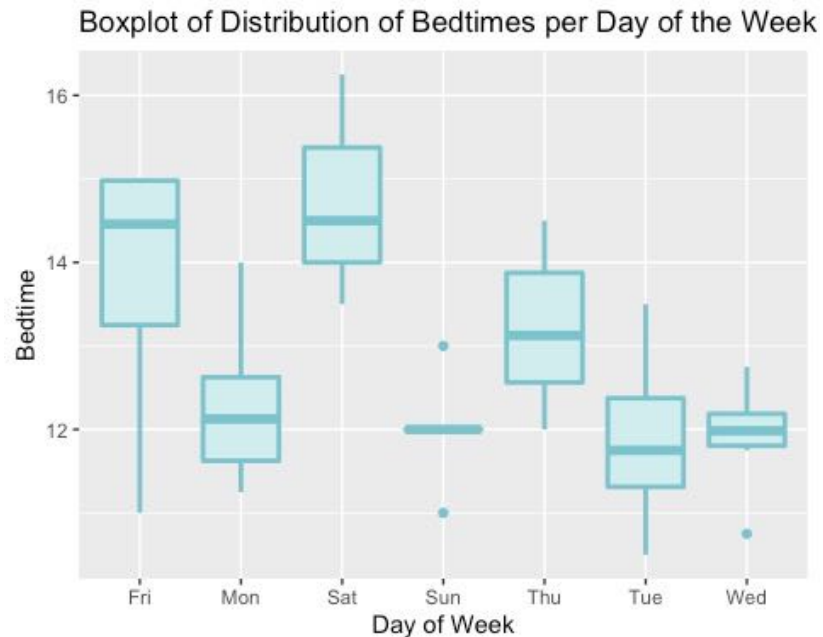
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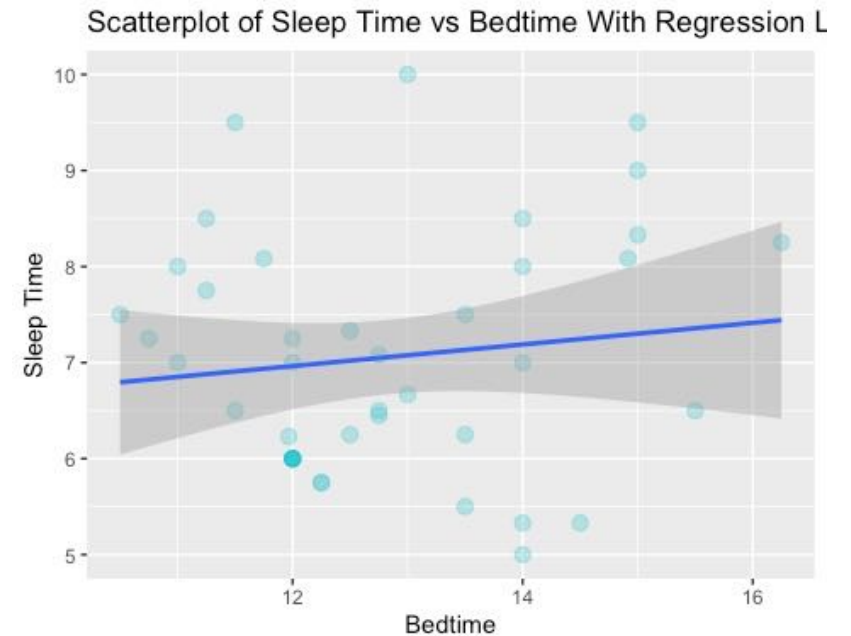
Assignment Questions – Hypothesis Tests

- Create a graph to display the relationship between bed time and day of the week.



Assignment Questions – Linear Regression

- Create a scatterplot with the time you went to bed on the x-axis and your nightly sleep time on the y-axis. Include the regression line with your plot.



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Findings and Conclusions

- Noted in many course evaluations as an interesting and helpful project
- No concerns raised about data collection effort
- Able to use data for almost every week's content
- Consistent context helped students focus on statistical concepts each week
- Students generally provided insightful comments to open-ended questions
- Project answers more in-depth than homework answers

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