

# STAT 113: HW2

Due Electronically via the RStudio Server Monday night 03/07/22

Last Revised March 2, 2022

## SLOs:

A2: Classifying variables based on measurement scale and role

A4: Reasoning about study design and confounding variables

B1: Creating and interpreting numerical and graphical summaries for categorical data

1. (A2, A4) **Urban Brains and Rural Brains.** A study published in 2010 showed that city dwellers have a 21% higher risk of developing anxiety disorders and a 39% higher risk of developing mood disorders than those who live in the country. A follow-up study published in 2011 used brain scans of city dwellers and country dwellers as they took a difficult math test. To increase the stress of the participants, those conducting the study tried to humiliate the participants by telling them how poorly they were doing on the test. The brain scans showed very different levels of activity in stress centers of the brain, with the urban dwellers having greater brain activity than rural dwellers in areas that react to stress.
  - (a) Is the 2010 study an experiment or an observational study?
  - (b) Can we conclude from the 2010 study that living in a city increases a person's likelihood of developing an anxiety disorder or mood disorder?
  - (c) Is the 2011 study an experiment or an observational study?
  - (d) In the 2011 study, what is the explanatory variable and what is the response variable? Indicate whether each is categorical or quantitative.
  - (e) Can we conclude from the 2011 study that living in a city increases activity

in stress centers of the brain when a person is under stress? If so, what allows this? If not, what would the researchers need to have done to license this conclusion?

2. (B1) **Sports and Concussions.** Researchers examined all sports-related concussions reported to an emergency room for children ages 5 to 18 in the United States over the course of one year. The table below displays the number of concussions in each of the major activity categories.

Activity	Cases
Bicycle	23,405
Football	20,293
Basketball	11,507
Playground	10,414
Soccer	7,667
Baseball	7,433
All-Terrain Vehicle	5,220
Hockey	4,111
Skateboarding	4,408
Swimming	3,846
Horseback Riding	2,648
Total	100,952

- (a) Are these results from a population or a sample?
- (b) What proportion of concussions came from playing football?
- (c) What proportion of concussions came from riding bicycles?
- (d) Can we conclude that, at least in terms of concussions, riding bicycles is more dangerous to children in the US than playing football? Why or why not?
3. (B1) **Culture and Schizophrenia.** A recent study examining the link between schizophrenia and culture interviewed 60 people who had been diagnosed with schizophrenia and who heard voices in their heads. The participants were evenly split between the US, India, and Ghana, and each was interviewed to determine whether the voices were mostly negative, mostly neutral, or mostly positive. The results are shown in the table below. “Learned cultural expectations about the nature of mind and self” appear to influence how the voices are perceived.

	US	India	Ghana	Total
Negative	14	4	2	20
Neutral	6	3	2	11
Positive	0	13	16	29
Total	20	20	20	60

- (a) What proportion of all the participants felt that the voices are mostly negative?
- (b) What proportion of all US participants felt that the voices are mostly negative?
- (c) What proportion of non-US participants felt that the voices are mostly negative?
- (d) What proportion of participants hearing positive voices are from the US?
- (e) Does culture appear to be associated with how voices are perceived by people with schizophrenia?