STAT 113: HW3

Due Electronically via the RStudio Server Monday night 10/25/21

Last Revised March 11, 2022

SLOs:

A4: Reasoning about study design and confounding variables

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

D2: (Lab) Techniques for Transparent and Reproducible Results

Problems

1. (SLO A4) **Walking and Health.** In a newspaper article entitled "Outwit the Grim Reaper by Walking Faster,"[1] a study is described in which men's walking speeds at age 70 were measured and then the men were followed over several years. In the study, men who walked slowly were more likely to die.

   The newspaper article describing the study concludes by saying that "Men can elude the Grim Reaper by walking at speeds of at least 3 miles per hour."

   1. Is this an observational or experimental study?
   2. What common mistake is this article making?
   3. Give an alternative interpretation of the finding reported.
   4. How would the study need to have been conducted differently for the conclusion in the newspaper article to follow from the results in the study?

2. (SLO B1) **Insomnia Therapy.** In a study designed to investigate the value of Cognitive Behavioral Therapy for treating insomnia, forty people who had been diagnosed with insomnia were randomly divided into two groups, with 20 people

[1] medicalexpress.com, posted December 16, 2011

in each group. Participants in one group received a one-hour cognitive behavioral therapy session while those in the other group received no treatment. Three months later, 14 of those in the therapy group reported sleep improvements while only 3 people in the other group reported improvements.

(a) Create a two-way table of the data. Include totals across and down.

(b) How many of the 40 people in the study reported sleep improvement?

(c) Of the people receiving the therapy session, what proportion reported sleep improvements?

(d) What proportion of people who did not receive therapy reported sleep improvements?

(e) If we use $\hat{p}_T$ to denote the proportion from part (c) and use $\hat{p}_N$ to denote the proportion from part (d), calculate the difference in proportion reporting sleep improvements, $\hat{p}_T - \hat{p}_N$, between those getting therapy and those not getting therapy.