BIOST 509: In-Class Exercise 5

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Due date: 6:30pm on November 1, 2019 via Canvas

Instructions

Use the FEV dataset used in Lecture 5 and earlier lectures to answer the following questions. The dataset is available from Canvas in `Pages/Module 5 materials` or `Files/datasets`. **Answer the questions in full sentences; i.e., do not just say, e.g., "no difference."** This is an opportunity to practice your scientific and statistical communication!

Questions

1. Use a t-test to test for a difference in mean FEV by sex. What is the p-value for the t-test? Is there a significant difference in mean FEV by sex?
2. Perform a linear regression analysis with FEV as the response (dependent) variable and sex as the predictor (independent) variable. Give an interpretation of the coefficient for sex. Give a 95% confidence interval for the coefficient of sex. Is there significant evidence that FEV differs by sex? What is the value of R-squared for the model you fit? Compare your results from the linear regression model to the t-test results you obtained in Question 1.
3. Perform a linear regression analysis with FEV as the response and height as the predictor. Describe the relationship between the two variables based on the output from your regression analysis. Is there significant evidence of an association between FEV and height?
4. Fit two multiple linear regression analyses with FEV as the response. In the first model, include age and sex as predictors. In the second model, include age, sex, and smoking status. Discuss the differences in the coefficient estimates in each model.

Optional: Introduction to R Markdown

R Markdown is a great way to intersperse code, output of your analysis, and text. I make these lecture slides, homeworks, and homework solutions using R Markdown.

Please work in a RStudio Project when using R Markdown. This allows you to keep track of where files to read in are.

To create a new R Markdown document for your homework in RStudio

1. Click File -> New File -> R Markdown...
2. Select "PDF" as output format (with "Document" selected on the left)
    - You may need to install MikTeX (Windows) or MacTeX (Mac)
        - MikTeX download: https://miktex.org/download
        - MacTeX download: https://tug.org/mactex/mactex-download.html
3. A new example R Markdown file will appear
4. Click "Knit" to build the PDF

You will learn R Markdown best by changing the example R Markdown document, knitting the PDF, and seeing how the PDF changes. The HW 2 solutions are available as a `Rmd` on Canvas under "File/Module 5 materials" if you would like to follow a different example.