

Difference in BMI of Male and Female Statistic Students at Longwood University

Brooke Buchanan

MATH 171 Spring 2020

Dr. Steven Hoehner

Difference in BMI of Male and Female Statistic Students at Longwood University

Introduction

This study is a statistical analysis of survey responses from statistic students at Longwood University with the goal to determine a difference in BMI between male and females of the population. It was determined that there is a statistically significant difference in BMI between both genders of the sample.

Data collection

The population for this study consists of students at Longwood University. The variables included in the populations data are sex, class, presidential approval, and body mass index (BMI). Sex, class, and presidential approval are categorical and discrete data values whereas BMI is quantitative and continuous data. The simple random samples (SRS) were found by using a TI-84 calculator. The first command was to press MATH and scroll over to PROB. Then press [8] randIntNoRep to enter the appropriate set of numbers. By using numbers from only the female population enter the lower, upper, and number of terms (n). For this data, 1 was the lower, the upper was 219, and n was 40. Once randIntNoRep(1, 219, 40) was complete, press enter to view the forty random samples while scrolling across the screen. From the male population, the lower was 220, the upper was 349, and n was 40. The male formula would appear as randIntNoRep(220, 349, 40). This method allows for no repeats to show out of the forty numbers. These simple random sample sizes of forty covers only 18.3% of females in the population and 31% of males in the population. This is a reasonable amount to approximate the populations of all students in Math 171 and Math 301 because the randomized samples provide a large range of data. Refer to Table 1 and Table 2 for the full data for both samples.

Data description

Presidential approval was surveyed from both samples with the options to select “approve, disapprove, or unsure.” From the simple random sample of females, “disapprove” is the mode of presidential approval. The proportion of 26/40 or 65% of females from the sample disapprove of President Trump. The male simple random sample also shows that disapproval is the most common response to presidential approval. This conclusion shows that 15/40 or 37.5% of male statistic students in the sample disapprove of the current president. Although both samples of students disapprove of President Trump, there is a larger gap between both genders. The second leading value is the student’s choice of “unsure” and the difference in these values are much closer for the male students compared to females. Refer to Histogram 1 and Histogram 2 to view the total results. The body mass index (BMI) was also surveyed among both samples in Histogram 3 and Histogram 4. The three most frequent values for female BMI in this simple random sample include 21.7, 22.2, and 22.9. From the male simple random sample, 24.4 is the most frequent value for the body mass index category. Male statistic students had a larger BMI mode compared to female statistic students. Both histograms demonstrate that each gender has data for the body mass index skewed to the right. These distributions are normally distributed because the sample size is larger than thirty. The center of the distribution for females is 23.7 while the distribution for males is 25.6. The spread of data from the female simple random sample is 18.1 to 47.9. The simple random sample for males has a spread of 17.9 to 62.9. Please refer to Table 3 for the descriptive statistics of the BMI for both genders. There are outliers in the upper fence for each sample. The female simple random sample had three outliers of 41.7, 42.2, and 47.9. The male simple random sample had two outliers of 47.6 and 62.9. These numbers were found by using the formula $Q3 + 1.5 \times IQR$. The female sample used $29.1 + 1.5 \times 7.7$

and the male sample used $30.7 + 1.5 \times 8$. There were no outliers in the lower fence. This conclusion was verified by using $Q1 - 1.5 \times IQR$ for each sample.

Data analysis

There is a difference in BMI between male and female statistic students at Longwood University. The data collected demonstrated that males have a higher range of BMI than females. The sample meets the requirement of being greater than 30 and each individual was randomly selected. The hypothesis for these sets of data are $H_0: \mu_1 - \mu_2 = 0$ and $H_a: \mu_1 - \mu_2 \neq 0$. For the hypothesis, μ_1 : mean BMI of female statistic students and μ_2 : mean BMI of male statistic students. The test statistic equals 0.99 and the degrees of freedom is 39 for this two-sample set of data. With this data, the p-value is 0.834. There are statistically significant results found by the hypothesis test. We reject H_0 , we have significant evidence that the male students have a higher BMI than the female students. With a 95% confidence interval, the difference in mean BMI for both male and female statistic students at Longwood University lies between -5.058 and 1.659.

Appendix

Table 1: Simple Random Sample of Female Statistic Students at Longwood University

ID	Sex	Class	Presidential Approval	BMI (kg/m²)
5	Female	Junior	Unsure	22.9
6	Female	Freshman	Disapprove	22.3
11	Female	Senior	Disapprove	30
12	Female	Freshman	Disapprove	29.2
20	Female	Freshman	Unsure	20.4
33	Female	Sophomore	Disapprove	19.3
48	Female	Senior	Disapprove	47.9
61	Female	Sophomore	Disapprove	22.2
62	Female	Freshman	Disapprove	21.7
63	Female	Junior	Disapprove	21.6
65	Female	Freshman	Approve	21
69	Female	Senior	Unsure	18.1
76	Female	Junior	Disapprove	23.8
79	Female	Freshman	Disapprove	23.3
82	Female	Freshman	Disapprove	22.2
89	Female	Freshman	Unsure	23.6
102	Female	Freshman	Unsure	25.9
106	Female	Freshman	Approve	27.5
109	Female	Sophomore	Disapprove	25.6
116	Female	Freshman	Unsure	41.7
118	Female	Junior	Disapprove	34.6
119	Female	Sophomore	Unsure	34.5
122	Female	Freshman	Disapprove	25.8
130	Female	Freshman	Disapprove	21.7
133	Female	Senior	Disapprove	21.1
142	Female	Junior	Disapprove	24.1
143	Female	Sophomore	Disapprove	22.9
148	Female	Sophomore	Disapprove	19.2
149	Female	Freshman	Disapprove	18.5
172	Female	Freshman	Disapprove	42.2
175	Female	Freshman	Disapprove	35.2
176	Female	Sophomore	Approve	33.8
184	Female	Junior	Disapprove	28.2
185	Female	Junior	Approve	26.6
187	Female	Freshman	Disapprove	25

194	Female	Sophomore	Unsure	19.5
195	Female	Freshman	Unsure	19.4
198	Female	Junior	Disapprove	37.9
203	Female	Senior	Disapprove	29
216	Female	Freshman	Unsure	18.9

Table 2: Simple Random Sample of Male Statistic Students at Longwood University

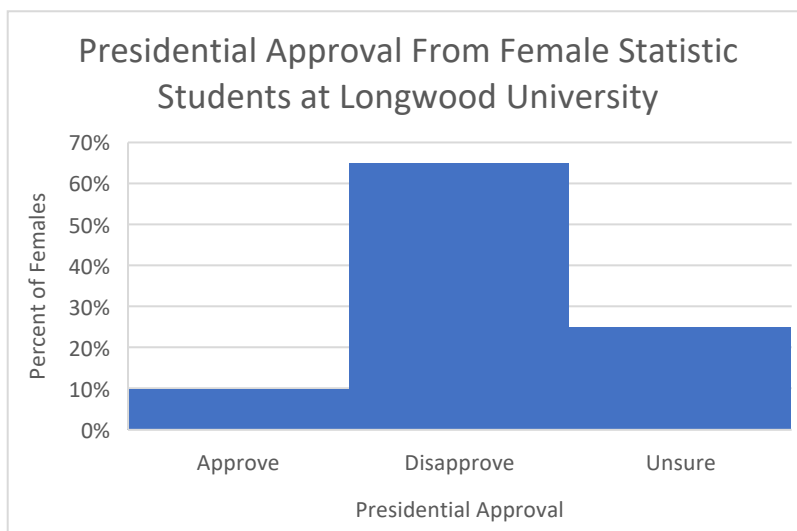
ID	Sex	Class	Presidential Approval	BMI (kg/m ²)
222	Male	Sophomore	Disapprove	20.4
224	Male	Sophomore	Unsure	27.8
228	Male	Senior	Approve	32
229	Male	Freshman	Unsure	26.2
233	Male	Freshman	Disapprove	17.9
234	Male	Junior	Approve	47.6
235	Male	Junior	Unsure	31.7
236	Male	Junior	Unsure	30.7
238	Male	Junior	Approve	28
239	Male	Freshman	Unsure	26.6
241	Male	Freshman	Disapprove	22
249	Male	Junior	Disapprove	20.5
254	Male	Sophomore	Disapprove	34
255	Male	Freshman	Approve	32.6
256	Male	Junior	Unsure	32.2
262	Male	Sophomore	Unsure	26.6
263	Male	Junior	Unsure	25.1
264	Male	Freshman	Disapprove	24.4
268	Male	Sophomore	Disapprove	22.3
269	Male	Freshman	Disapprove	22.1
287	Male	Senior	Disapprove	29.8
289	Male	Sophomore	Unsure	28.4
292	Male	Sophomore	Unsure	25.1
300	Male	Junior	Disapprove	40.7
303	Male	Freshman	Approve	23
307	Male	Junior	Disapprove	24.9
312	Male	Junior	Approve	30.6
313	Male	Freshman	Disapprove	30.1
317	Male	Freshman	Approve	24.4
321	Male	Sophomore	Unsure	29.6
324	Male	Junior	Disapprove	23.8

327	Male	Sophomore	Unsure	62.9
328	Male	Senior	Approve	35
331	Male	Junior	Disapprove	24.5
332	Male	Junior	Approve	24.4
335	Male	Senior	Unsure	21.6
337	Male	Freshman	Approve	19.5
339	Male	Senior	Approve	21.4
342	Male	Senior	Unsure	24.8
345	Male	Freshman	Disapprove	21.2

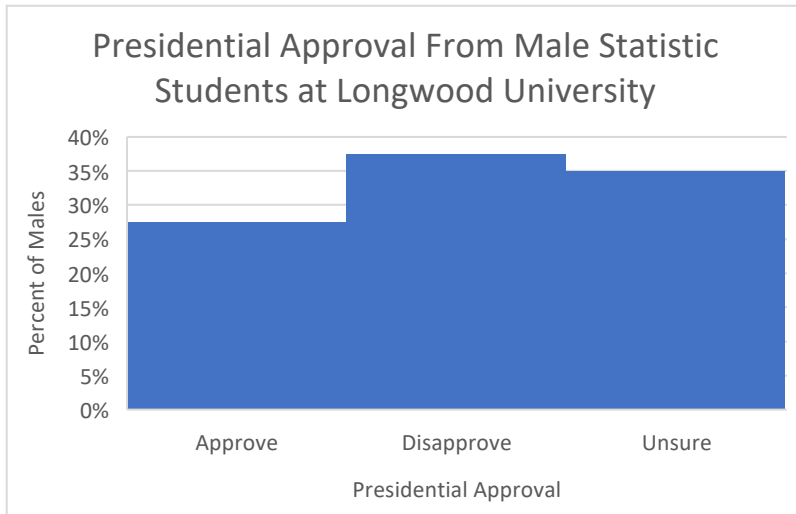
Table 3

	Female	Male
Column1	Column2	Column3
Mean	26.2	27.9
Standard Deviation	7.2	8.1
Minimum	18.1	17.9
Q1	21.4	22.7
Median	23.7	25.7
Q3	29.1	30.7
Maximum	47.9	62.9

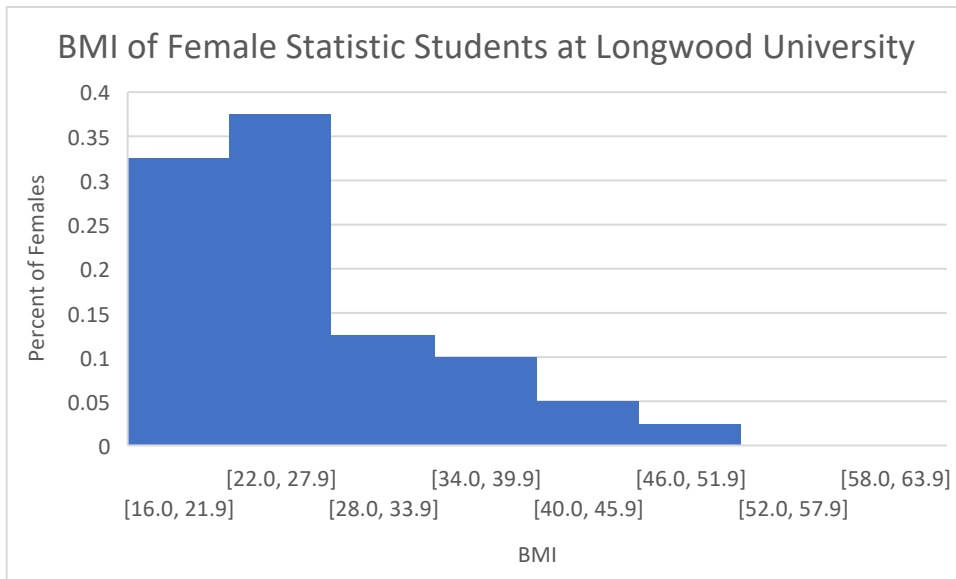
Histogram 1



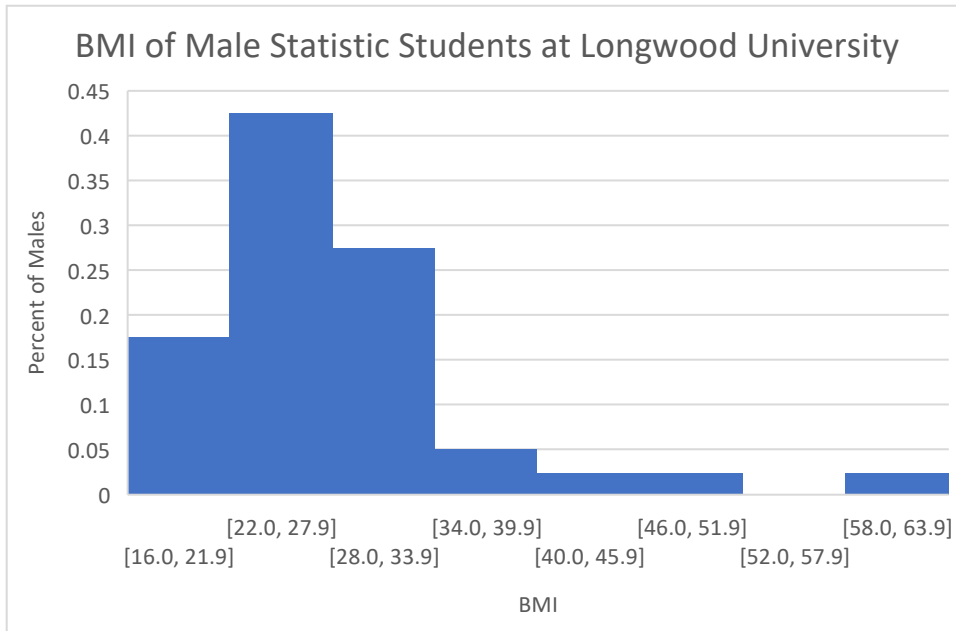
Histogram 2



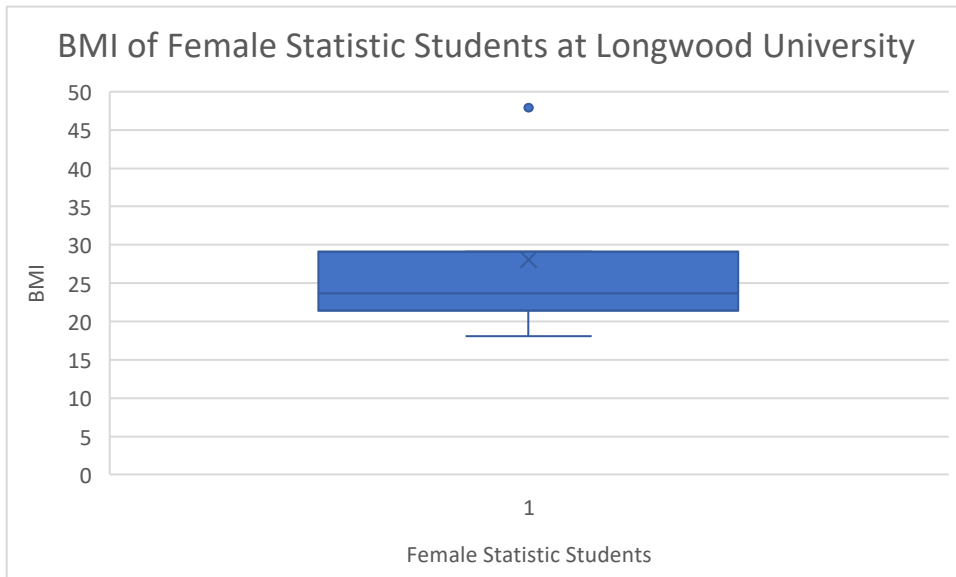
Histogram 3



Histogram 4



Boxplot 1



Boxplot 2

