



Analysis on Fear of Walking Alone

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Introduction

Pepper spray. Blunt, metal striking objects. Sharp objects. Hidden knives. Whistles. Personal alarms. Flashlights. These are all examples of self-defense items, items that I find myself and fellow women carrying when we are out and about. And this has become the new norm. As a woman, I always make sure to have my pepper spray with me when I know I will be walking alone. Remembering to text friends when I get home. Wearing baggy clothing to blend in. Making sure I have a safe way to get back home if I want to go out at night. These are all precautions that me and other females constantly worry and think about. Furthermore, this makes me wonder, has this fear of walking alone always been an issue? Is it just an issue with women or is it also an issue for men, and just not talked about? To examine this question, men and women were asked whether or not there is any area that is within a mile of them where they would be afraid to walk alone at night. For the data analysis, we will investigate 3 questions:

Is there a difference in percentage of people afraid of walking alone in their neighborhood in 1973 and 2021?

In 2021, do women tend to be more afraid of walking alone in their neighborhood than men?

Do women tend to be more afraid of walking alone in their neighborhood than men?

Materials and Methods

The data was obtained through the General Social Survey (GSS), which is a project of the National Opinion Research Center (NORC) at the University of Chicago funded by the National Science Foundation. The GSS has been monitoring and studying American society, its changes, and its complexities since 1973. The GSS is a publicly available resource and is widely used. The GSS Data Explorer is one of the many ways the public can easily access GSS data with all the tools to transform the data into useful information readily at hand.

To find the specific data we will be examining, we navigated to the “key trends” portion of the GSS website. The variables in this data set included the following:

- Fear – Whether or not there is any area that is within a mile of you where you would be afraid to walk alone at night (yes, no)
- Year – GSS year for this respondent
- Sex – Sex of the respondent

The data set includes data from 1973 through 2021. However, 19 out of the 49 years in this period do not have data provided.

Analysis and Results

Question 1: Is there a difference in percentage of people afraid of walking alone in their neighborhood in 1973 and 2021?

To test whether there is a significant difference in the percentage of people afraid of walking alone in their neighborhood in 1973 compared to in 2021, we will be performing a two-proportion z-test. However, first, let's first explore the data.

Table 1: Descriptive Statistics of the Percentages of People Afraid of Walking Alone

	Mean	Median	Standard Deviation	Minimum	Maximum
Percentage of Being Afraid Walking Alone	36.53	34.05	16.13	15.48	61.93

Figure 1: Proportion of Percentage of Respondents Afraid in 1973 and 2021

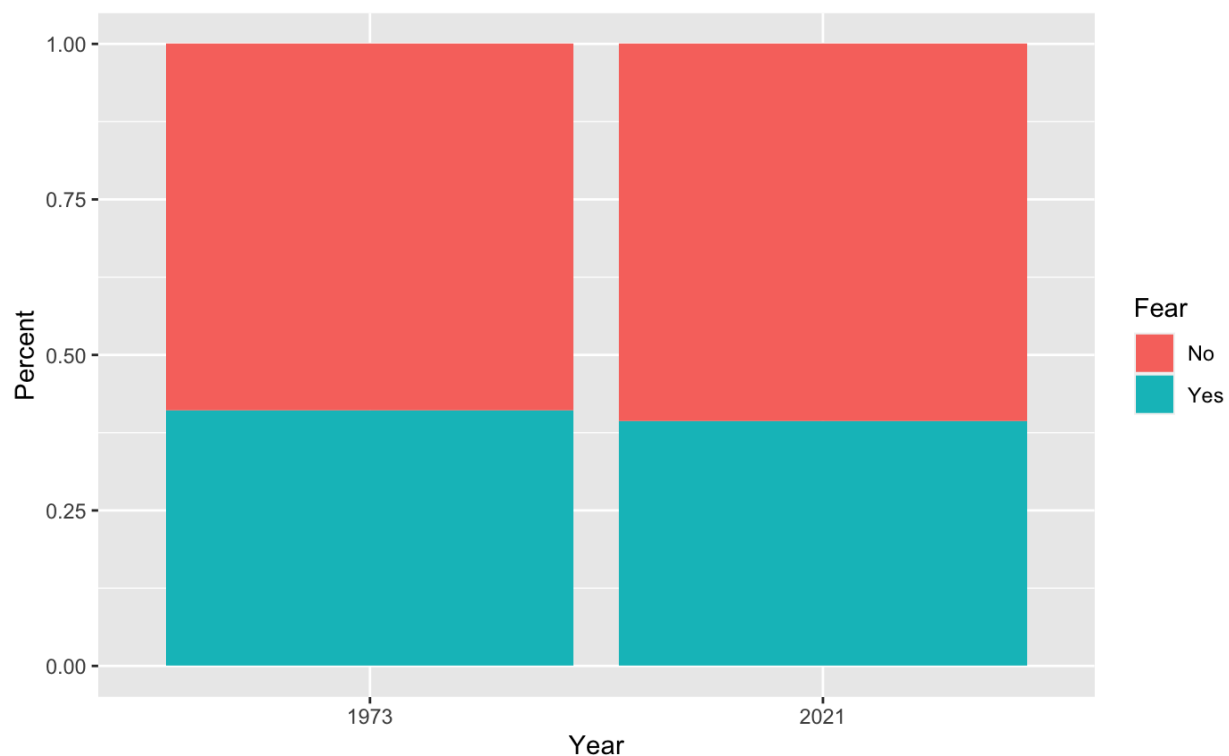


Figure 1 shows that the percentage of men and women who were afraid of walking alone in their neighborhood in 1973 was 41.06% and was 39.37% in 2021. As the statistics in Table 1 reveal, these values are typical since they are within one standard deviation of the mean and median. It is also evident that the standard deviation is on the larger side, and since the difference in percentage between 1973 and 2021 is 1.69%. This is a very small percentage, especially compared to the standard deviation, so we may predict that there will not be a

significant difference between the percentage of people afraid of walking alone in their neighborhood in 1973 compared to in 2021. However, let's officially test this.

Table 2: Two-Sample Proportion z-test for Question 1

	z-statistic	p-value	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Question 1 Hypothesis Test	1.32	0.093	-0.0085	0.042

After performing a two-sample proportion z-test, with a p-value of 0.093, which is larger than our significance level of 0.05, we do not have strong evidence that there is a difference between the percentage of people afraid of walking alone in their neighborhood in 1973 compared to in 2021, so it is plausible that there is not a significant difference of percentage of being afraid between the two years.

We are 95% confident that the difference in the true proportion of respondents that are afraid of walking alone in their neighborhood is between 0.0085 lower and 0.042 higher in 1973 compared to 2021. Furthermore, since zero is in this confidence interval, we have further evidence that there is not a significant difference in percentage between these two years. This explanation is consistent with the descriptive statistics shown in Table 1 because we predicted that there would not be a significant difference between the percentage of people afraid of walking alone in their neighborhood in 1973 compared to in 2021.

Since there was not a significant difference between 1973 and 2021, perhaps there is a confounding variable present. Let's try taking sex into account and seeing if there is a significant difference the percentage of being afraid walking alone between men and women.

Question 2: In 2021, do women tend to be more afraid of walking alone in their neighborhood than men?

To test whether there is significant evidence that the percentage of women afraid of walking alone in their neighborhood in 2021 is higher compared to the percentage of men afraid of walking alone in their neighborhood in 2021, we will be performing a two-proportion z-test. However, first, let's first explore the data.

Figure 2: Proportion of Percentage of Respondents Afraid by Sex in 2021

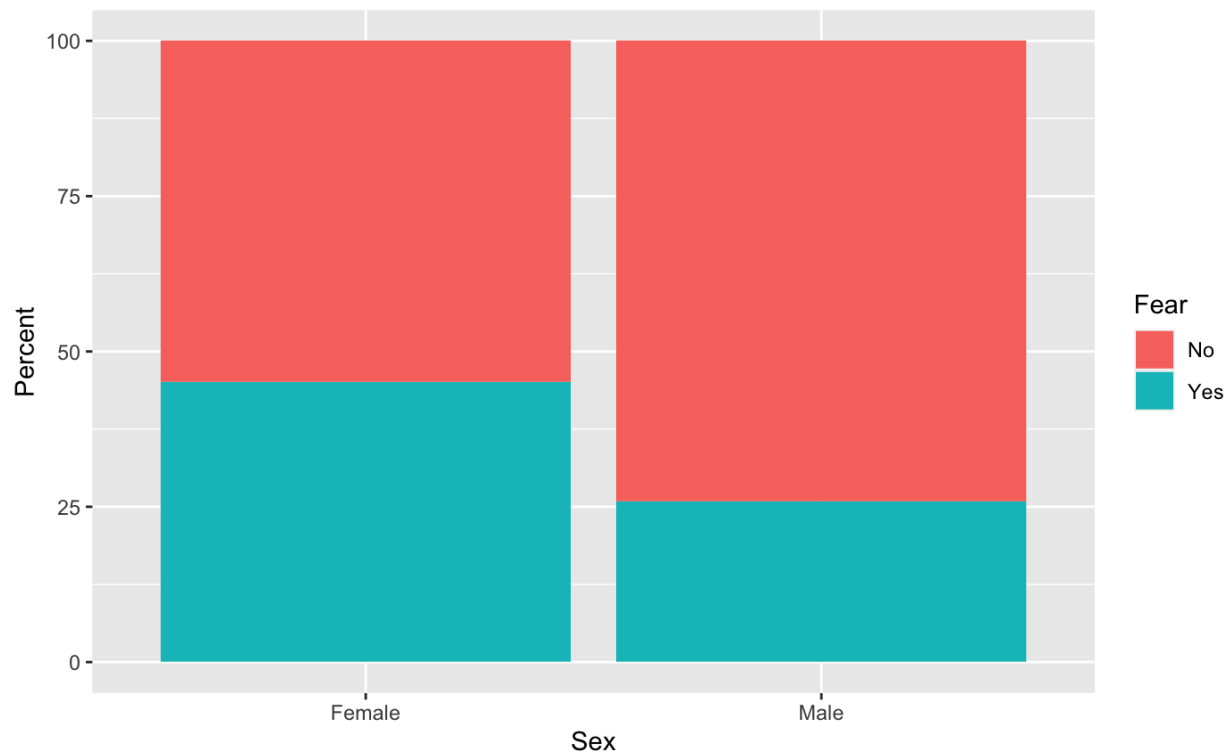


Figure 2 displays the percentage of women afraid of walking alone in their neighborhood in 2021 is 45.09%, and the percentage of men afraid of walking alone in their neighborhood in 2021 is 25.94%. The difference in percentage between men and women in 2021 is 19.15%. As you recall, the standard deviation is 16.13%, so the difference between men and women is over one standard deviation, so this may be predictive that there may be a significant difference in the percentage of women and men afraid of walking alone in their neighborhood in 2021. However, let's officially test this.

Table 3: Two-Sample Proportion z-test for Question 2

	z-statistic	p-value	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Question 2 Hypothesis Test	12.79	<0.00001	0.17	0.22

After performing a two-sample proportion z-test, with a p-value of <0.00001, which is much smaller than our significance level of 0.05, we have strong evidence that women tend to be more afraid than men in walking there is a difference in the percentage of women and men afraid of walking alone in their neighborhood in 2021.

We are 95% confident that the difference in the true proportion of respondents that are afraid of walking alone in their neighborhood is between 0.17 and 0.22 higher for women compared

to men. Furthermore, this further signifies women tend to be more afraid to walk alone in their neighborhood than men in 2021.

Now that we have determined that women tend to be more afraid of walking alone in their neighborhood in 2021 than men, let's see if this trend is present over time.

Question 3: Do women tend to be more afraid of walking alone in their neighborhood than men?

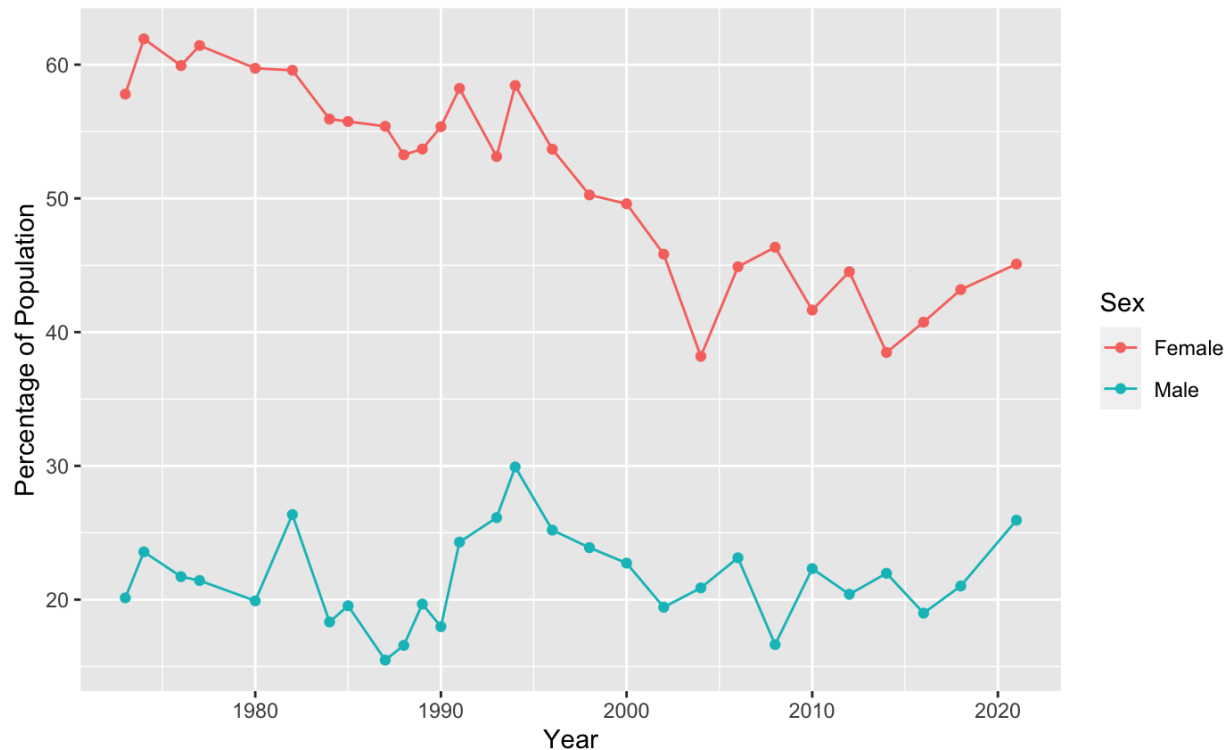
We will be examining whether there is significant evidence that the percentage of women afraid of walking alone in their neighborhood is higher compared to the percentage of men afraid of walking alone in their neighborhood throughout 1963 to 2021. However, first, let's first explore the data.

Table 4: Descriptive Statistics of the Percentages of People Afraid of Walking Alone of Women and Men

	Mean	Median	Standard Deviation	Minimum	Maximum
Women	51.50	53.47	7.34	38.19	61.93
Men	21.56	21.23	3.35	15.48	29.92

As seen in Table 4, women consistently have higher percentages of being afraid of walking alone, more specifically their mean, median, minimum, and maximum are drastically higher than men's.

Figure 3: Line Graph of Percentage of Men and Women Afraid Throughout 1973 to 2021



This trend can also be seen in Figure 3. As is shown, the female group always has a larger percentage of the population afraid of walking alone than men. Another trend that is evident from figure 3 is that it appears that the percentage of the population afraid of walking alone has reduced for females from 1963 compared to 2021 but has increased from 1963 from 2021 for men. This is particularly interesting for me, because although I did expect that females would consistently be more afraid of walking alone than men, I did not expect the percentage to reduce from 1963 to 2021, I thought it would increase for both genders.

Conclusion

Ultimately, since this was not an experiment and was an observational study, we cannot draw cause and effect conclusions from our analyses. However, we can examine the trends we analyzed and tested for. We determined through a two-sample proportion z-test that there is not a significant difference between the percentage of people afraid of walking alone in their neighborhood in 1973 compared to in 2021. This led us to think perhaps sex could be a confounding variable, so we looked into whether or not there is significant evidence that the percentage of women afraid of walking alone in their neighborhood in 2021 is higher compared to the percentage of men afraid of walking alone in their neighborhood in 2021. After this, we wanted to examine whether this trend was present throughout 1963 to 2021. Through analyzing descriptive statistics and a line graph, we determined that women tend to be more afraid of walking alone in their neighborhood than men.

A message that can be drawn from this is that we should be taking action to make women feel safer walking alone. We should not be focusing our attention on women taking action to make themselves feel safer like carrying pepper spray with them, but we should attack the problem at its core by finding solutions that both men and women can do to make everyone feel safe walking alone.

Appendix

Appendix 1: R Code for Loading in Data and Libraries

```
setwd("~/Documents/STAT365/FinalProject")
library(tidyverse)
library(readxl)
fearData = read_excel("afraid_walk_neighborhood.xlsx")
```

Appendix 2: R Code for Table 1

```
summary(fearData)
```

Appendix 3: R Code for Figure 1

```
Year <- c(1973, 1973, 2021, 2021)
Percent <- c((611/1488), (877/1488), (17110/43463), (26353/43463))
Fear <- c("Yes", "No", "Yes", "No")
df <- data.frame(Year, Percent, Fear)
df$Year=factor(df$Year)
df %>%
  ggplot(aes(y = Percent, x = Year, fill = Fear)) +
  geom_col()
```

Appendix 4: R Code for Figure 2

```
Sex <- c("Female", "Male", "Female", "Male")
Percent <- c(45.09, 25.94, 54.91, 74.06)
Fear <- c("Yes", "Yes", "No", "No")
df <- data.frame(Sex, Percent, Fear)
df %>%
  ggplot(aes(y = Percent, x = Sex, fill = Fear)) +
  geom_col()
```

Appendix 5: R Code for Table 4

```
fearData %>%
  filter(Sex == "Female") %>%
  summary()
women <- fearData %>%
  filter(Sex == "Female")
sd(women$`Percentage of Population`)
fearData %>%
  filter(Sex == "Male") %>%
  summary()
men <- fearData %>%
  filter(Sex == "Male")
sd(men$`Percentage of Population`)
```

Appendix 6: R Code for Figure 3

```
fearData %>%  
  ggplot(aes(x = Year, y = `Percentage of Population`, color = Sex)) +  
  geom_point() +  
  geom_line()
```