Exploratory Data Analysis Project

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```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(ggplot2)
library(sjmisc)
library(readxl)
library(janitor)
```

```
##
## Attaching package: 'janitor'
```

```
## The following objects are masked from 'package:sjmisc':
##
##     remove_empty_cols, remove_empty_rows
```

```
## The following objects are masked from 'package:stats':
##
##     chisq.test, fisher.test
```

```
setwd("/Users/chancemanning/Desktop/Math 130/data")
police <- read.csv("police.csv")

#change label for body_camera
police <- police %>%
    mutate(body_camera = ifelse(body_camera==FALSE, "No", "Yes"))
```

Introduction

For this study, I will be using the variables body camera status, arms status, and fleeing status. I want to examine whether there is a relationship between body camera status and whether a suspect is armed or fleeing?

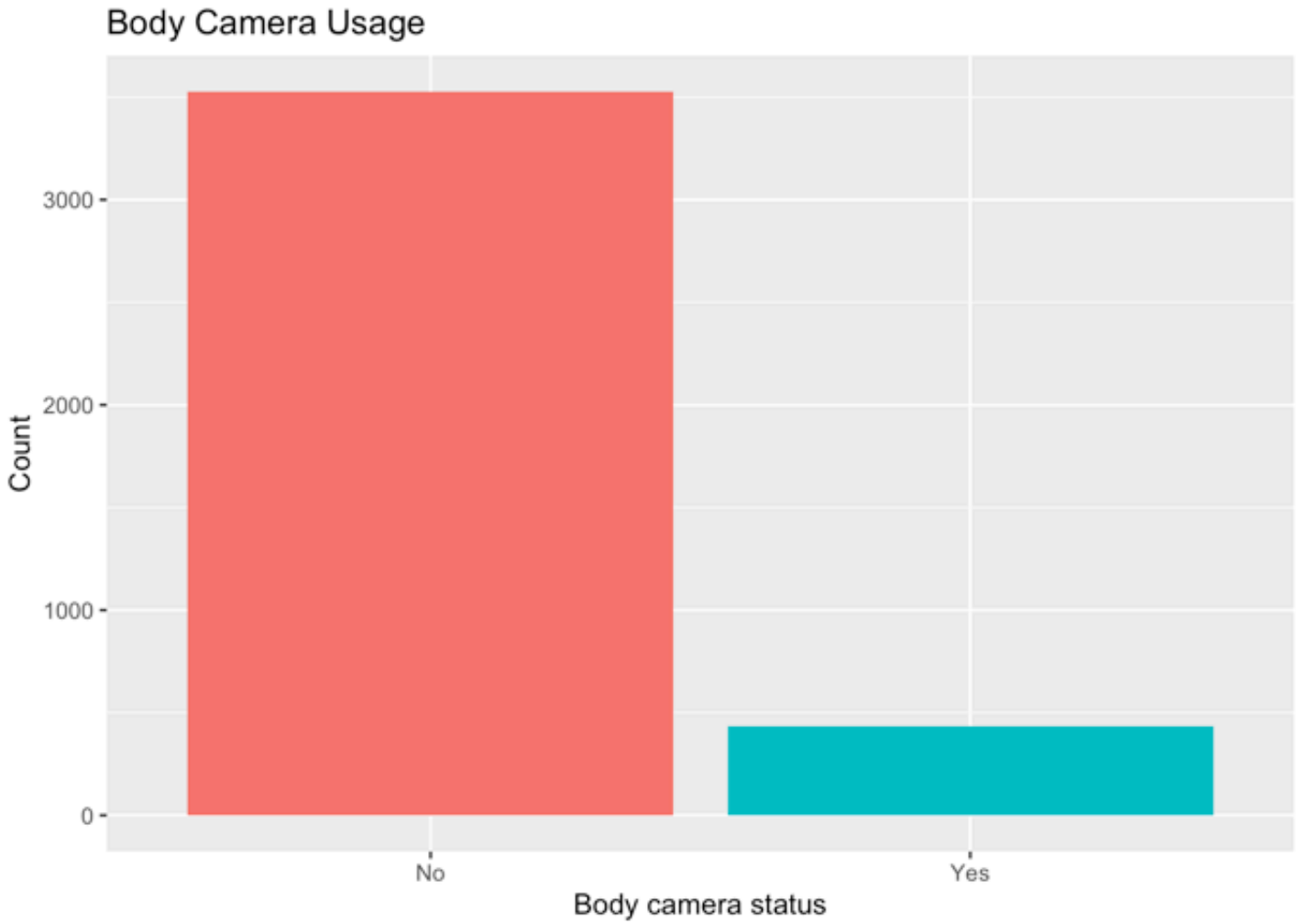
Univariate Exploration

Body camera

```
frq(police$body_camera)
```

```
## x <character>
## # total N=3960 valid N=3960 mean=1.11 sd=0.31
##
## Value |    N | Raw % | Valid % | Cum. %
## ---------------------------------------
## No    | 3527 | 89.07 |   89.07 |  89.07
## Yes   |  433 | 10.93 |   10.93 | 100.00
## <NA>  |    0 |  0.00 |    <NA> |   <NA>
```

```
police %>% ggplot(aes(x=body_camera)) + geom_bar(aes(fill = body_camera)) +
  xlab("Body camera status") +
  ylab("Count") +
  ggtitle("Body Camera Usage") +
  scale_x_discrete(labels= c("No", "Yes")) +
  theme(legend.position = "none")
```



This bar graph displays how often body cameras were in use during each altercation. The bar graph clearly shows that a majority of police do not use their body cameras seeing only 10.93% fall into the “Yes” category.

Arms status

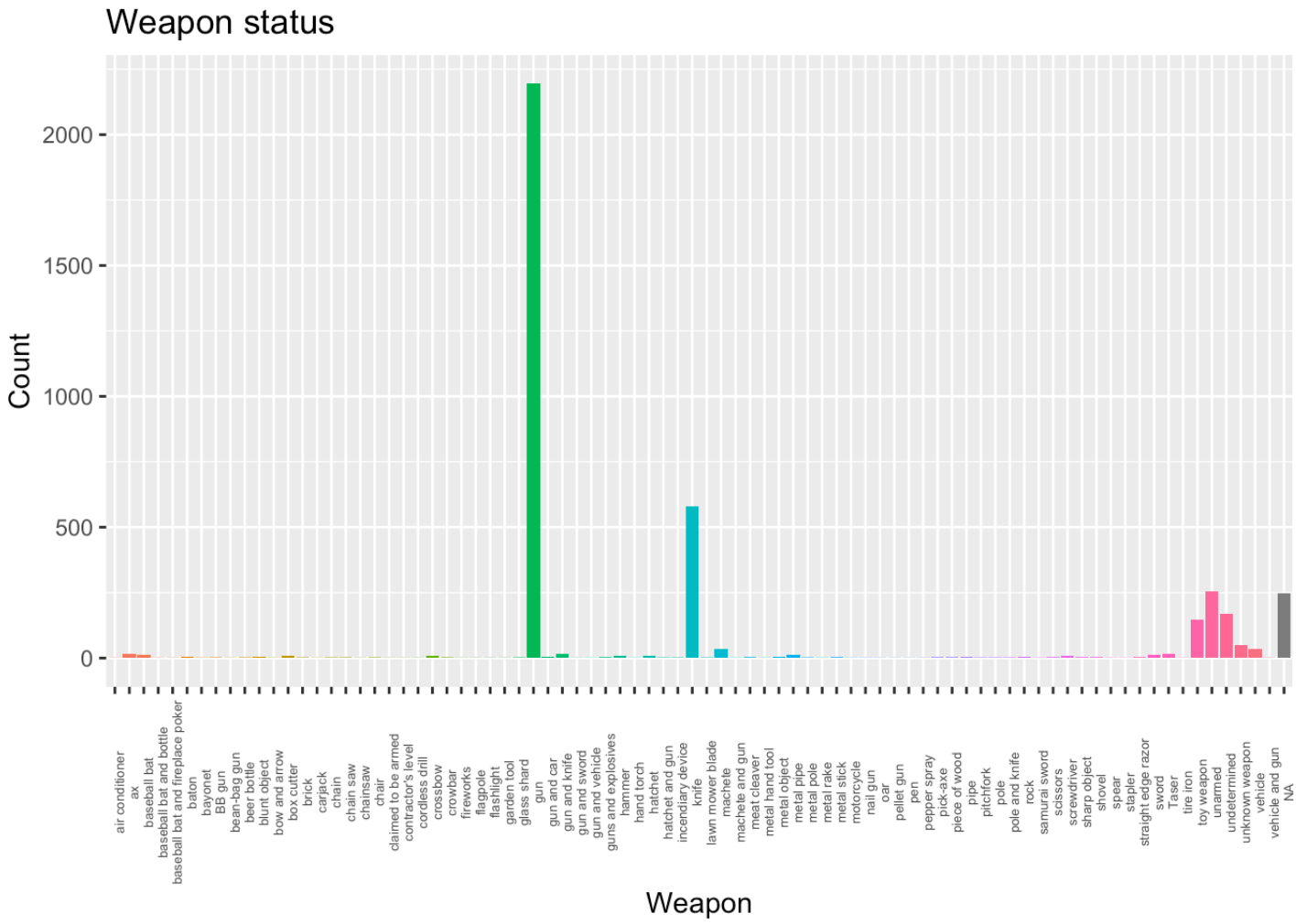
```
frq(police$armed)
```

```
## x <character>
## # total N=3960 valid N=3711 mean=40.80 sd=18.57
##
## Value                            |    N | Raw % | Valid % | Cum. %
## ---------------------------------------------------------------------
## air conditioner                  |    1 |  0.03 |    0.03 |   0.03
## ax                               |   17 |  0.43 |    0.46 |   0.49
## baseball bat                     |   11 |  0.28 |    0.30 |   0.78
## baseball bat and bottle          |    1 |  0.03 |    0.03 |   0.81
## baseball bat and fireplace poker |    1 |  0.03 |    0.03 |   0.84
## baton                            |    4 |  0.10 |    0.11 |   0.94
```

```
## bayonet                 |    1 |  0.03 |    0.03 |   0.97
## BB gun                  |    2 |  0.05 |    0.05 |   1.02
## bean-bag gun            |    1 |  0.03 |    0.03 |   1.05
## beer bottle             |    2 |  0.05 |    0.05 |   1.10
## blunt object            |    5 |  0.13 |    0.13 |   1.24
## bow and arrow           |    1 |  0.03 |    0.03 |   1.27
## box cutter              |   10 |  0.25 |    0.27 |   1.54
## brick                   |    2 |  0.05 |    0.05 |   1.59
## carjack                 |    1 |  0.03 |    0.03 |   1.62
## chain                   |    2 |  0.05 |    0.05 |   1.67
## chain saw               |    2 |  0.05 |    0.05 |   1.72
## chainsaw                |    1 |  0.03 |    0.03 |   1.75
## chair                   |    2 |  0.05 |    0.05 |   1.81
## claimed to be armed     |    1 |  0.03 |    0.03 |   1.83
## contractor's level      |    1 |  0.03 |    0.03 |   1.86
## cordless drill          |    1 |  0.03 |    0.03 |   1.89
## crossbow                |    9 |  0.23 |    0.24 |   2.13
## crowbar                 |    2 |  0.05 |    0.05 |   2.18
## fireworks               |    1 |  0.03 |    0.03 |   2.21
## flagpole                |    1 |  0.03 |    0.03 |   2.24
## flashlight              |    1 |  0.03 |    0.03 |   2.26
## garden tool             |    1 |  0.03 |    0.03 |   2.29
## glass shard             |    2 |  0.05 |    0.05 |   2.34
## gun                     | 2195 | 55.43 |   59.15 |  61.49
## gun and car             |    5 |  0.13 |    0.13 |  61.63
## gun and knife           |   15 |  0.38 |    0.40 |  62.03
## gun and sword           |    1 |  0.03 |    0.03 |  62.06
## gun and vehicle         |    1 |  0.03 |    0.03 |  62.09
## guns and explosives     |    3 |  0.08 |    0.08 |  62.17
## hammer                  |    8 |  0.20 |    0.22 |  62.38
## hand torch              |    1 |  0.03 |    0.03 |  62.41
## hatchet                 |    8 |  0.20 |    0.22 |  62.62
## hatchet and gun         |    2 |  0.05 |    0.05 |  62.68
## incendiary device       |    2 |  0.05 |    0.05 |  62.73
## knife                   |  581 | 14.67 |   15.66 |  78.39
## lawn mower blade        |    2 |  0.05 |    0.05 |  78.44
## machete                 |   36 |  0.91 |    0.97 |  79.41
## machete and gun         |    1 |  0.03 |    0.03 |  79.44
## meat cleaver            |    3 |  0.08 |    0.08 |  79.52
## metal hand tool         |    1 |  0.03 |    0.03 |  79.55
## metal object            |    4 |  0.10 |    0.11 |  79.66
## metal pipe              |   11 |  0.28 |    0.30 |  79.95
## metal pole              |    2 |  0.05 |    0.05 |  80.01
## metal rake              |    1 |  0.03 |    0.03 |  80.03
## metal stick             |    3 |  0.08 |    0.08 |  80.11
## motorcycle              |    1 |  0.03 |    0.03 |  80.14
## nail gun                |    1 |  0.03 |    0.03 |  80.17
```

```
## oar                          |     1 |  0.03 |    0.03 |  80.19
## pellet gun                   |     1 |  0.03 |    0.03 |  80.22
## pen                          |     1 |  0.03 |    0.03 |  80.25
## pepper spray                 |     1 |  0.03 |    0.03 |  80.27
## pick-axe                     |     3 |  0.08 |    0.08 |  80.36
## piece of wood                |     3 |  0.08 |    0.08 |  80.44
## pipe                         |     6 |  0.15 |    0.16 |  80.60
## pitchfork                    |     2 |  0.05 |    0.05 |  80.65
## pole                         |     2 |  0.05 |    0.05 |  80.71
## pole and knife               |     2 |  0.05 |    0.05 |  80.76
## rock                         |     4 |  0.10 |    0.11 |  80.87
## samurai sword                |     1 |  0.03 |    0.03 |  80.89
## scissors                     |     3 |  0.08 |    0.08 |  80.98
## screwdriver                  |     8 |  0.20 |    0.22 |  81.19
## sharp object                 |     3 |  0.08 |    0.08 |  81.27
## shovel                       |     3 |  0.08 |    0.08 |  81.35
## spear                        |     1 |  0.03 |    0.03 |  81.38
## stapler                      |     1 |  0.03 |    0.03 |  81.41
## straight edge razor          |     3 |  0.08 |    0.08 |  81.49
## sword                        |    13 |  0.33 |    0.35 |  81.84
## Taser                        |    17 |  0.43 |    0.46 |  82.30
## tire iron                    |     1 |  0.03 |    0.03 |  82.32
## toy weapon                   |   145 |  3.66 |    3.91 |  86.23
## unarmed                      |   256 |  6.46 |    6.90 |  93.13
## undetermined                 |   171 |  4.32 |    4.61 |  97.74
## unknown weapon               |    48 |  1.21 |    1.29 |  99.03
## vehicle                      |    35 |  0.88 |    0.94 |  99.97
## vehicle and gun              |     1 |  0.03 |    0.03 | 100.00
## <NA>                         |   249 |  6.29 |    <NA> |   <NA>
```

```
police %>% ggplot(aes(x=armed)) + geom_bar(aes(fill = armed)) + theme(legend.position
= "none") +
  theme(axis.text.x = element_text(angle = 90, size=5)) +
  xlab("Weapon") +
  ylab("Count") +
  ggtitle("Weapon status")
```



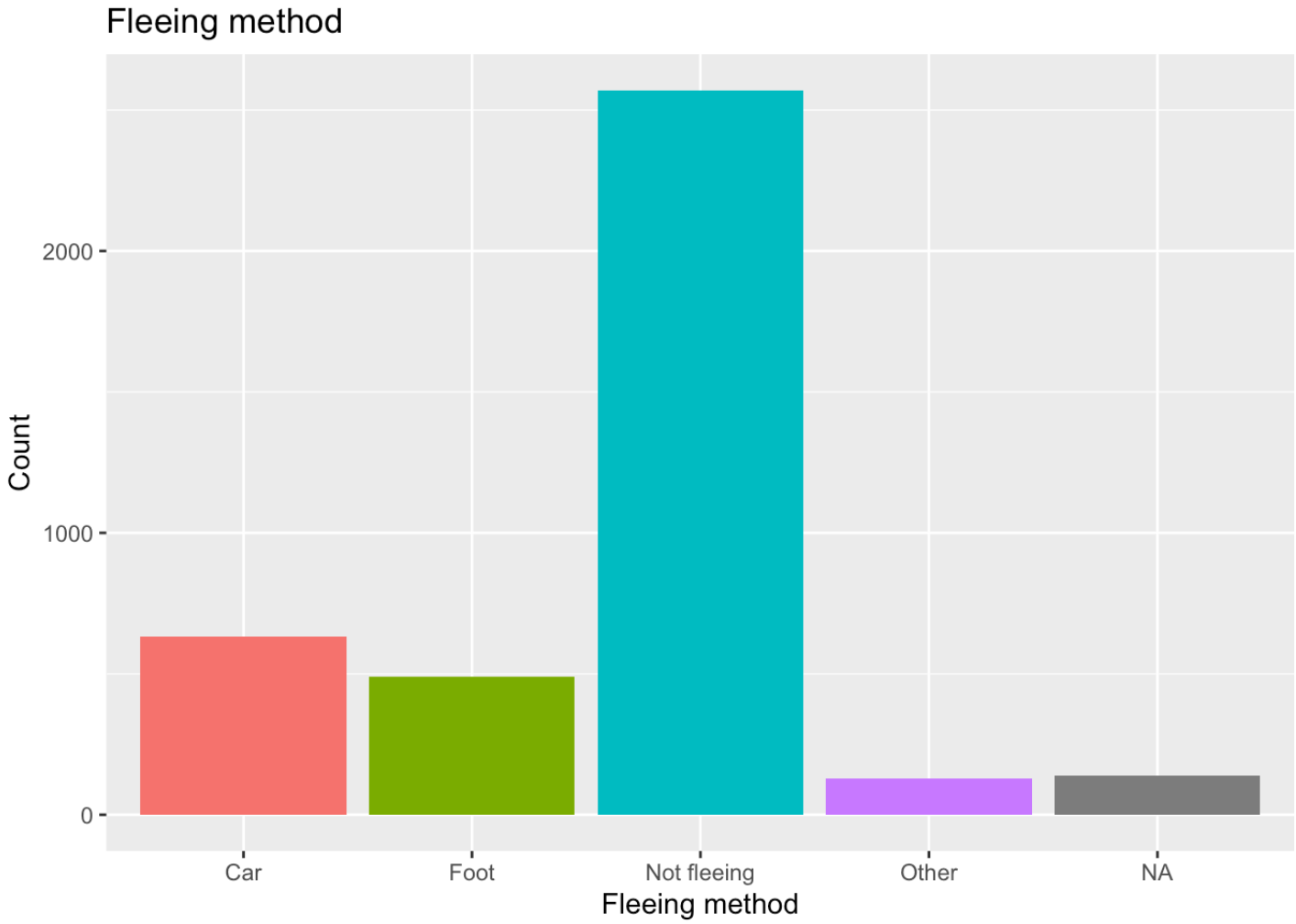
As we can see from the bar graph, guns and knives are the most commonly used weapons. However, being unarmed is the next category with the highest count.

Fleeing status

```
frq(police$flee)
```

```
## x <character>
## # total N=3960 valid N=3820 mean=2.57 sd=0.80
##
## Value       |    N | Raw % | Valid % | Cum. %
## ---------------------------------------------
## Car         |  631 | 15.93 |   16.52 |  16.52
## Foot        |  491 | 12.40 |   12.85 |  29.37
## Not fleeing | 2570 | 64.90 |   67.28 |  96.65
## Other       |  128 |  3.23 |    3.35 | 100.00
## <NA>        |  140 |  3.54 |    <NA> |    <NA>
```

```
police %>% ggplot(aes(x=flee)) + geom_bar(aes(fill = flee)) + theme(legend.position =
"none") +
  theme(axis.text.x = element_text(angle = 0)) +
  xlab("Fleeing method") +
  ylab("Count") +
  ggtitle("Fleeing method")
```



As interpreted from the bar plot, most suspects do not flee with 67.28% meeting this criteria.

Bivariate Exploration

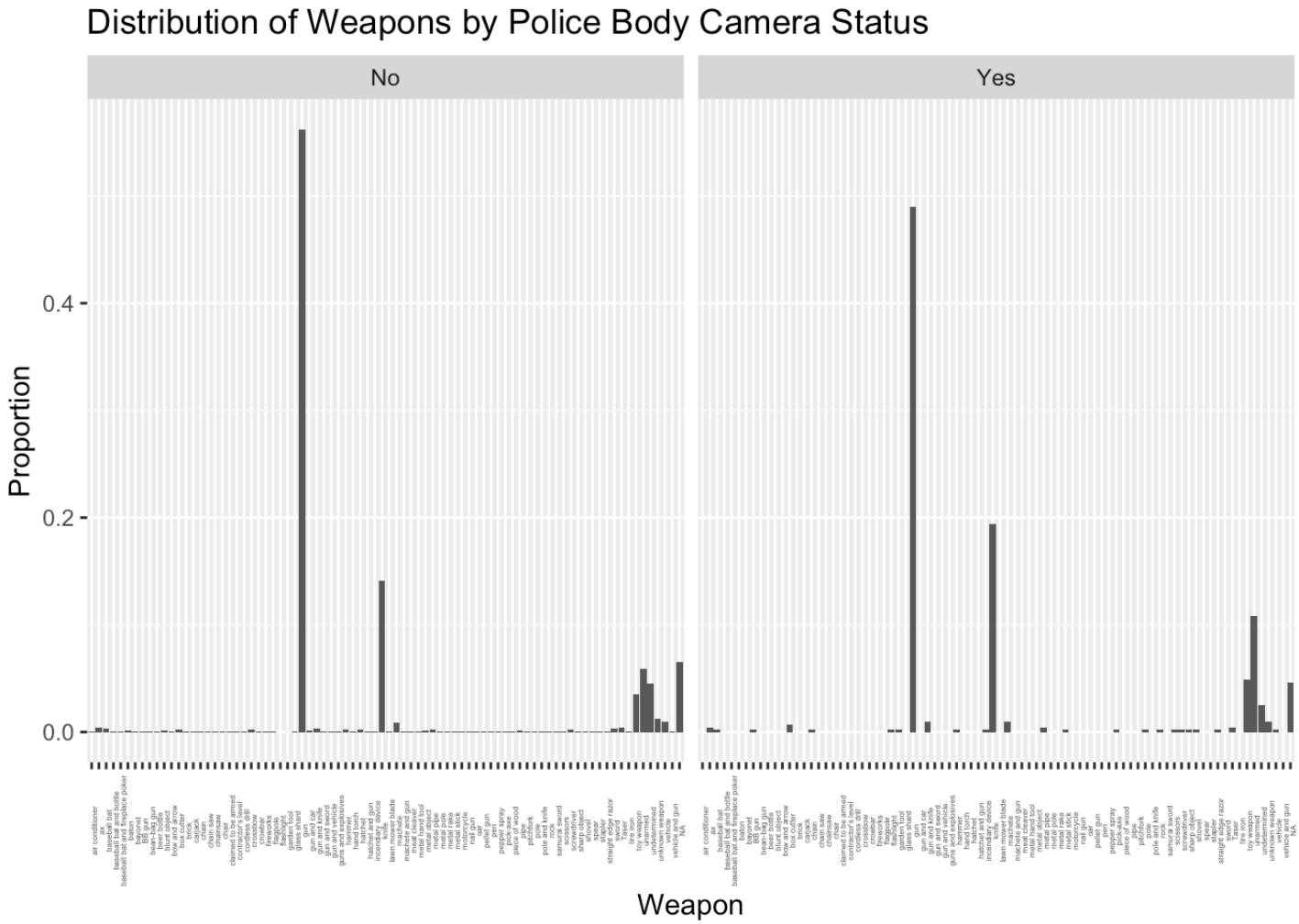
Body Camera and Arms Status

```
#Table
police %>% tabyl(armed, body_camera)  %>%
  adorn_totals(c("row", "col")) %>%
  adorn_percentages("col") %>%
  adorn_pct_formatting(2) %>%
  adorn_ns("front")
```

	armed <chr>	No <chr>	Yes <chr>	Total <chr>
1	air conditioner	1 (0.03%)	0 (0.00%)	1 (0.03%)
2	ax	15 (0.43%)	2 (0.46%)	17 (0.43%)
3	baseball bat	10 (0.28%)	1 (0.23%)	11 (0.28%)
4	baseball bat and bottle	1 (0.03%)	0 (0.00%)	1 (0.03%)
5	baseball bat and fireplace poker	1 (0.03%)	0 (0.00%)	1 (0.03%)
6	baton	4 (0.11%)	0 (0.00%)	4 (0.10%)
7	bayonet	1 (0.03%)	0 (0.00%)	1 (0.03%)
8	BB gun	1 (0.03%)	1 (0.23%)	2 (0.05%)
9	bean-bag gun	1 (0.03%)	0 (0.00%)	1 (0.03%)
10	beer bottle	2 (0.06%)	0 (0.00%)	2 (0.05%)

1-10 of 83 rows Previous **1** 2 3 4 5 6 … 9 Next

```
#Graph
police %>% ggplot(aes(x=armed)) + geom_bar(aes(y = ..prop.., group=1)) + theme(legend
.position = "none") +
  theme(axis.text.x = element_text(angle = 90, size=3)) +
  facet_wrap(~body_camera) +
  xlab("Weapon") +
  ylab("Proportion") +
  ggtitle("Distribution of Weapons by Police Body Camera Status")
```



As we can see from the bar graphs above guns, knives, and unarmed are the top three weapon statuses in that respective order whether body cameras are in use or not.

Body Camera and Fleeing Method

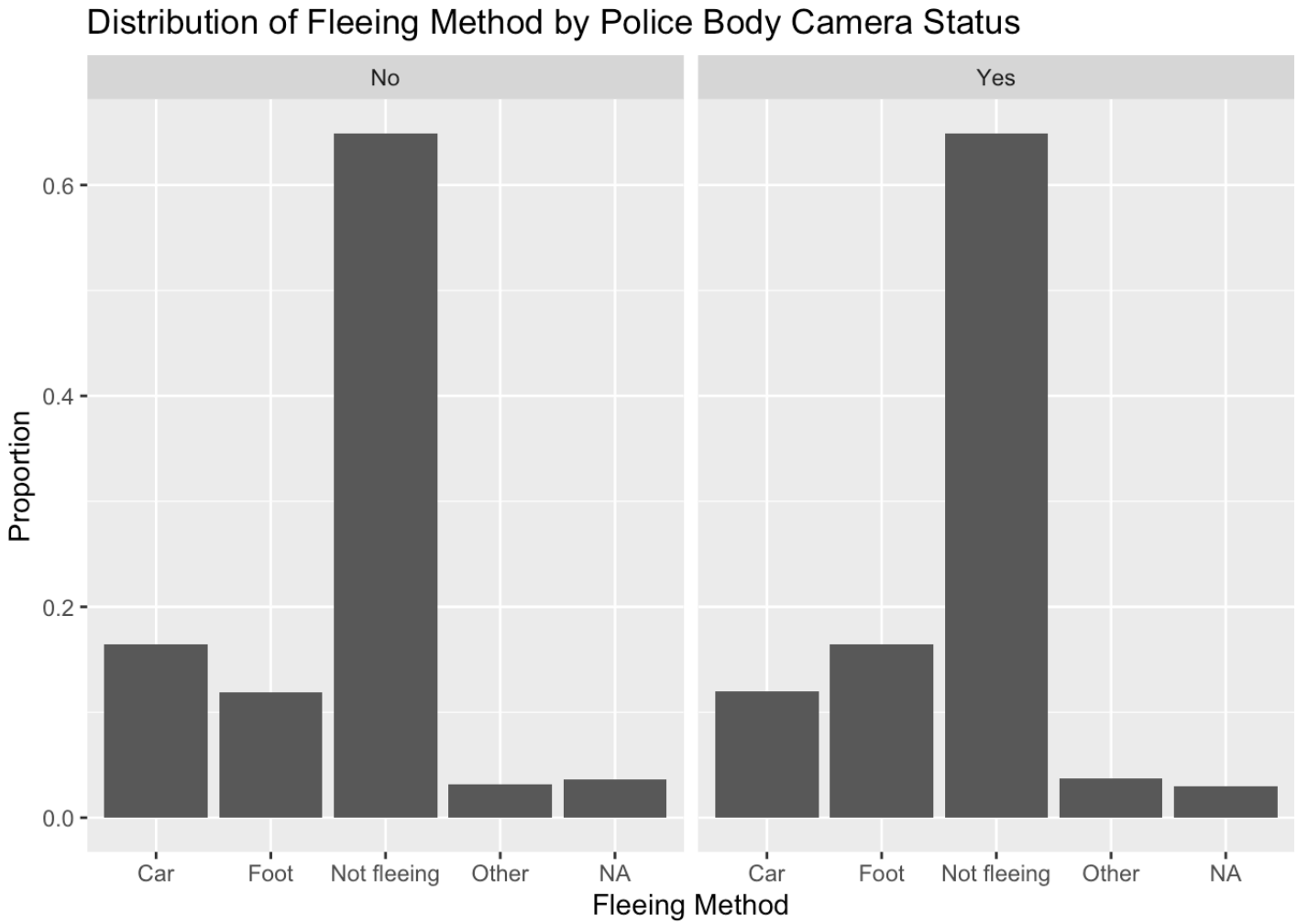
```
police %>% tabyl(flee, body_camera)  %>%
  adorn_totals(c("row", "col")) %>%
  adorn_percentages("col") %>%
  adorn_pct_formatting(2) %>%
  adorn_ns("front")
```

flee <chr>	No <chr>	Yes <chr>	Total <chr>
1 Car	579 (16.42%)	52 (12.01%)	631 (15.93%)
2 Foot	420 (11.91%)	71 (16.40%)	491 (12.40%)
3 Not fleeing	2289 (64.90%)	281 (64.90%)	2570 (64.90%)

4	Other	112 (3.18%)	16 (3.70%)	128 (3.23%)
5	*NA*	127 (3.60%)	13 (3.00%)	140 (3.54%)
6	Total	3527 (100.00%)	433 (100.00%)	3960 (100.00%)

6 rows

```
police %>% ggplot(aes(x=flee)) + geom_bar(aes(y = ..prop.., group=1)) + theme(legend.
position = "none") +
  theme(axis.text.x = element_text(angle = 0)) +
  facet_wrap(~body_camera) +
  xlab("Fleeing Method") +
  ylab("Proportion") +
  ggtitle("Distribution of Fleeing Method by Police Body Camera Status")
```



From the bar graphs above we can see the only clear difference is the increase in amount of suspects fleeing by car when body cameras are not in use compared to the amount of suspects that flee on foot when body cameras are being used.

Conclusion

For this study I used the variables body camera status, arms status, and fleeing status to determine the relationship between body camera usage alongside the suspect variables. I have found that the suspect was armed with a gun 59.15% of these fatal altercations. Of these 2,195 fatal police shootings involving suspects with guns body cameras were only active 212 times. Similarly, when considering suspects that did not choose to flee, of the 2570 there were only 281 instances where police body cameras were turned on. The specific data suggests that police body cameras were only active 10.93% of the time causing such a high skew in numbers. From the data I can conclude that although body cameras are not used often the outcome is proportionately similar when considering both weapon and fleeing status.