BigIdeas_Analysis

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Analysis of Big Ideas Lab Survey Data

This file is to document the analysis process for the Big Ideas Lab survey data.

First I will load the necessary packages for analysis.

Then I will load the dataset to be analyzed.

```
big_ideas_data <- read_excel("/Users/kyliebalotin/Github/Coursera-Case-Study---Bellabeat/Analysis/Big_I
```

In the following code section, I'm combining the separate columns of the different phone and wearable types into a single column (each) that contains a string of the name of the device manufacturer.

```
#Changing how the data is organized
#initiate some of the new column names
phone_type <- rep("phone", (length(big_ideas_data$Gender)))
wearable_type <- rep("wearable", (length(big_ideas_data$Gender)))

#Creating a new data attribute listing what kind of phone each submission has
for (i in 1:length(big_ideas_data$Gender)) {
    if (big_ideas_data[i, 1]==1) {
        phone_type[i] = "iPhone"
    }
    else if (big_ideas_data[i, 2]==1) {
        phone_type[i] = "Android"
    }
    else if (big_ideas_data[i, 3]==1) {
        phone_type[i] = "Other"
    }
    else if (big_ideas_data[i, 4]==1) {
        phone_type[i] = "None"
    }
}

#Checking that the only for phone type are: None, iPhone, Android, and Other
unique(phone_type)
```

```
## [1] "Android" "iPhone"  "None"    "Other"
```

```
#Creating a new data attribute listing what kind of wearable each submission has
for (i in 1:length(big_ideas_data$Gender)) {
    if (big_ideas_data[i, 12]==1) {
        wearable_type[i] = "None"
    }
    else if (big_ideas_data[i, 13]==1) {
        wearable_type[i] = "Fitbit"
    }
    else if (big_ideas_data[i, 14]==1) {
        wearable_type[i] = "Apple Watch"
    }
    else if (big_ideas_data[i, 15]==1) {
        wearable_type[i] = "Garmin"
    }
    else if (big_ideas_data[i, 16]==1) {
        wearable_type[i] = "Samsung"
    }
    else if (big_ideas_data[i, 17]==1) {
        wearable_type[i] = "Other"
    }
}

#Checking that the options for wearable type are: None, Fitbit, Apple Watch, Garmin, Samsung, and Other
unique(wearable_type)
```

```
## [1] "None"        "Apple Watch" "Fitbit"      "Samsung"     "Other"
## [6] "Garmin"
```

```
#Merge these new columns back into original dataframe
big_ideas_data_org <- data.frame(big_ideas_data, phone_type, wearable_type)
#View(big_ideas_data_org)
```

Next, I'm creating some subsets of the data (based on gender). Bellabeat's primary consumer demographic is women, so I want to make sure I am able to capture the results specifically for survey participants who identify as female.

The next coding section documents the different calculations I performed on the dataset. I first look at the demographic information about the survey participants to have a better idea about how the sample population might relate to the larger population.

Then I looked at the survey's responses regarding how participants are using their smart phones and wearables (ex: fitness tracking, sleep monitoring, etc) and reasons why the participants might not own a wearable. I also calculated how many of the participants own phones and wearables. I have performed these calculations for the whole survey sample population and the subset of the sample population that identify as female.

```
#Find out some demographic information about the survey participants

#Finding number of participants who identify as different genders
unique_g <- unique(big_ideas_data_org$Gender)
count_unique_g <- rep(0, length(unique_g))
for (i in 1:length(unique_g)) {
    count_unique_g[i] <- sum(big_ideas_data_org$Gender==unique_g[i], na.rm=TRUE)
}
```

```
count_g <- data.frame(unique_g, count_unique_g)
count_g
```

```
##                       unique_g count_unique_g
## 1                       Female            871
## 2                         Male            478
## 3           Gender Fluid/Queer              3
## 4 Other Gender - Not Disclosed              8
## 5                   Non-binary              4
## 6     Other Gender - Disclosed              3
## 7             Transgender Male              1
```

```
#Finding out number of participants in different age groups
unique_age <- unique(big_ideas_data_org$generation_age_group)
count_unique_age <- rep(0, length(unique_age))

count_unique_age_f <- rep(0, length(unique_age))

for (i in 1:length(unique_age)) {
    count_unique_age[i] <- sum(big_ideas_data_org$generation_age_group==unique_age[i])
    count_unique_age_f[i] <- sum(big_ideas_data_org_f$generation_age_group==unique_age[i])
}
count_age <- data.frame(unique_age, count_unique_age, count_unique_age_f)
count_age
```

```
##   unique_age count_unique_age count_unique_age_f
## 1      42_57              460                334
## 2      26_41              176                116
## 3      58_76              579                355
## 4        77+              129                 49
## 5      18_25               24                 17
```

```
#Level of Education
unique_edu <- unique(big_ideas_data_org$Highest.level.of.education)
count_unique_edu <- rep(0, length(unique_edu))

count_unique_edu_f <- rep(0, length(unique_edu))

for (i in 1:length(unique_edu)) {
    count_unique_edu[i] <- sum(big_ideas_data_org$Highest.level.of.education==unique_edu[i])
    count_unique_edu_f[i] <- sum(big_ideas_data_org_f$Highest.level.of.education==unique_edu[i])
}
count_edu <- data.frame(unique_edu, count_unique_edu, count_unique_edu_f)
count_edu
```

```
##                   unique_edu count_unique_edu count_unique_edu_f
## 1            Graduate degree              515                314
## 2 Some college but no degree              231                158
## 3           College graduate              545                353
## 4       High school graduate               74                 45
## 5      Less than high school                3                  1
```

```r
#Employment Status
unique_emp <- unique(big_ideas_data_org$Employment.Status)
count_unique_emp <- rep(0, length(unique_emp))

count_unique_emp_f <- rep(0, length(unique_emp))

for (i in 1:length(unique_emp)) {
    count_unique_emp[i] <- sum(big_ideas_data_org$Employment.Status==unique_emp[i])
    count_unique_emp_f[i] <- sum(big_ideas_data_org_f$Employment.Status==unique_emp[i])
}
count_emp <- data.frame(unique_emp, count_unique_emp, count_unique_emp_f)
count_emp
```

```
##                           unique_emp count_unique_emp count_unique_emp_f
## 1                Employed full-time              630                417
## 2      Retired, not looking for work              400                207
## 3         Disabled, not able to work              120                 85
## 4                Employed part-time              108                 76
## 5 Not employed, but looking for work               41                 27
## 6 Not employed, not looking for work               69                 59
```

```r
#Race/Ethnicity
eth_simp <- c("Black/African American", "Asian/Asian American", "Hispanic", "White/Caucasian", "Other")
count_eth <- rep(0, length(eth_simp))
count_eth_f <- rep(0, length(eth_simp))

for (i in 1:length(eth_simp)) {
    x <- i+45
    count_eth[i] <- sum(big_ideas_data_org[x], na.rm=TRUE)
    count_eth_f[i] <- sum(big_ideas_data_org_f[x], na.rm=TRUE)
}

count_ethnicity <- data.frame(eth_simp, count_eth, count_eth_f)
count_ethnicity
```

```
##                 eth_simp count_eth count_eth_f
## 1 Black/African American       390         306
## 2   Asian/Asian American        60          32
## 3               Hispanic        78          45
## 4        White/Caucasian       826         477
## 5                  Other        77          55
```

```r
#Looking at reasons why participants use smartphones/wearables
#Use of Smart Phones
activity_phone <- colnames(big_ideas_data_org[5:9])
activity_phone_simp <- c("Not tracking", "Fitness and workout monitoring", "Health tracking", "Sleep mo
count_activity_phone <- rep(0, length(activity_phone))
count_activity_phone_f <- rep(0, length(activity_phone))
for (i in 1:length(activity_phone)) {
    count_activity_phone[i] <- sum(big_ideas_data_org[i+4], na.rm=TRUE)
    count_activity_phone_f[i] <- sum(big_ideas_data_org_f[i+4], na.rm=TRUE)
}
```

```
count_activity_ph <- data.frame(activity_phone_simp, count_activity_phone, count_activity_phone_f)
count_activity_ph
```

```
##              activity_phone_simp count_activity_phone count_activity_phone_f
## 1                    Not tracking                  551                    343
## 2 Fitness and workout monitoring                  627                    405
## 3                 Health tracking                  284                    180
## 4                Sleep monitoring                  269                    171
## 5                           Other                  143                     90
```

```
#Reasons for not owning a wearable
reason_not_simp <- c("Don't own one yet", "No particular reason", "Too expensive", "Too hard to read", "
count_reason_not <- rep(0, length(reason_not_simp))
count_reason_not_f <- rep(0, length(reason_not_simp))
for (i in 1:length(reason_not_simp)) {
    count_reason_not[i] <- sum(big_ideas_data_org[i+17], na.rm=TRUE)
    count_reason_not_f[i] <- sum(big_ideas_data_org_f[i+17], na.rm=TRUE)
}
count_reason_no <- data.frame(reason_not_simp, count_reason_not, count_reason_not_f)
count_reason_no
```

```
##                    reason_not_simp count_reason_not count_reason_not_f
## 1                Don’t own one yet               58                 36
## 2             No particular reason              125                 63
## 3                    Too expensive              178                123
## 4                 Too hard to read               17                  9
## 5 Don’t trust they work correctly               38                 22
## 6                Don’t know enough               54                 34
## 7      Not interested in tracking              127                 77
## 8                          Privacy               68                 33
## 9                            Other               85                 48
```

```
#Use of wearable
activity_wear_simp <- c("Apps", "Fitness and workout monitoring", "Sleep monitoring", "Health tracking"
unique_reasons <- unique(big_ideas_data_org$Wearable.device.usage.by.reason_Apps..social.media..news..e
unique_reasons
```

```
## [1] NA                                "Secondary reason"
## [3] "Not a reason"                    "Not applicable to my device(s)"
## [5] "Main reason"
```

```
count_main <- rep(0, length(activity_wear_simp))
count_sec <- rep(0, length(activity_wear_simp))
count_notreason <- rep(0, length(activity_wear_simp))
count_na <- rep(0, length(activity_wear_simp))

count_main_f <- rep(0, length(activity_wear_simp))
count_sec_f <- rep(0, length(activity_wear_simp))
count_notreason_f <- rep(0, length(activity_wear_simp))
count_na_f <- rep(0, length(activity_wear_simp))
for (i in 1:length(activity_wear_simp)) {
```

```
    count_main[i] <- sum(big_ideas_data_org[i+26]=="Main reason", na.rm=TRUE)
    count_sec[i] <- sum(big_ideas_data_org[i+26]=="Secondary reason", na.rm=TRUE)
    count_notreason[i] <- sum(big_ideas_data_org[i+26]=="Not a reason", na.rm=TRUE)
    count_na[i] <- sum(big_ideas_data_org[i+26]=="Not applicable to my device(s)", na.rm=TRUE)

    count_main_f[i] <- sum(big_ideas_data_org_f[i+26]=="Main reason", na.rm=TRUE)
    count_sec_f[i] <- sum(big_ideas_data_org_f[i+26]=="Secondary reason", na.rm=TRUE)
    count_notreason_f[i] <- sum(big_ideas_data_org_f[i+26]=="Not a reason", na.rm=TRUE)
    count_na_f[i] <- sum(big_ideas_data_org_f[i+26]=="Not applicable to my device(s)", na.rm=TRUE)
}

count_activity_wear <- data.frame(activity_wear_simp, count_main, count_sec, count_notreason, count_na)
count_activity_wear
```

```
##               activity_wear_simp count_main count_sec count_notreason count_na
## 1                           Apps         75       157             430      140
## 2 Fitness and workout monitoring        522       188              75       17
## 3               Sleep monitoring        126       265             338       73
## 4                Health tracking        228       272             210       92
## 5                  Communication        291       229             200       82
## 6      Music/audiobooks/podcasts         50       161             433      158
## 7                     Navigation         72       187             385      158
## 8                        Fashion         36       108             568       90
```

```
count_activity_wear_f <- data.frame(activity_wear_simp, count_main_f, count_sec_f, count_notreason_f, co
count_activity_wear_f
```

```
##               activity_wear_simp count_main_f count_sec_f count_notreason_f
## 1                           Apps           46          97               293
## 2 Fitness and workout monitoring          358         125                44
## 3               Sleep monitoring           69         187               232
## 4                Health tracking          150         185               140
## 5                  Communication          196         142               144
## 6      Music/audiobooks/podcasts           30         104               285
## 7                     Navigation           49         108               266
## 8                        Fashion           28          74               378
##   count_na_f
## 1        102
## 2         11
## 3         50
## 4         63
## 5         56
## 6        119
## 7        115
## 8         58
```

```
#Counting Phone and Wearable Ownership
phones <- unique(phone_type)
count_phones <- rep(0, length(phones))
count_phones_f <- rep(0, length(phones))

for (i in 1:length(phones)) {
```

```
    count_phones[i] <- sum(big_ideas_data_org$phone_type==phones[i], na.rm=TRUE)
    count_phones_f[i] <- sum(big_ideas_data_org_f$phone_type==phones[i], na.rm=TRUE)
}
count_ph <- data.frame(phones, count_phones, count_phones_f)
count_ph
```

```
##    phones count_phones count_phones_f
## 1 Android          436            290
## 2  iPhone          894            559
## 3    None           25             14
## 4   Other           13              8
```

```
wearables <- unique(wearable_type)
count_wearables <- rep(0, length(wearables))
count_wearables_f <- rep(0, length(wearables))

for (i in 1:length(wearables)) {
    count_wearables[i] <- sum(big_ideas_data_org$wearable_type==wearables[i], na.rm=TRUE)
    count_wearables_f[i] <- sum(big_ideas_data_org_f$wearable_type==wearables[i], na.rm=TRUE)
}
count_w <- data.frame(wearables, count_wearables, count_wearables_f)
count_w
```

```
##     wearables count_wearables count_wearables_f
## 1        None            566               333
## 2 Apple Watch            312               200
## 3      Fitbit            337               246
## 4     Samsung             54                35
## 5       Other             50                33
## 6      Garmin             49                24
```

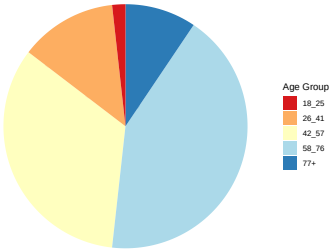
Finally, I plot the different calculations in order to show my findings visually. The following code checks that the demographic information does not change too much when the participant population is subset to look at only female-identifying participants.

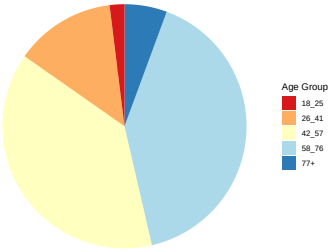
```
#Demographic information
#Pie Chart of Participants' Genders
demographic_g <- ggplot(count_g, aes(x="", y=count_unique_g, fill=unique_g)) + geom_bar(stat="identity"

#Pie Chart of Participants' Ages
demographic_age <- ggplot(count_age, aes(x="", y=count_unique_age, fill=unique_age)) + geom_bar(stat="i

#Female population age demographics
demographic_age_f <- ggplot(count_age, aes(x="", y=count_unique_age_f, fill=unique_age)) + geom_bar(sta

#Level of Education demographics
demographic_edu <- ggplot(count_edu, aes(x="", y=count_unique_edu, fill=unique_edu)) + geom_bar(stat="i

#Female population edu demographics
demographic_edu_f <- ggplot(count_edu, aes(x="", y=count_unique_edu_f, fill=unique_edu)) + geom_bar(sta

#Employment Status demographics
```

```r
demographic_emp <- ggplot(count_emp, aes(x="", y=count_unique_emp, fill=unique_emp)) + geom_bar(stat="i

#Female population employment status demographics
demographic_emp_f <- ggplot(count_emp, aes(x="", y=count_unique_emp_f, fill=unique_emp)) + geom_bar(sta

#Race/ethnicity demographics
demographic_eth <- ggplot(count_ethnicity, aes(x="", y=count_eth, fill=eth_simp)) + geom_bar(stat="iden

#Female population employment status demographics
demographic_eth_f <- ggplot(count_ethnicity, aes(x="", y=count_eth_f, fill=eth_simp)) + geom_bar(stat="

grid.arrange(tableGrob(count_age), demographic_age, demographic_age_f,
             tableGrob(count_edu), demographic_edu, demographic_edu_f,
             tableGrob(count_emp), demographic_emp, demographic_emp_f,
             tableGrob(count_ethnicity), demographic_eth, demographic_eth_f,
             nrow=4, ncol=3,
             top="Demographic Information About Survey Participants", bottom = "Plots in middle column
```

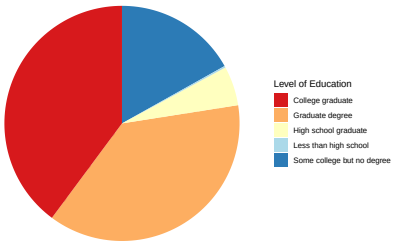
Demographic Information About Survey Participants

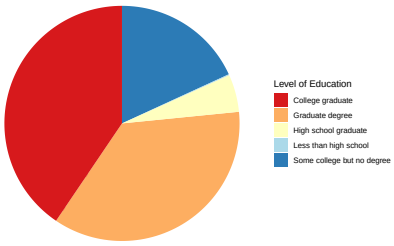
	unique_age	count_unique_age	count_unique_age_f
1	42_57	460	334
2	26_41	176	116
3	58_76	579	355
4	77+	129	49
5	18_25	24	17



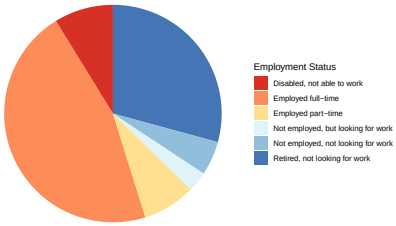


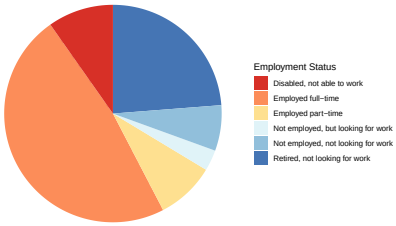
	unique_edu	count_unique_edu	count_unique_edu_f
1	Graduate degree	515	314
2	Some college but no degree	231	158
3	College graduate	545	353
4	High school graduate	74	45
5	Less than high school	3	1



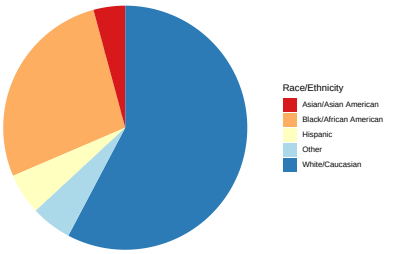


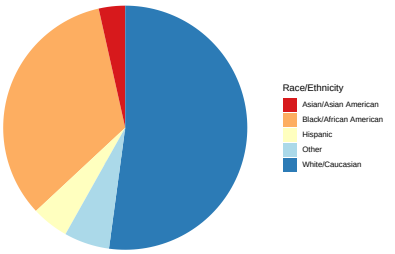
	unique_emp	count_unique_emp	count_unique_emp_f
1	Employed full−time	630	417
2	Retired, not looking for work	400	207
3	Disabled, not able to work	120	85
4	Employed part−time	108	76
5	Not employed, but looking for work	41	27
6	Not employed, not looking for work	69	59





	eth_simp	count_eth	count_eth_f
1	Black/African American	390	306
2	Asian/Asian American	60	32
3	Hispanic	78	45
4	White/Caucasian	826	477
5	Other	77	55





Plots in middle column represent the whole survey participant population; plots in the right column represent survey participants who identify as female

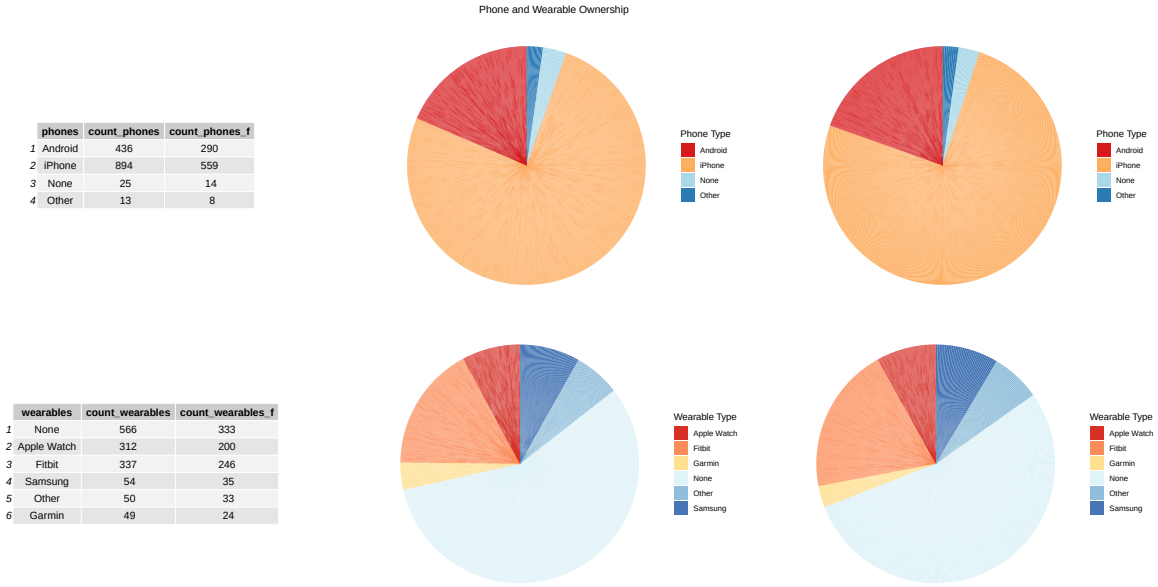
Then I looked at how the participants are using their phones and wearables, as well as why some participants do not own a wearable device. The majority of the participants own a smart phone, but about half of the participants do not own a wearable. The majority of phone owning participants use their phone for fitness and workout monitoring, followed closely by participants who do not use their phones to track anything. Some participants will use their phones for sleep and health monitoring.

Among the whole survey participant population, primary reason why participants do not own a wearable is the price (i.e. wearables are too expensive), followed closely by participants not being interested in tracking activity and participants do not have a specific reason why they don't own one.

The main reason why participants use wearable devices is for fitness and workout monitoring, followed by communication and health tracking, respectively. Sleep monitoring, health tracking, and communication are the top three secondary uses of wearables, respectively. In terms of not being considered a main use of a wearable, fashion was ranked the highest. Music/audiobooks/podcasts, navigation, and other apps are not common features of wearables.

All of these results do not change when the survey population is filtered to only female-identifying participants.

```
#Breakdown of Phone and Wearable Ownership
own_phone <- ggplot(big_ideas_data_org, aes(x="", y=phone_type, fill=phone_type)) + geom_bar(stat="iden

own_phone_f <- ggplot(big_ideas_data_org_f, aes(x="", y=phone_type, fill=phone_type)) + geom_bar(stat="

own_wear <- ggplot(big_ideas_data_org, aes(x="", y=wearable_type, fill=wearable_type)) + geom_bar(stat=

own_wear_f <- ggplot(big_ideas_data_org_f, aes(x="", y=wearable_type, fill=wearable_type)) + geom_bar(s

grid.arrange(tableGrob(count_ph), own_phone, own_phone_f,
             tableGrob(count_w), own_wear, own_wear_f,
             nrow=2, ncol=3,
             top = "Phone and Wearable Ownership",
             bottom = "Plots in middlecolumn represent the whole survey participant population; plots i
```



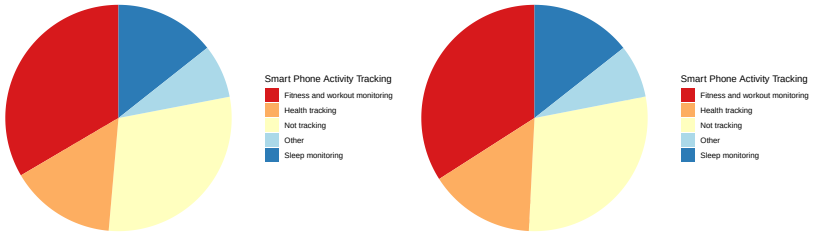
	phones	count_phones	count_phones_f
1	Android	436	290
2	iPhone	894	559
3	None	25	14
4	Other	13	8

	wearables	count_wearables	count_wearables_f
1	None	566	333
2	Apple Watch	312	200
3	Fitbit	337	246
4	Samsung	54	35
5	Other	50	33
6	Garmin	49	24

```
#Breakdown of Phone Usage
phone_use <- ggplot(count_activity_ph, aes(x="", y=count_activity_phone, fill=activity_phone_simp)) + g

phone_use_f <- ggplot(count_activity_ph, aes(x="", y=count_activity_phone_f, fill=activity_phone_simp))

grid.arrange(tableGrob(count_activity_ph), phone_use, phone_use_f,
             nrow=1, ncol=3,
             top="Phone Activity Tracking by Survey Participants", bottom = "Plots in middle column rep
```

Phone Activity Tracking by Survey Participants

	activity_phone_simp	count_activity_phone	count_activity_phone_f
1	Not tracking	551	343
2	Fitness and workout monitoring	627	405
3	Health tracking	284	180
4	Sleep monitoring	269	171
5	Other	143	90

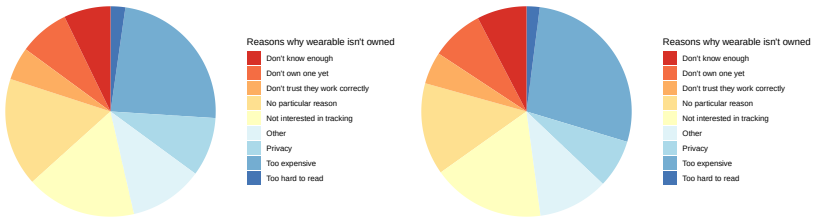


Plots in middle column represent the whole survey participant population; plots in the right column represent survey participants who identify as female

```
#Breakdown of Reasons why participants don't own wearables
wearable_no <- ggplot(count_reason_no, aes(x="", y=count_reason_not, fill=reason_not_simp)) + geom_bar(s

wearable_no_f <- ggplot(count_reason_no, aes(x="", y=count_reason_not_f, fill=reason_not_simp)) + geom_b

grid.arrange(tableGrob(count_reason_no), wearable_no, wearable_no_f,
             nrow=1, ncol=3,
             top="Reasons Why Participants Don't Own a Wearable", bottom = "Plots in middle column repre
```

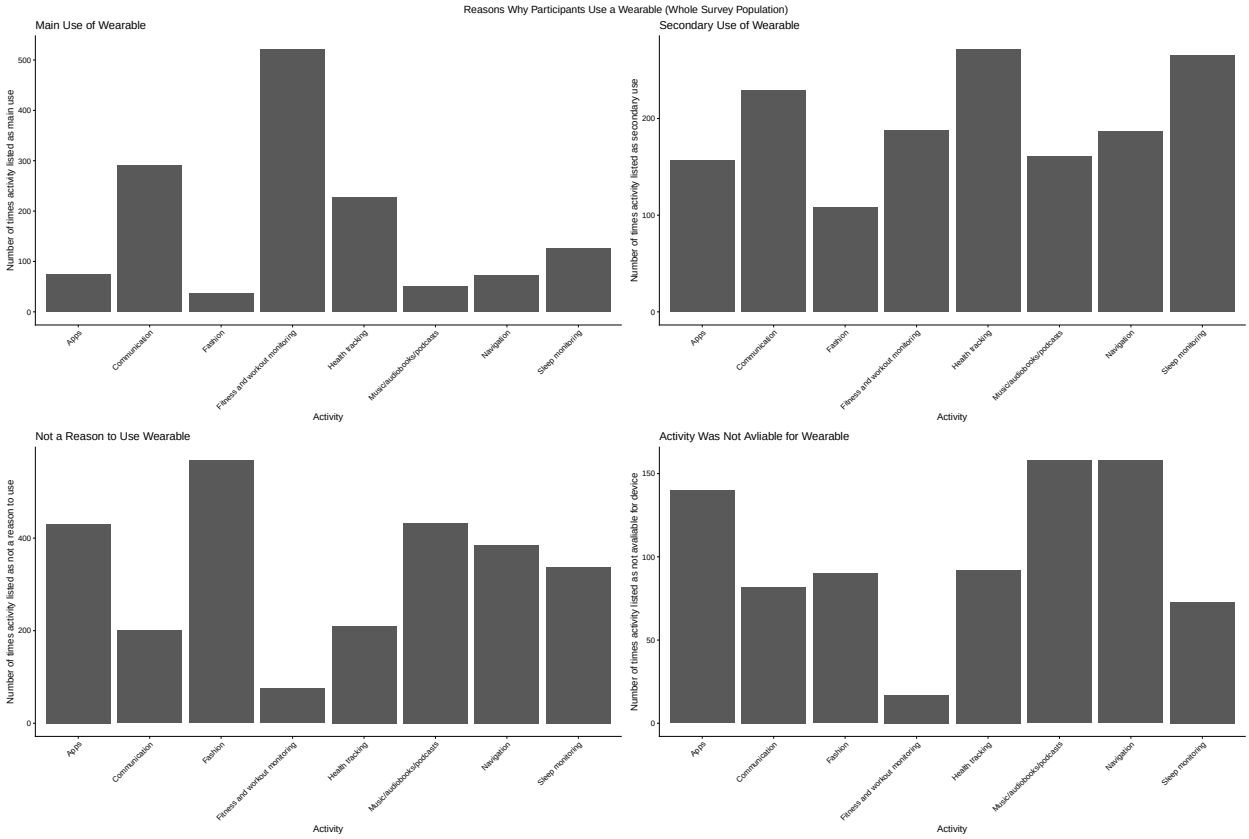
Reasons Why Participants Don't Own a Wearable

	reason_not_simp	count_reason_not	count_reason_not_f
1	Don't own one yet	58	36
2	No particular reason	125	63
3	Too expensive	178	123
4	Too hard to read	17	9
5	Don't trust they work correctly	38	22
6	Don't know enough	54	34
7	Not interested in tracking	127	77
8	Privacy	68	33
9	Other	85	48



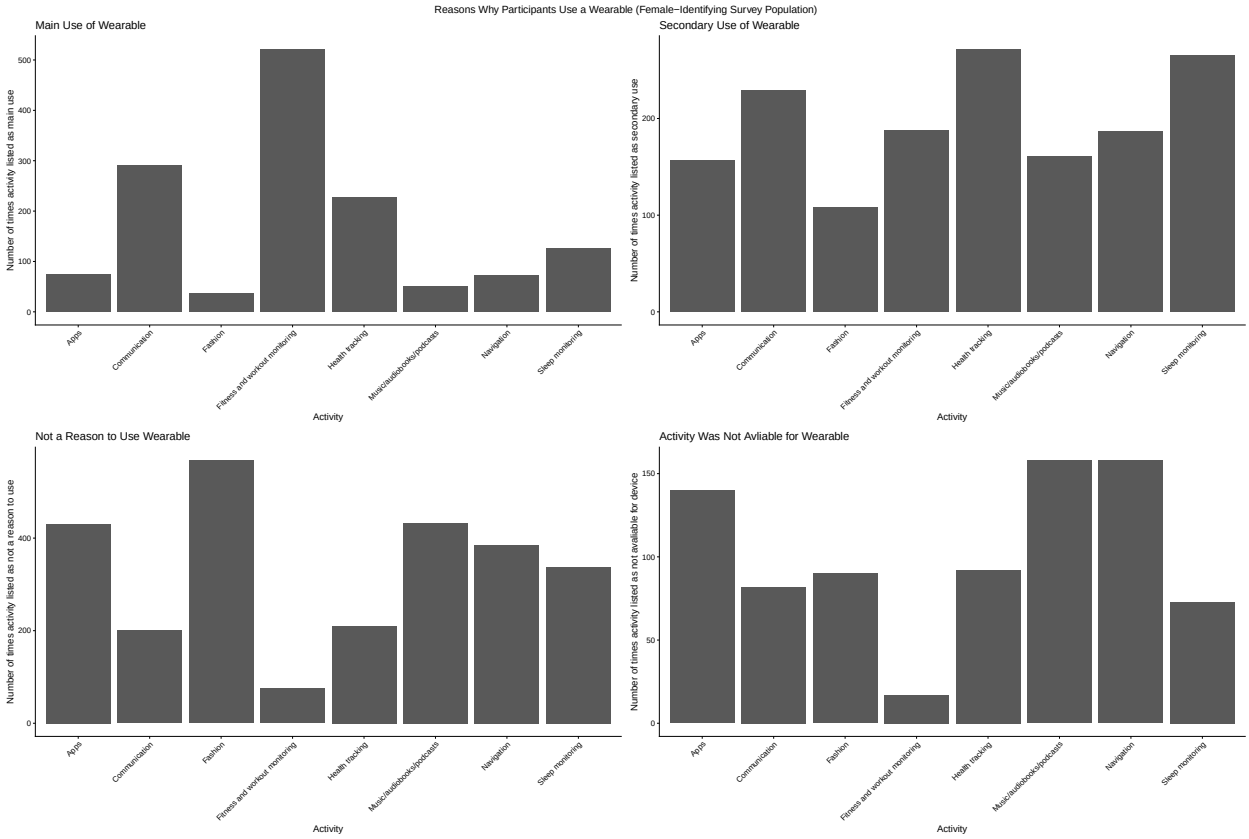
Plots in middle column represent the whole survey participant population; plots in the right column represent survey participants who identify as female

```
#Breakdown of Wearable Usage
wear_use_main <- ggplot(count_activity_wear, aes(x=activity_wear_simp, y=count_main)) + geom_bar(stat="

wear_use_sec <- ggplot(count_activity_wear, aes(x=activity_wear_simp, count_sec)) + geom_bar(stat="iden

wear_use_not <- ggplot(count_activity_wear, aes(x=activity_wear_simp, count_notreason)) + geom_bar(stat

wear_use_na <- ggplot(count_activity_wear, aes(x=activity_wear_simp, count_na)) + geom_bar(stat="identi

grid.arrange(wear_use_main, wear_use_sec,
             wear_use_not, wear_use_na,
             tableGrob(count_activity_wear),
             nrow=3, ncol=2,
             top="Reasons Why Participants Use a Wearable (Whole Survey Population)")
```



	activity_wear_simp	count_main	count_sec	count_notreason	count_na
1	Apps	75	157	430	140
2	Fitness and workout monitoring	522	188	75	17
3	Sleep monitoring	126	265	338	73
4	Health tracking	228	272	210	92
5	Communication	291	229	200	82
6	Music/audiobooks/podcasts	50	161	433	158
7	Navigation	72	187	385	158
8	Fashion	36	108	568	90

```
wear_use_main_f <- ggplot(count_activity_wear_f, aes(x=activity_wear_simp, y=count_main)) + geom_bar(sta

wear_use_sec_f <- ggplot(count_activity_wear_f, aes(x=activity_wear_simp, count_sec)) + geom_bar(stat="

wear_use_not_f <- ggplot(count_activity_wear_f, aes(x=activity_wear_simp, count_notreason)) + geom_bar(

wear_use_na_f <- ggplot(count_activity_wear_f, aes(x=activity_wear_simp, count_na)) + geom_bar(stat="id

grid.arrange(wear_use_main_f, wear_use_sec_f,
             wear_use_not_f, wear_use_na_f,
             tableGrob(count_activity_wear_f),
             nrow=3, ncol=2,
             top="Reasons Why Participants Use a Wearable (Female-Identifying Survey Population)")
```



	activity_wear_simp	count_main_f	count_sec_f	count_notreason_f	count_na_f
1	Apps	46	97	293	102
2	Fitness and workout monitoring	358	125	44	11
3	Sleep monitoring	69	187	232	50
4	Health tracking	150	185	140	63
5	Communication	196	142	144	56
6	Music/audiobooks/podcasts	30	104	285	119
7	Navigation	49	108	266	115
8	Fashion	28	74	378	58