

1. Load Packages
2. Load Data
 - 2.1. Prep & Merge datasets
 - 2.2. Rename Variables
3. Descriptives
 - 3.1. Main Study Variables
 - 3.2. Demographics
 - 3.3. Violence Exposure
 - 3.4. Area Deprivation Index
4. Correlations
 - 4.1. Correlation Matrix
 - 4.2. Correlation Plot
 - 4.3. ECV & Amygdala Reactivity
 - 4.4. Scatterplot (ECV & RT Amygdala)
5. Missing Data Analysis
 - 5.1 Missing Data with Demos
 - 5.1.1. Twin Gender
 - 5.1.2. Twin Race
 - 5.1.3. Twin Age
6. Scale Study Variables
7. Select Variables for Mplus Models

MTwiNS Exposure to Community Violence

[Code ▼](#)

Gabriela Suarez

12 March, 2023

[Hide](#)

```
knitr::opts_chunk$set(echo = TRUE)
```

1. Load Packages

Hide

```
library(readr)
library(tidyverse)
library(psych)
library(Hmisc)
library(corrplot)
library(stats)
library(ggplot2)
```

2. Load Data

Hide

```
cov = read_csv("mtwins_ecv_covariates.csv")
amy = read_csv("main_effects_scan-cov_extracted_data.csv")
```

2.1. Prep & Merge datasets

Hide

```
cov[cov== -99] = NA
df = full_join(cov, amy, by="MTWINSID")
```

2.2. Rename Variables

Hide

```
df = df %>%
  rename(ADI = ADINAT) %>%
  rename(Violence_Exposure = INDV) %>%
  rename(RT_Amygdala_Threat = RTBL009) %>%
  rename(LF_Amygdala_Threat = LFBL009) %>%
  rename(RT_Amygdala_Neutral = RTBL015) %>%
  rename(LF_Amygdala_Neutral = LFBL015) %>%
  rename(Parental_Nurturance = TRINVOL) %>%
  rename(Family_Income = ANNINC) %>%
  rename(Parent_Education = PCEDUC) %>%
  rename(Twin_Age = TWAGE) %>%
  rename(Twin_Gender = TWSEX) %>%
  rename(Twin_Race = TWRACER)
```

3. Descriptives

3.1. Main Study Variables

Hide

```
as.data.frame(psych::describe(dplyr::select(df, ADI, Violence_Exposure, RT_Amygdala_Threat, LF_Amygdala_Threat, RT_Amygdala_Neutral, LF_Amygdala_Neutral, Parental_Nurturance, Family_Income, Parent_Education, Twin_Age)))
```

| | v... <int> | n <dbl> | mean <dbl> | sd <dbl> | median <dbl> | trimmed <dbl> | mad <dbl> |
|---------------------|----------------------|-------------------|----------------------|--------------------|------------------------|-------------------------|---------------------|
| ADI | 1 | 689 | 60.6574746 | 21.1036742 | 60.0000 | 60.5298373 | 23.7216000 |
| Violence_Exposure | 2 | 679 | 2.8615611 | 3.6817980 | 2.0000 | 2.1855832 | 2.9652000 |
| RT_Amygdala_Threat | 3 | 505 | 0.1970691 | 0.4309548 | 0.1852 | 0.1858943 | 0.2735397 |
| LF_Amygdala_Threat | 4 | 505 | 0.2198535 | 0.4935882 | 0.1776 | 0.1919696 | 0.2892553 |
| RT_Amygdala_Neutral | 5 | 505 | 0.1337471 | 0.6072627 | 0.1031 | 0.1270677 | 0.3460388 |
| LF_Amygdala_Neutral | 6 | 505 | 0.1221754 | 0.6611389 | 0.1260 | 0.1327714 | 0.3988194 |
| Parental_Nurturance | 7 | 620 | 40.5598240 | 5.9921627 | 42.0000 | 41.2146261 | 5.9304000 |
| Family_Income | 8 | 694 | 9.3227666 | 3.0121688 | 10.0000 | 9.7931655 | 2.9652000 |
| Parent_Education | 9 | 706 | 6.2917847 | 1.3013318 | 7.0000 | 6.3745583 | 1.4826000 |
| Twin_Age | 10 | 708 | 14.1412429 | 2.2382415 | 14.0000 | 14.3098592 | 1.4826000 |

1-10 of 10 rows | 1-9 of 14 columns

3.2. Demographics

Hide

```
demos = select(df, Twin_Age, Twin_Gender, Twin_Race, Parent_Education, Family_Income)
apply((demos), 2, table)
```

```
## $Twin_Age
##
##      7      8      9     10     11     12     13     14     15     16     17     18     19
##      6      4     12     38     36     58     62    146    150     96     80     18      2
##
## $Twin_Gender
##
##      0      1
##    385    323
##
## $Twin_Race
##
##      0      1
##    170    538
##
## $Parent_Education
##
##      1      3      4      5      6      7      8
##      2      8     52    156    122    232    134
##
## $Family_Income
##
##      0      1      2      3      4      5      6      7      8      9     10     11     12
##      4      6     18     16     18     14     52     66     38     70     46     82    264
```

Hide

```
prop.table(table(df$Twin_Gender))
```

```
##
##           0           1
## 0.5437853 0.4562147
```

Hide

```
prop.table(table(df$Parent_Education))
```

```
##
##           1           3           4           5           6           7
## 0.002832861 0.011331445 0.073654391 0.220963173 0.172804533 0.328611898
##           8
## 0.189801700
```

Hide

```
prop.table(table(df$Family_Income))
```

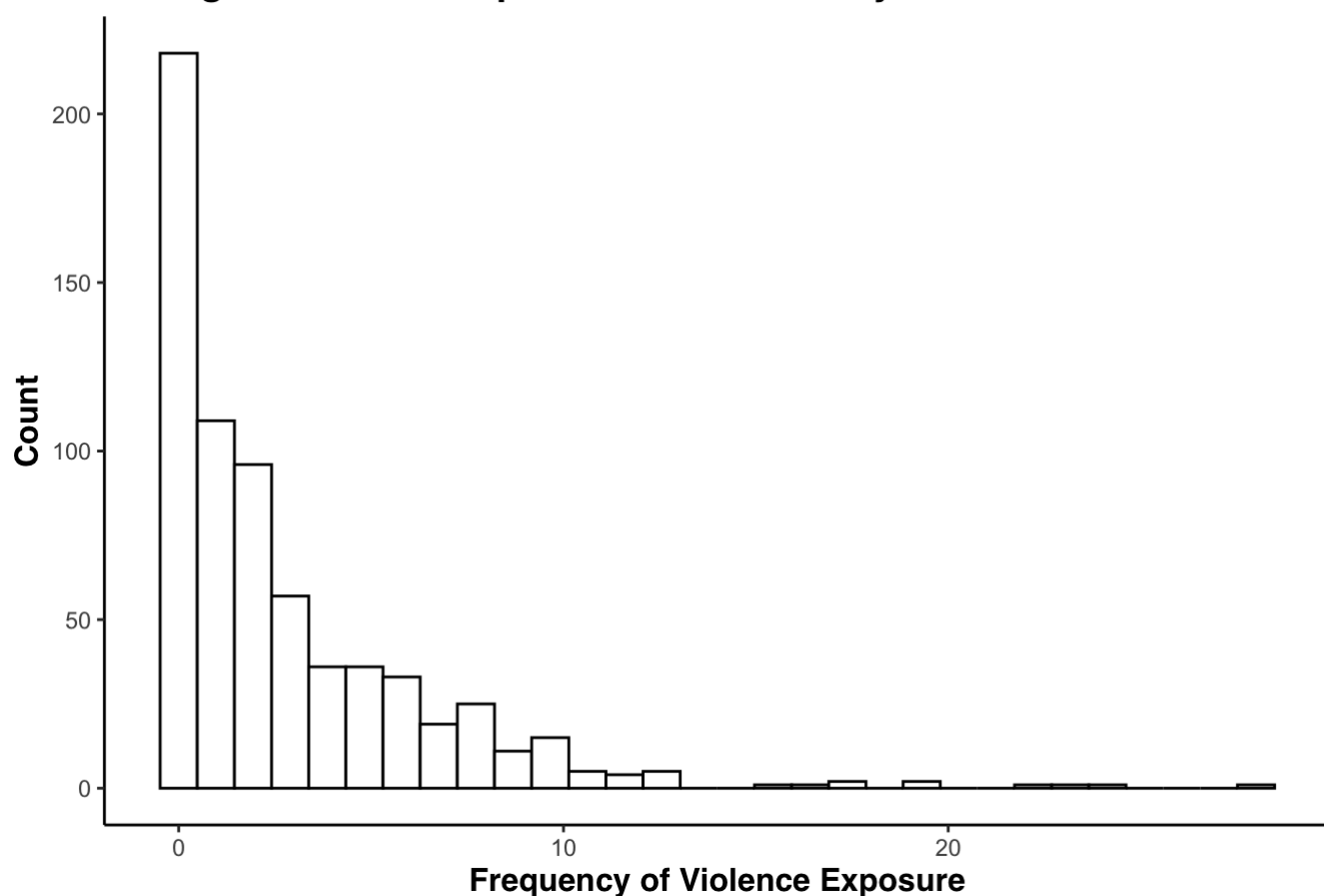
```
##
##          0          1          2          3          4          5
## 0.005763689 0.008645533 0.025936599 0.023054755 0.025936599 0.020172911
##          6          7          8          9         10         11
## 0.074927954 0.095100865 0.054755043 0.100864553 0.066282421 0.118155620
##          12
## 0.380403458
```

3.3. Violence Exposure

[Hide](#)

```
df %>%
  ggplot(aes(x = Violence_Exposure)) +
  geom_histogram(fill = 'white', col = 'black') +
  labs(title = 'Histogram of Twin Exposure to Community Violence',
       x = 'Frequency of Violence Exposure', y = 'Count') +
  theme_classic() + theme(axis.title.x = element_text(size = 12, family = "sans"),
                          axis.title.y = element_text(size = 12, family = "sans"),
                          title = element_text(size = 12, face = 'bold', family =
                                                'sans'))
```

Histogram of Twin Exposure to Community Violence

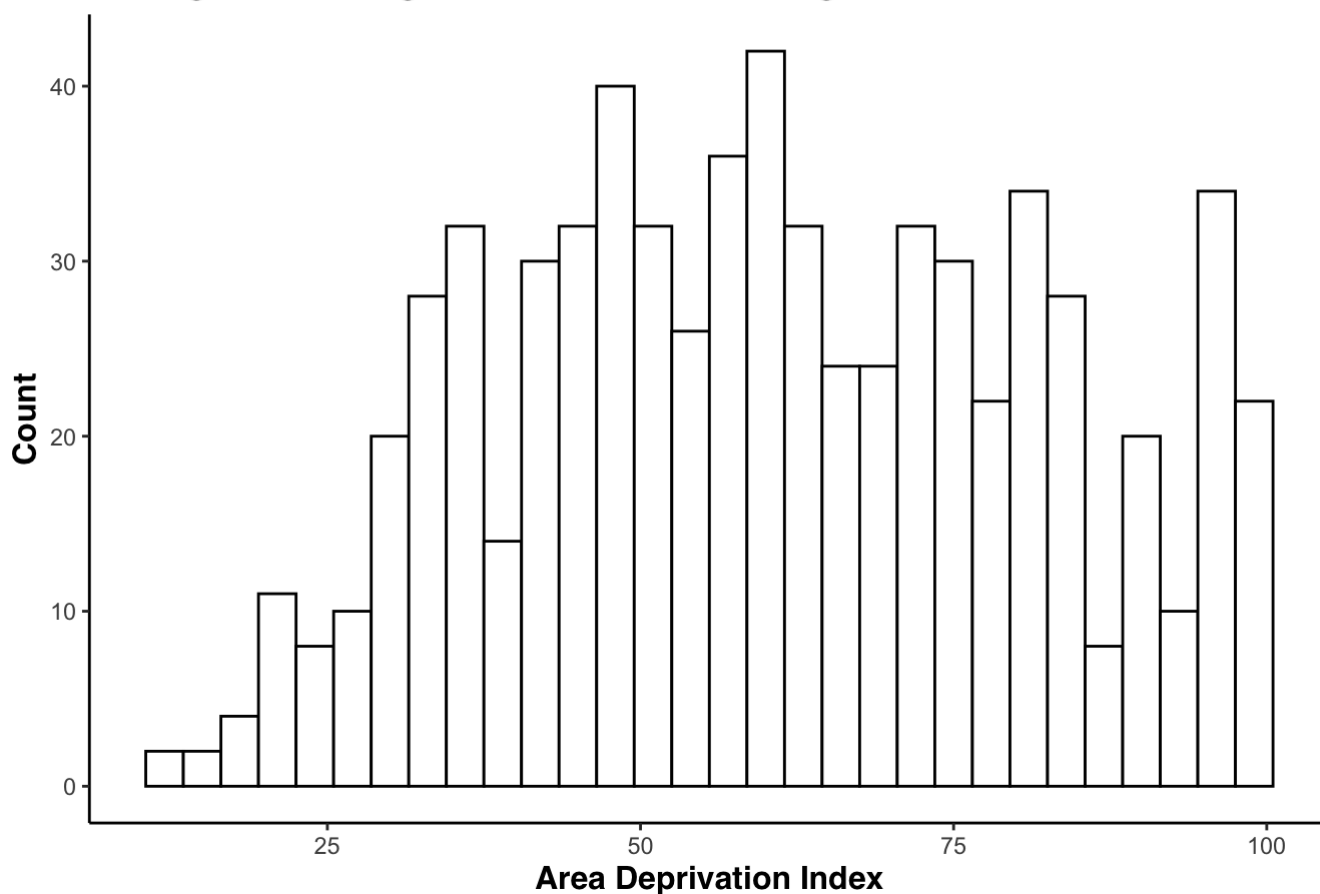


3.4. Area Deprivation Index

Hide

```
df %>%
  ggplot(aes(x = ADI)) +
  geom_histogram(fill = 'white', col = 'black') +
  labs(title = 'Histogram of Neighborhood Disadvantage',
       x = 'Area Deprivation Index', y = 'Count') +
  theme_classic() + theme(axis.title.x = element_text(size = 12, family = "sans"),
                          axis.title.y = element_text(size = 12, family = "sans"),
                          title = element_text(size = 12, face = 'bold', family =
' sans'))
```

Histogram of Neighborhood Disadvantage



4. Correlations

4.1. Correlation Matrix

Hide

```
x = dplyr::select(df, ADI, Violence_Exposure, RT_Amygdala_Threat, LF_Amygdala_Threat,
                  RT_Amygdala_Neutral, LF_Amygdala_Neutral, Parental_Nurturance,
                  Family_Income, Parent_Education, Twin_Age, Twin_Gender, Twin_Race)
rcorr(as.matrix(x))
```

| ## | ADI | Violence_Exposure | RT_Amygdala_Threat | |
|------------------------|---------------------|---------------------|---------------------|----------|
| ## ADI | 1.00 | 0.27 | 0.09 | |
| ## Violence_Exposure | 0.27 | 1.00 | 0.12 | |
| ## RT_Amygdala_Threat | 0.09 | 0.12 | 1.00 | |
| ## LF_Amygdala_Threat | 0.08 | 0.04 | 0.67 | |
| ## RT_Amygdala_Neutral | -0.04 | 0.00 | -0.04 | |
| ## LF_Amygdala_Neutral | -0.04 | -0.02 | 0.07 | |
| ## Parental_Nurturance | -0.08 | -0.19 | -0.06 | |
| ## Family_Income | -0.40 | -0.18 | -0.06 | |
| ## Parent_Education | -0.25 | -0.12 | -0.05 | |
| ## Twin_Age | -0.01 | 0.03 | -0.02 | |
| ## Twin_Gender | -0.04 | -0.15 | 0.00 | |
| ## Twin_Race | -0.31 | -0.15 | -0.09 | |
| ## | LF_Amygdala_Threat | RT_Amygdala_Neutral | LF_Amygdala_Neutral | |
| ## ADI | 0.08 | -0.04 | -0.04 | |
| ## Violence_Exposure | 0.04 | 0.00 | -0.02 | |
| ## RT_Amygdala_Threat | 0.67 | -0.04 | 0.07 | |
| ## LF_Amygdala_Threat | 1.00 | 0.08 | -0.01 | |
| ## RT_Amygdala_Neutral | 0.08 | 1.00 | 0.65 | |
| ## LF_Amygdala_Neutral | -0.01 | 0.65 | 1.00 | |
| ## Parental_Nurturance | -0.02 | -0.02 | 0.03 | |
| ## Family_Income | -0.08 | -0.02 | 0.00 | |
| ## Parent_Education | -0.05 | 0.07 | 0.02 | |
| ## Twin_Age | -0.05 | 0.01 | -0.01 | |
| ## Twin_Gender | 0.01 | -0.05 | -0.08 | |
| ## Twin_Race | -0.11 | -0.09 | -0.01 | |
| ## | Parental_Nurturance | Family_Income | Parent_Education | Twin_Age |
| ## ADI | -0.08 | -0.40 | -0.25 | -0.01 |
| ## Violence_Exposure | -0.19 | -0.18 | -0.12 | 0.03 |
| ## RT_Amygdala_Threat | -0.06 | -0.06 | -0.05 | -0.02 |
| ## LF_Amygdala_Threat | -0.02 | -0.08 | -0.05 | -0.05 |
| ## RT_Amygdala_Neutral | -0.02 | -0.02 | 0.07 | 0.01 |
| ## LF_Amygdala_Neutral | 0.03 | 0.00 | 0.02 | -0.01 |
| ## Parental_Nurturance | 1.00 | 0.07 | 0.01 | -0.08 |
| ## Family_Income | 0.07 | 1.00 | 0.45 | 0.09 |
| ## Parent_Education | 0.01 | 0.45 | 1.00 | 0.18 |
| ## Twin_Age | -0.08 | 0.09 | 0.18 | 1.00 |
| ## Twin_Gender | 0.12 | 0.04 | -0.02 | 0.15 |
| ## Twin_Race | 0.00 | 0.37 | 0.16 | 0.19 |
| ## | Twin_Gender | Twin_Race | | |
| ## ADI | -0.04 | -0.31 | | |
| ## Violence_Exposure | -0.15 | -0.15 | | |
| ## RT_Amygdala_Threat | 0.00 | -0.09 | | |
| ## LF_Amygdala_Threat | 0.01 | -0.11 | | |
| ## RT_Amygdala_Neutral | -0.05 | -0.09 | | |
| ## LF_Amygdala_Neutral | -0.08 | -0.01 | | |
| ## Parental_Nurturance | 0.12 | 0.00 | | |
| ## Family_Income | 0.04 | 0.37 | | |
| ## Parent_Education | -0.02 | 0.16 | | |
| ## Twin_Age | 0.15 | 0.19 | | |
| ## Twin_Gender | 1.00 | 0.07 | | |
| ## Twin_Race | 0.07 | 1.00 | | |

```

##
## n
##          ADI_Violence_Exposure RT_Amygdala_Threat LF_Amygdala_Threat
## ADI          689          661          491          491
## Violence_Exposure 661          679          491          491
## RT_Amygdala_Threat 491          491          505          505
## LF_Amygdala_Threat 491          491          505          505
## RT_Amygdala_Neutral 491          491          505          505
## LF_Amygdala_Neutral 491          491          505          505
## Parental_Nurturance 606          600          479          479
## Family_Income      675          668          497          497
## Parent_Education    687          678          505          505
## Twin_Age            689          679          505          505
## Twin_Gender         689          679          505          505
## Twin_Race           689          679          505          505
##          RT_Amygdala_Neutral LF_Amygdala_Neutral Parental_Nurturance
## ADI          491          491          606
## Violence_Exposure 491          491          600
## RT_Amygdala_Threat 505          505          479
## LF_Amygdala_Threat 505          505          479
## RT_Amygdala_Neutral 505          505          479
## LF_Amygdala_Neutral 505          505          479
## Parental_Nurturance 479          479          620
## Family_Income      497          497          606
## Parent_Education    505          505          618
## Twin_Age            505          505          620
## Twin_Gender         505          505          620
## Twin_Race           505          505          620
##          Family_Income Parent_Education Twin_Age Twin_Gender
## ADI          675          687          689          689
## Violence_Exposure 668          678          679          679
## RT_Amygdala_Threat 497          505          505          505
## LF_Amygdala_Threat 497          505          505          505
## RT_Amygdala_Neutral 497          505          505          505
## LF_Amygdala_Neutral 497          505          505          505
## Parental_Nurturance 606          618          620          620
## Family_Income      694          694          694          694
## Parent_Education    694          706          706          706
## Twin_Age            694          706          708          708
## Twin_Gender         694          706          708          708
## Twin_Race           694          706          708          708
##          Twin_Race
## ADI          689
## Violence_Exposure 679
## RT_Amygdala_Threat 505
## LF_Amygdala_Threat 505
## RT_Amygdala_Neutral 505
## LF_Amygdala_Neutral 505
## Parental_Nurturance 620
## Family_Income      694
## Parent_Education    706
## Twin_Age            708

```



```

## Twin_Gender          708
## Twin_Race            708
##
## P
##          ADI      Violence_Exposure RT_Amygdala_Threat
## ADI          0.0000          0.0403
## Violence_Exposure 0.0000          0.0057
## RT_Amygdala_Threat 0.0403 0.0057
## LF_Amygdala_Threat 0.0662 0.3790          0.0000
## RT_Amygdala_Neutral 0.3505 0.9464          0.3773
## LF_Amygdala_Neutral 0.3303 0.7165          0.1119
## Parental_Nurturance 0.0370 0.0000          0.2282
## Family_Income      0.0000 0.0000          0.1480
## Parent_Education    0.0000 0.0026          0.2586
## Twin_Age           0.7568 0.4307          0.6613
## Twin_Gender        0.2989 0.0000          0.9684
## Twin_Race          0.0000 0.0000          0.0480
##          LF_Amygdala_Threat RT_Amygdala_Neutral LF_Amygdala_Neutral
## ADI          0.0662          0.3505          0.3303
## Violence_Exposure 0.3790          0.9464          0.7165
## RT_Amygdala_Threat 0.0000          0.3773          0.1119
## LF_Amygdala_Threat          0.0604          0.8716
## RT_Amygdala_Neutral 0.0604          0.0000
## LF_Amygdala_Neutral 0.8716          0.0000
## Parental_Nurturance 0.6214          0.6595          0.4832
## Family_Income      0.0825          0.6892          0.9142
## Parent_Education    0.3101          0.0986          0.6671
## Twin_Age           0.2887          0.8066          0.7510
## Twin_Gender        0.8337          0.2479          0.0677
## Twin_Race          0.0114          0.0483          0.8237
##          Parental_Nurturance Family_Income Parent_Education Twin_Age
## ADI          0.0370          0.0000          0.0000          0.7568
## Violence_Exposure 0.0000          0.0000          0.0026          0.4307
## RT_Amygdala_Threat 0.2282          0.1480          0.2586          0.6613
## LF_Amygdala_Threat 0.6214          0.0825          0.3101          0.2887
## RT_Amygdala_Neutral 0.6595          0.6892          0.0986          0.8066
## LF_Amygdala_Neutral 0.4832          0.9142          0.6671          0.7510
## Parental_Nurturance          0.0729          0.7805          0.0384
## Family_Income      0.0729          0.0000          0.0139
## Parent_Education    0.7805          0.0000          0.0000
## Twin_Age           0.0384          0.0139          0.0000
## Twin_Gender        0.0036          0.3451          0.6152          0.0000
## Twin_Race          0.9956          0.0000          0.0000          0.0000
##          Twin_Gender Twin_Race
## ADI          0.2989          0.0000
## Violence_Exposure 0.0000          0.0000
## RT_Amygdala_Threat 0.9684          0.0480
## LF_Amygdala_Threat 0.8337          0.0114
## RT_Amygdala_Neutral 0.2479          0.0483
## LF_Amygdala_Neutral 0.0677          0.8237
## Parental_Nurturance 0.0036          0.9956
## Family_Income      0.3451          0.0000

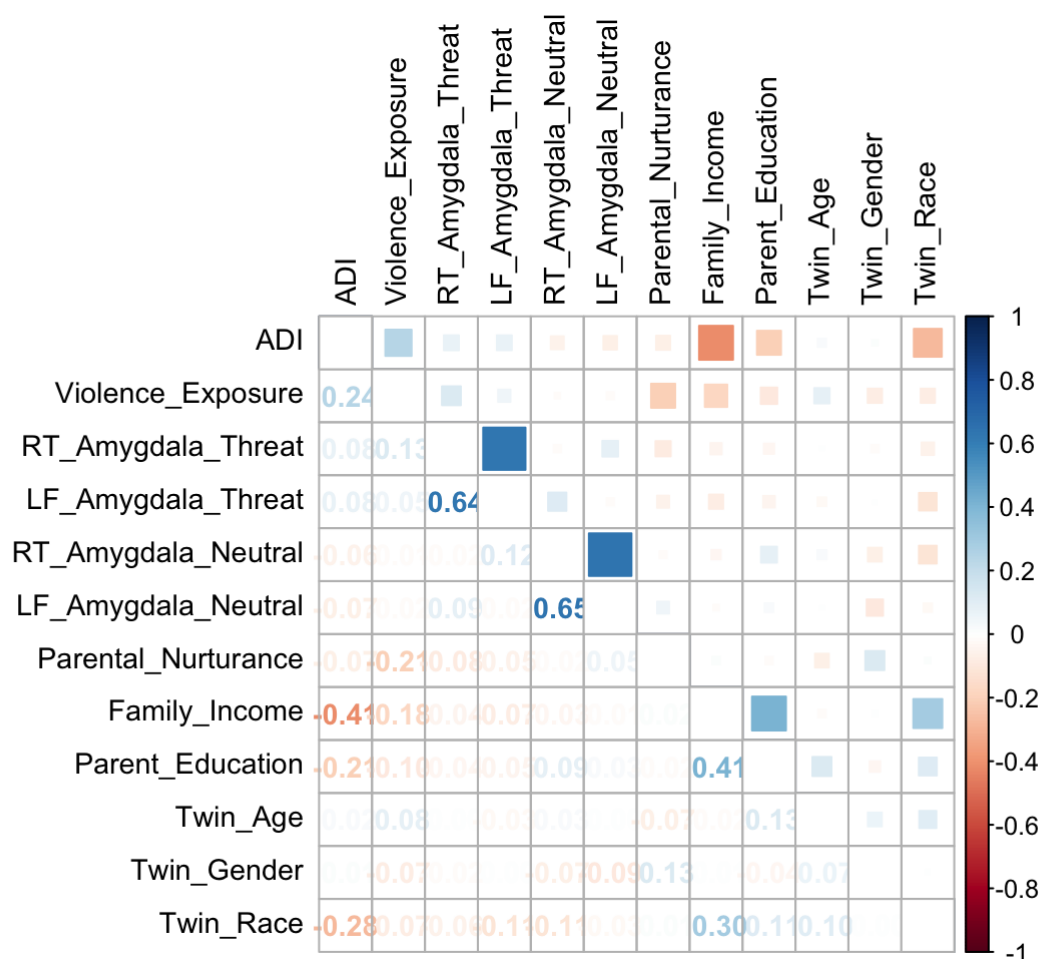
```

```
## Parent_Education    0.6152    0.0000
## Twin_Age           0.0000    0.0000
## Twin_Gender        0.0624
## Twin_Race          0.0624
```

4.2. Correlation Plot

[Hide](#)

```
res = cor(x, use = "complete.obs", method = "pearson")
corrplot.mixed(res, lower = "number", upper = "square", number.cex = 0.9, tl.cex =
  0.9, tl.pos = "lt", tl.col = "black")
```



4.3. ECV & Amygdala Reactivity

[Hide](#)

```
y = dplyr::select(df, Violence_Exposure, RT_Amygdala_Threat, LF_Amygdala_Threat,
  RT_Amygdala_Neutral, LF_Amygdala_Neutral)
cor(y, method = "pearson", use = "complete.obs")
```

```
##          Violence_Exposure RT_Amygdala_Threat LF_Amygdala_Threat
## Violence_Exposure      1.000000000      0.12451781      0.039787567
## RT_Amygdala_Threat      0.124517806      1.000000000      0.649499313
## LF_Amygdala_Threat      0.039787567      0.64949931      1.000000000
## RT_Amygdala_Neutral      0.003040662     -0.01188517      0.103048060
## LF_Amygdala_Neutral     -0.016429748      0.09529731     -0.001874288
##          RT_Amygdala_Neutral LF_Amygdala_Neutral
## Violence_Exposure      0.003040662     -0.016429748
## RT_Amygdala_Threat     -0.011885169      0.095297305
## LF_Amygdala_Threat      0.103048060     -0.001874288
## RT_Amygdala_Neutral      1.000000000      0.636426289
## LF_Amygdala_Neutral      0.636426289      1.000000000
```

[Hide](#)

```
rcorr(as.matrix(y))
```

```
## Violence_Exposure RT_Amygdala_Threat LF_Amygdala_Threat
## Violence_Exposure 1.00 0.12 0.04
## RT_Amygdala_Threat 0.12 1.00 0.67
## LF_Amygdala_Threat 0.04 0.67 1.00
## RT_Amygdala_Neutral 0.00 -0.04 0.08
## LF_Amygdala_Neutral -0.02 0.07 -0.01
## RT_Amygdala_Neutral LF_Amygdala_Neutral
## Violence_Exposure 0.00 -0.02
## RT_Amygdala_Threat -0.04 0.07
## LF_Amygdala_Threat 0.08 -0.01
## RT_Amygdala_Neutral 1.00 0.65
## LF_Amygdala_Neutral 0.65 1.00
##
## n
## Violence_Exposure RT_Amygdala_Threat LF_Amygdala_Threat
## Violence_Exposure 679 491 491
## RT_Amygdala_Threat 491 505 505
## LF_Amygdala_Threat 491 505 505
## RT_Amygdala_Neutral 491 505 505
## LF_Amygdala_Neutral 491 505 505
## RT_Amygdala_Neutral LF_Amygdala_Neutral
## Violence_Exposure 491 491
## RT_Amygdala_Threat 505 505
## LF_Amygdala_Threat 505 505
## RT_Amygdala_Neutral 505 505
## LF_Amygdala_Neutral 505 505
##
## P
## Violence_Exposure RT_Amygdala_Threat LF_Amygdala_Threat
## Violence_Exposure 0.0057 0.3790
## RT_Amygdala_Threat 0.0057 0.0000
## LF_Amygdala_Threat 0.3790 0.0000
## RT_Amygdala_Neutral 0.9464 0.3773 0.0604
## LF_Amygdala_Neutral 0.7165 0.1119 0.8716
## RT_Amygdala_Neutral LF_Amygdala_Neutral
## Violence_Exposure 0.9464 0.7165
## RT_Amygdala_Threat 0.3773 0.1119
## LF_Amygdala_Threat 0.0604 0.8716
## RT_Amygdala_Neutral 0.0000
## LF_Amygdala_Neutral 0.0000
```

Hide

```
pval = c(0.0057, 0.3790, 0.9464, 0.7165)
p.adjust(pval, method = "bonferroni")
```

```
## [1] 0.0228 1.0000 1.0000 1.0000
```

Hide

```
p.adjust(pval, method = "fdr")
```

```
## [1] 0.0228 0.7580 0.9464 0.9464
```

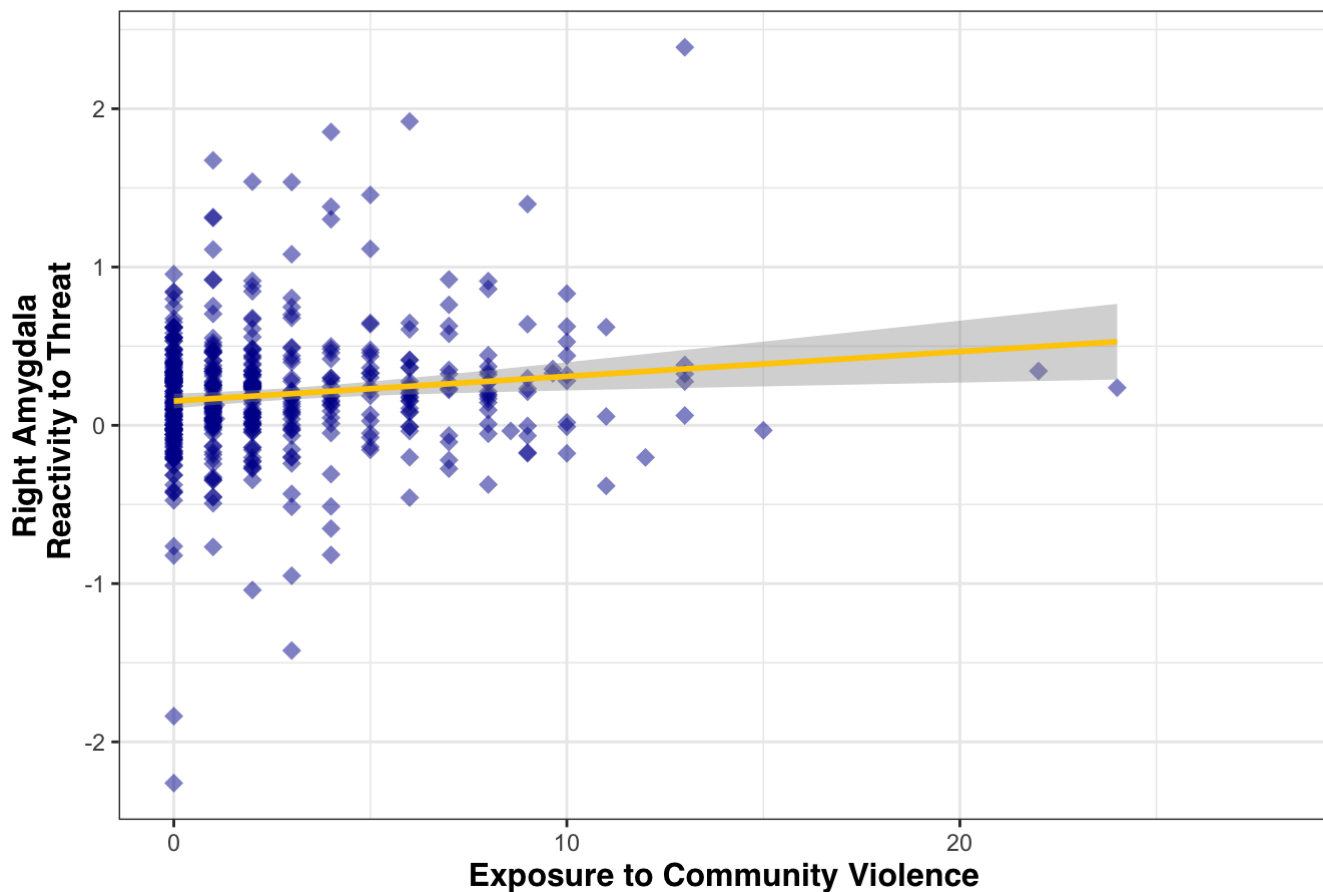
Exposure to community violence is only associated with right amygdala reactivity to threat.

4.4. Scatterplot (ECV & RT Amygdala)

[Hide](#)

```
df %>%
  ggplot(aes(x = Violence_Exposure, y = RT_Amygdala_Threat)) +
  geom_point(shape = 18, color = '#000099', alpha = 0.5, size = 3) +
  geom_smooth(method = 'lm', color = '#FFCC00') +
  labs(title = 'Association between Violence Exposure & Amygdala Reactivity',
       x = 'Exposure to Community Violence',
       y = 'Right Amygdala\n Reactivity to Threat') +
  theme_bw() + theme(axis.title.x = element_text(size=12, family='sans'),
                    axis.title.y = element_text(size=12, family='sans'),
                    title = element_text(size = 12, face = 'bold', family = 'sans'))
```

Association between Violence Exposure & Amygdala Reactivity



5. Missing Data Analysis

Hide

```
df$ADI.miss = ifelse(!is.na(df$ADI), "Not Missing", "Missing")
df$ECV.miss = ifelse(!is.na(df$Violence_Exposure), "Not Missing", "Missing")
df$MRI.miss = ifelse(!is.na(df$RT_Amygdala_Threat), "Not Missing", "Missing")
df$Nurture.miss = ifelse(!is.na(df$Parental_Nurturance), "Not Missing", "Missing")

missing = dplyr::select(df, ADI.miss, ECV.miss, MRI.miss, Nurture.miss)
apply(missing, 2, table)
```

```
##           ADI.miss ECV.miss MRI.miss Nurture.miss
## Missing           19      29      203           88
## Not Missing       689     679      505          620
```

5.1 Missing Data with Demos

5.1.1. Twin Gender

Hide

```
# Gender 0 = male; 1 = female
chisq.test(table(df$Twin_Gender, df$ADI.miss))
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Gender, df$ADI.miss)
## X-squared = 2.188, df = 1, p-value = 0.1391
```

Hide

```
chisq.test(table(df$Twin_Gender, df$ECV.miss))
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Gender, df$ECV.miss)
## X-squared = 0.43388, df = 1, p-value = 0.5101
```

Hide

```
chisq.test(table(df$Twin_Gender, df$MRI.miss))
```

```
##
## Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Gender, df$fMRI.miss)
## X-squared = 5.5437, df = 1, p-value = 0.01855
```

Hide

```
table(df$Twin_Gender, df$fMRI.miss)
```

```
##
##      Missing Not Missing
##    0      125      260
##    1       78      245
```

Hide

```
chisq.test(table(df$Twin_Gender, df$Nurture.miss))
```

```
##
## Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Gender, df$Nurture.miss)
## X-squared = 55.75, df = 1, p-value = 8.229e-14
```

Hide

```
table(df$Twin_Gender, df$Nurture.miss)
```

```
##
##      Missing Not Missing
##    0       81      304
##    1        7      316
```

Examining the patterns of missing data revealed that twin gender was associated with missing data on the parental nurturance variable ($X^2(1) = 55.8, p < .001$) and fMRI data ($X^2(1) = 5.5, p = .02$), such that males were more likely to be missing data on these measures.

5.1.2. Twin Race

Hide

```
# Race/Ethnicity (0 = Non-White; 1 = White)
chisq.test(table(df$Twin_Race, df$ADI.miss))
```

```
## Warning in chisq.test(table(df$Twin_Race, df$ADI.miss)): Chi-squared
## approximation may be incorrect
```

```
##
## Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Race, df$ADI.miss)
## X-squared = 2.5583, df = 1, p-value = 0.1097
```

Hide

```
chisq.test(table(df$Twin_Race, df$ECV.miss))
```

```
##
## Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Race, df$ECV.miss)
## X-squared = 17.923, df = 1, p-value = 2.301e-05
```

Hide

```
table(df$Twin_Race, df$ECV.miss)
```

```
##
##      Missing Not Missing
##    0         17         153
##    1         12         526
```

Hide

```
chisq.test(table(df$Twin_Race, df$MRI.miss))
```

```
##
## Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Race, df$MRI.miss)
## X-squared = 3.6035, df = 1, p-value = 0.05766
```

Hide

```
table(df$Twin_Race, df$MRI.miss)
```

```
##
##      Missing Not Missing
##    0         59         111
##    1        144         394
```


Hide

```
chisq.test(table(df$Twin_Race, df$Nurture.miss))
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  table(df$Twin_Race, df$Nurture.miss)
## X-squared = 21.458, df = 1, p-value = 3.616e-06
```

Hide

```
table(df$Twin_Race, df$Nurture.miss)
```

```
##
##      Missing Not Missing
##    0         39         131
##    1         49         489
```

Twin race/ethnicity was associated with missing data on the indirect violence variable ($X^2(1) = 17.9, p < .001$) and the parental nurturance variable ($X^2(1) = 21.5, p < .001$), such that twins with available data on these measures were more likely to be non-Hispanic White.

5.1.3. Twin Age

Hide

```
t.test(df$Twin_Age ~ df$ADI.miss)
```

```
##
##  Welch Two Sample t-test
##
## data:  df$Twin_Age by df$ADI.miss
## t = -0.78978, df = 18.486, p-value = 0.4397
## alternative hypothesis: true difference in means between group Missing and group
## Not Missing is not equal to 0
## 95 percent confidence interval:
## -2.1119496  0.9563465
## sample estimates:
##      mean in group Missing mean in group Not Missing
##              13.57895              14.15675
```

Hide

```
t.test(df$Twin_Age ~ df$ECV.miss)
```

```
##
## Welch Two Sample t-test
##
## data: df$Twin_Age by df$ECV.miss
## t = -4.4748, df = 29.414, p-value = 0.000106
## alternative hypothesis: true difference in means between group Missing and group
Not Missing is not equal to 0
## 95 percent confidence interval:
## -3.462041 -1.290993
## sample estimates:
## mean in group Missing mean in group Not Missing
## 11.86207 14.23859
```

Hide

```
t.test(df$Twin_Age ~ df$MRI.miss)
```

```
##
## Welch Two Sample t-test
##
## data: df$Twin_Age by df$MRI.miss
## t = -4.1835, df = 308.29, p-value = 3.748e-05
## alternative hypothesis: true difference in means between group Missing and group
Not Missing is not equal to 0
## 95 percent confidence interval:
## -1.2456995 -0.4487257
## sample estimates:
## mean in group Missing mean in group Not Missing
## 13.53695 14.38416
```

Hide

```
t.test(df$Twin_Age ~ df$Nurture.miss)
```

```
##
## Welch Two Sample t-test
##
## data: df$Twin_Age by df$Nurture.miss
## t = -8.5695, df = 103.57, p-value = 1.06e-13
## alternative hypothesis: true difference in means between group Missing and group
Not Missing is not equal to 0
## 95 percent confidence interval:
## -2.963076 -1.849387
## sample estimates:
## mean in group Missing mean in group Not Missing
## 12.03409 14.44032
```

Lastly, twin age was associated with missing data on the indirect violence variable ($t(706) = -5.7, p < .001$), the parental nurturance variable ($t(706) = -10.1, p < .001$), and fMRI data ($t(706) = -4.6, p < .001$), such that older twins were more likely to have available data on these measures.

Because of this, twin gender, race/ethnicity, and age were all included as covariates in all models examined in SPM12 and the mediation and moderated mediation models in Mplus. Missing data on all other variables were not associated with twin gender, race/ethnicity, or age ($p's > .05$).

6. Scale Study Variables

[Hide](#)

```
df$ADI_Z = scale(df$ADI, center = TRUE, scale = TRUE)
df$ECV_Z = scale(df$Violence_Exposure, center = TRUE, scale = TRUE)
df$RT_Amygdala_Threat_Z = scale(df$RT_Amygdala_Threat, center = TRUE, scale = TRUE)
df$LF_Amygdala_Threat_Z = scale(df$LF_Amygdala_Threat, center = TRUE, scale = TRUE)
df$RT_Amygdala_Neutral_Z = scale(df$RT_Amygdala_Neutral, center = TRUE, scale = TRUE)
df$LF_Amygdala_Neutral_Z = scale(df$LF_Amygdala_Neutral, center = TRUE, scale = TRUE)
df$Nurture_Z = scale(df$Parental_Nurturance, center = TRUE, scale = TRUE)
```

7. Select Variables for Mplus Models

[Hide](#)

```
vars <- dplyr::select(df, FAMID, MTWINSID, Twin_Gender, Twin_Age, Twin_Race, Parent_
  _Education, Family_Income,
  ADI, ADI_Z, Violence_Exposure, ECV_Z, RT_Amygdala_Threat, RT_
  Amygdala_Threat_Z,
  LF_Amygdala_Threat, LF_Amygdala_Threat_Z, RT_Amygdala_Neutra
  l, RT_Amygdala_Neutral_Z,
  LF_Amygdala_Neutral, LF_Amygdala_Neutral_Z, Parental_Nurturan
  ce, Nurture_Z)

#write.csv(vars, paste0("mtwins_ecv_", format(Sys.time(), "%m%d%Y"), ".csv"), quote
  = F, row.names=FALSE, na="-9999")
```