Final Paper Analyses

Marilyn Piccirillo

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```
## Loading tidyverse: ggplot2
## Loading tidyverse: tibble
## Loading tidyverse: tidyr
## Loading tidyverse: readr
## Loading tidyverse: purrr
## Loading tidyverse: dplyr

## Warning: package 'tidyr' was built under R version 3.4.2

## Warning: package 'purrr' was built under R version 3.4.2

## Warning: package 'dplyr' was built under R version 3.4.2

## Conflicts with tidy packages ----------------------------------------------
## %+%():    ggplot2, psych
## alpha():  ggplot2, psych
## filter(): dplyr, stats
## lag():    dplyr, stats

##
## Attaching package: 'lubridate'

## The following object is masked from 'package:base':
##
##     date

## Loading required package: Matrix

##
## Attaching package: 'Matrix'

## The following object is masked from 'package:tidyr':
##
##     expand

## This is lavaan 0.5-23.1097

## lavaan is BETA software! Please report any bugs.

##
## Attaching package: 'lavaan'

## The following object is masked from 'package:psych':
##
##     cor2cov

## Warning: package 'sjstats' was built under R version 3.4.2

## Warning in checkMatrixPackageVersion(): Package version inconsistency detected.
## TMB was built with Matrix version 1.2.10
## Current Matrix version is 1.2.11
## Please re-install 'TMB' from source or restore original 'Matrix' package

##
## Attaching package: 'sjstats'
```

```
## The following object is masked from 'package:broom':
##
##     bootstrap

## The following object is masked from 'package:psych':
##
##     phi

## Warning: package 'sjPlot' was built under R version 3.4.2

## Warning in read.spss("StressStudy_T1short_rename.sav", use.value.labels
## = FALSE, : StressStudy_T1short_rename.sav: Unrecognized record type 7,
## subtype 10 encountered in system file

## Warning in read.spss("StressStudy_T1short_rename.sav", use.value.labels =
## FALSE, : StressStudy_T1short_rename.sav: Long string missing values record
## found (record type 7, subtype 22), but ignored

## Warning in read.spss("StressStudy_T2short_rename.sav", use.value.labels
## = FALSE, : StressStudy_T2short_rename.sav: Unrecognized record type 7,
## subtype 10 encountered in system file

## Warning in read.spss("StressStudy_T2short_rename.sav", use.value.labels =
## FALSE, : StressStudy_T2short_rename.sav: Long string missing values record
## found (record type 7, subtype 22), but ignored

## Warning in read.spss("StressStudy_T3short_rename.sav", use.value.labels
## = FALSE, : StressStudy_T3short_rename.sav: Unrecognized record type 7,
## subtype 10 encountered in system file

## Warning in read.spss("StressStudy_T3short_rename.sav", use.value.labels =
## FALSE, : StressStudy_T3short_rename.sav: Long string missing values record
## found (record type 7, subtype 22), but ignored
```

Testing a longitudinal path model to replicate the model proposed by Davidson et al. (2011). They examined how interpersonal needs (Percieved burdensomness and thwarted belongingness) mediated the relationship of depression and social anxiety predicting suicidality. The issue with their model is that they used cross-sectional data. I'd like to replicate their model using longitundial data. There weren't enough people who indicated symptoms of suicidality, so I will use the Acquired Capability for Suicide Scale, which assesses constructs such as fearlessness towards death. ACSS scores are highly correlated with suicidality.

I will test the following mediation relationships:

Depression –> Percieved Burdensomness, Thwarted Belongingness –> Acquired Capability for Suicide Social Anxiety –> Percieved Burdensomness, Thwarted Belongingness –> Acquired Capability for Suicide

I expect that the mediation effect will be stronger for Depression –> Percieved burdensomness –> ACSS and that the mediation effect will be stronger for Social Anxiety –> Thwarted Belongingness –> ACSS

```
medDep <- '

#Correlate residuals

T1_BDI ~~ T2_BDI
T2_BDI ~~ T3_BDI

T1_Belong ~~ T2_Belong
T2_Belong ~~ T3_Belong

T1_Burden ~~ T2_Burden
```

```
T2_Burden ~~ T3_Burden

T1_ACSS ~~ T2_ACSS
T2_ACSS ~~ T3_ACSS

#Regressions to calculate indirect effects

T1_Burden ~ a1*T1_BDI + c1*T1_ACSS
T1_Belong ~ b1*T1_BDI + d1*T1_ACSS

T2_Belong ~ a1*T1_BDI + c2*T2_ACSS + g1*T1_Belong
T2_Burden ~ b1*T1_BDI + d2*T2_ACSS + h1*T2_Burden

T3_Belong ~ a2*T2_BDI + c3*T3_ACSS + g2*T2_Belong
T3_Burden ~ b2*T2_BDI + d3*T3_ACSS + h2*T2_Burden

T2_ACSS ~ i1*T1_ACSS + e1*T1_BDI + c1*T1_Belong + d1*T1_Burden
T3_ACSS ~ i2*T2_ACSS + e1*T1_BDI + c2*T2_Belong + d2*T2_Belong

#BDI --> Belong (a)
#BDI --> Burden (b)
#Belong --> ACSS (c)
#Burden --> ACSS (d)
#BDI --> ACSS (e)
#AR: BDI--> BDI (f)
#AR: Belong --> Belong (g)
#AR: Burden --> Burden (h)
#AR: ACSS --> ACSS (i)

ind:= a1*i2*c2*g1*g2 + b1*i2*d2*h1*h2
total:= ind + e1 + i2 '

fit.medDep <- sem(medDep, data = Depressionshort, missing = "ml")
```

```
## Warning in lavaan::lavaan(model = medDep, data = Depressionshort, missing =
## "ml", : lavaan WARNING: model has NOT converged!
```

```
summary(fit.medDep, standardized = TRUE, fit.measures = TRUE)
```

```
## ** WARNING ** lavaan (0.5-23.1097) did NOT converge after 114 iterations
## ** WARNING ** Estimates below are most likely unreliable
##
##   Number of observations                           553
##
##   Number of missing patterns                         8
##
##   Estimator                                         ML
##   Minimum Function Test Statistic                   NA
##   Degrees of freedom                                NA
##   P-value                                           NA

## Warning in .local(object, ...): lavaan WARNING: fit measures not available if model did not converge

##
## Parameter Estimates:
```

```
## 
##    Information                                   Observed
##    Standard Errors                               Standard
## 
## Regressions:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   T1_Burden ~
##     T1_BDI    (a1)    0.317      NA                        0.317    0.464
##     T1_ACSS   (c1)   -0.001      NA                       -0.001   -0.000
##   T1_Belong ~
##     T1_BDI    (b1)    0.337      NA                        0.337    0.395
##     T1_ACSS   (d1)   -0.000      NA                       -0.000   -0.000
##   T2_Belong ~
##     T1_BDI    (a1)    0.317      NA                        0.317    0.360
##     T2_ACSS   (c2)   -0.033      NA                       -0.033   -0.014
##     T1_Belong (g1)    0.441      NA                        0.441    0.427
##   T2_Burden ~
##     T1_BDI    (b1)    0.337      NA                        0.337    0.576
##     T2_ACSS   (d2)    0.195      NA                        0.195    0.120
##     T2_Burden (h1)   -0.549      NA                       -0.549   -0.549
##   T3_Belong ~
##     T2_BDI    (a2)    0.099      NA                        0.099    0.096
##     T3_ACSS   (c3)   -0.098      NA                       -0.098   -0.036
##     T2_Belong (g2)    0.693      NA                        0.693    0.666
##   T3_Burden ~
##     T2_BDI    (b2)    0.049      NA                        0.049    0.102
##     T3_ACSS   (d3)    0.205      NA                        0.205    0.163
##     T2_Burden (h2)    0.462      NA                        0.462    0.636
##   T2_ACSS ~
##     T1_ACSS   (i1)    0.554      NA                        0.554    0.566
##     T1_BDI    (e1)    0.024      NA                        0.024    0.066
##     T1_Belong (c1)   -0.001      NA                       -0.001   -0.001
##     T1_Burden (d1)   -0.000      NA                       -0.000   -0.000
##   T3_ACSS ~
##     T2_ACSS   (i2)    0.574      NA                        0.574    0.609
##     T1_BDI    (e1)    0.024      NA                        0.024    0.070
##     T2_Belong (c2)   -0.033      NA                       -0.033   -0.087
## 
## Covariances:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   T1_BDI ~~
##     T2_BDI           0.107      NA                        0.107    0.001
##   T2_BDI ~~
##     T3_BDI           0.072      NA                        0.072    0.001
##  .T1_Belong ~~
##    .T2_Belong        0.029      NA                        0.029    0.000
##  .T2_Belong ~~
##    .T3_Belong        0.007      NA                        0.007    0.000
##  .T1_Burden ~~
##    .T2_Burden        0.244      NA                        0.244    0.007
##  .T2_Burden ~~
##    .T3_Burden        0.069      NA                        0.069    0.004
##  .T2_ACSS ~~
##     T1_ACSS          0.121      NA                        0.121    0.010
```

```
##     .T3_ACSS          0.031        NA                    0.031    0.003
## .T3_Belong ~~
##     .T3_Burden        0.037        NA                    0.037    0.002
##
## Intercepts:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv   Std.all
##     .T1_Burden        7.028        NA                    7.028    0.949
##     .T1_Belong       16.998        NA                   16.998    1.838
##     .T2_Belong        7.579        NA                    7.579    0.794
##     .T2_Burden        3.434        NA                    3.434    0.541
##     .T3_Belong        5.569        NA                    5.569    0.560
##     .T3_Burden        1.567        NA                    1.567    0.340
##     .T2_ACSS          2.893        NA                    2.893    0.742
##     .T3_ACSS          3.387        NA                    3.387    0.921
##      T1_BDI          10.490        NA                   10.490    0.966
##      T1_ACSS          8.244        NA                    8.244    2.071
##      T2_BDI           8.008        NA                    8.008    0.831
##      T3_BDI           5.689        NA                    5.689    0.804
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv   Std.all
##     .T1_Burden       43.042        NA                   43.042    0.784
##     .T1_Belong       72.143        NA                   72.143    0.844
##     .T2_Belong       51.659        NA                   51.659    0.566
##     .T2_Burden       26.000        NA                   26.000    0.645
##     .T3_Belong       53.711        NA                   53.711    0.544
##     .T3_Burden       11.359        NA                   11.359    0.533
##     .T2_ACSS         10.142        NA                   10.142    0.667
##     .T3_ACSS          8.353        NA                    8.353    0.617
##      T1_BDI         117.914        NA                  117.914    1.000
##      T1_ACSS         15.852        NA                   15.852    1.000
##      T2_BDI          92.793        NA                   92.793    1.000
##      T3_BDI          50.114        NA                   50.114    1.000
##
## Defined Parameters:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv   Std.all
##      ind             -0.011                              -0.011   -0.011
##      total            0.587                               0.587    0.664
```

```
medSIAS <- '


#Correlate residuals

T1_SIAS ~~ T2_SIAS
T2_SIAS ~~ T3_SIAS


T1_Belong ~~ T2_Belong
T2_Belong ~~ T3_Belong


T1_Burden ~~ T2_Burden
T2_Burden ~~ T3_Burden


T1_ACSS ~~ T2_ACSS
```

```
T2_ACSS ~~ T3_ACSS

#Regressions to calculate indirect effects

T1_Burden ~ a1*T1_SIAS + c1*T1_ACSS
T1_Belong ~ b1*T1_SIAS + d1*T1_ACSS

T2_Belong ~ a1*T1_SIAS + c2*T2_ACSS + g1*T1_Belong
T2_Burden ~ b1*T1_SIAS + d2*T2_ACSS + h1*T2_Burden

T3_Belong ~ a2*T2_SIAS + c3*T3_ACSS + g2*T2_Belong
T3_Burden ~ b2*T2_SIAS + d3*T3_ACSS + h2*T2_Burden

T2_ACSS ~ i1*T1_ACSS + e1*T1_SIAS + c1*T1_Belong + d1*T1_Burden
T3_ACSS ~ i2*T2_ACSS + e1*T1_SIAS + c2*T2_Belong + d2*T2_Belong

#SIAS --> Belong (a)
#SIAS --> Burden (b)
#Belong --> ACSS (c)
#Burden --> ACSS (d)
#SIAS --> ACSS (e)
#AR: SIAS--> SIAS (f)
#AR: Belong --> Belong (g)
#AR: Burden --> Burden (h)
#AR: ACSS --> ACSS (i)

ind:= a1*i2*c2*g1*g2 + b1*i2*d2*h1*h2
total:= ind + e1 + i2 '

fit.medSIAS <- sem(medSIAS, data = Depressionshort, missing = "ml")
```

```
## Warning in lavaan::lavaan(model = medSIAS, data = Depressionshort, missing
## = "ml", : lavaan WARNING: model has NOT converged!
```

```
summary(fit.medSIAS, standardized = TRUE, fit.measures = TRUE)
```

```
## ** WARNING ** lavaan (0.5-23.1097) did NOT converge after 10000 iterations
## ** WARNING ** Estimates below are most likely unreliable
##
##   Number of observations                          553
##
##   Number of missing patterns                        6
##
##   Estimator                                        ML
##   Minimum Function Test Statistic                  NA
##   Degrees of freedom                               NA
##   P-value                                          NA
```

```
## Warning in .local(object, ...): lavaan WARNING: fit measures not available if model did not converge
```

```
##
## Parameter Estimates:
##
##   Information                                Observed
##   Standard Errors                            Standard
```

```
## 
## Regressions:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv   Std.all
##   T1_Burden ~
##     T1_SIAS   (a1)   0.161      NA                        0.161    0.336
##     T1_ACSS   (c1)   0.013      NA                        0.013    0.007
##   T1_Belong ~
##     T1_SIAS   (b1)   0.187      NA                        0.187    0.299
##     T1_ACSS   (d1)   0.024      NA                        0.024    0.010
##   T2_Belong ~
##     T1_SIAS   (a1)   0.161      NA                        0.161    0.258
##     T2_ACSS   (c2)  -0.017      NA                       -0.017   -0.007
##     T1_Belong (g1)   0.523      NA                        0.523    0.524
##   T2_Burden ~
##     T1_SIAS   (b1)   0.187      NA                        0.187    0.500
##     T2_ACSS   (d2)   0.290      NA                        0.290    0.201
##     T2_Burden (h1)  -4.825      NA                       -4.825   -4.825
##   T3_Belong ~
##     T2_SIAS   (a2)   0.193      NA                        0.193    0.301
##     T3_ACSS   (c3)   0.049      NA                        0.049    0.019
##     T2_Belong (g2)   0.617      NA                        0.617    0.624
##   T3_Burden ~
##     T2_SIAS   (b2)   0.017      NA                        0.017    0.055
##     T3_ACSS   (d3)   0.206      NA                        0.206    0.169
##     T2_Burden (h2)   0.472      NA                        0.472    0.603
##   T2_ACSS ~
##     T1_ACSS   (i1)   0.566      NA                        0.566    0.579
##     T1_SIAS   (e1)  -0.017      NA                       -0.017   -0.067
##     T1_Belong (c1)   0.013      NA                        0.013    0.031
##     T1_Burden (d1)   0.024      NA                        0.024    0.044
##   T3_ACSS ~
##     T2_ACSS   (i2)   0.769      NA                        0.769    0.826
##     T1_SIAS   (e1)  -0.017      NA                       -0.017   -0.072
##     T2_Belong (c2)  -0.017      NA                       -0.017   -0.045
## 
## Covariances:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv   Std.all
##   T1_SIAS ~~
##     T2_SIAS          1.444      NA                        1.444    0.007
##   T2_SIAS ~~
##     T3_SIAS          0.805      NA                        0.805    0.004
##  .T1_Belong ~~
##    .T2_Belong        0.137      NA                        0.137    0.002
##  .T2_Belong ~~
##    .T3_Belong       -0.395      NA                       -0.395   -0.008
##  .T1_Burden ~~
##    .T2_Burden        7.078      NA                        7.078    0.222
##  .T2_Burden ~~
##    .T3_Burden        0.434      NA                        0.434    0.028
##  .T2_ACSS ~~
##     T1_ACSS          0.118      NA                        0.118    0.010
##    .T3_ACSS         -2.813      NA                       -2.813   -0.314
##  .T3_Belong ~~
##    .T3_Burden        0.545      NA                        0.545    0.025
```

```
## 
## Intercepts:
##                 Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##    .T1_Burden      6.914       NA                       6.914    0.966
##    .T1_Belong     16.463       NA                      16.463    1.762
##    .T2_Belong      5.695       NA                       5.695    0.611
##    .T2_Burden      2.367       NA                       2.367    0.424
##    .T3_Belong      2.803       NA                       2.803    0.304
##    .T3_Burden      1.503       NA                       1.503    0.343
##    .T2_ACSS        2.931       NA                       2.931    0.758
##    .T3_ACSS        2.277       NA                       2.277    0.633
##     T1_SIAS       20.737       NA                      20.737    1.387
##     T1_ACSS        8.244       NA                       8.244    2.085
##     T2_SIAS       19.107       NA                      19.107    1.331
##     T3_SIAS       17.460       NA                      17.460    1.320
## 
## Variances:
##                 Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##    .T1_Burden     45.404       NA                      45.404    0.887
##    .T1_Belong     79.534       NA                      79.534    0.911
##    .T2_Belong     50.092       NA                      50.092    0.576
##    .T2_Burden     22.352       NA                      22.352    0.716
##    .T3_Belong     44.668       NA                      44.668    0.526
##    .T3_Burden     10.889       NA                      10.889    0.569
##    .T2_ACSS        9.727       NA                       9.727    0.651
##    .T3_ACSS        8.234       NA                       8.234    0.636
##     T1_SIAS      223.682       NA                     223.682    1.000
##     T1_ACSS       15.638       NA                      15.638    1.000
##     T2_SIAS      206.074       NA                     206.074    1.000
##     T3_SIAS      174.850       NA                     174.850    1.000
## 
## Defined Parameters:
##                 Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##     ind           -0.096                              -0.096   -0.145
##     total          0.656                               0.656    0.614
```

```r
#Descriptive stats
table(DepressionMerge$Gender)
```

```
## 
##   1   2   3   4
## 122 425   1   1
```

```r
table(DepressionMerge$Ethnicity)
```

```
## 
##   0   1   2   3   4   5
## 319 109  35  25  37  27
```

```r
table(DepressionMerge$Hispanic)
```

```
## 
##   1   2
##  42 511
```

```r
describe(DepressionMerge$Age)
```

```
##    vars   n mean   sd median trimmed  mad min max range skew kurtosis   se
## X1    1 552 21.1 4.13     20   20.42 1.48  10  61    51 4.62    30.87 0.18
```

```r
#Subset data to calculate alphas
T1BDI <- dplyr::select(DepressionMerge, T1_BDI1:T1_BDI21)
T2BDI <- dplyr::select(DepressionMerge, T2_BDI1:T2_BDI21)
T3BDI <- dplyr::select(DepressionMerge, T3_BDI1:T3_BDI21)
T1SIAS <- dplyr::select(DepressionMerge, T1_SIAS1:T1_SIAS4, T1_SIAS6:T1_SIAS8, T1_SIAS10, T1_SIAS12:T1_S
T2SIAS <- dplyr::select(DepressionMerge, T2_SIAS1:T2_SIAS4, T2_SIAS6:T2_SIAS8, T2_SIAS10, T2_SIAS12:T2_S
T3SIAS <- dplyr::select(DepressionMerge, T3_SIAS1:T3_SIAS4, T3_SIAS6:T3_SIAS8, T3_SIAS10, T3_SIAS12:T3_S
T1ACSS <- dplyr::select(DepressionMerge, T1_ACSS1:T1_ACSS5)
T2ACSS <- dplyr::select(DepressionMerge, T2_ACSS1:T2_ACSS5)
T3ACSS <- dplyr::select(DepressionMerge, T3_ACSS1:T3_ACSS5)
T1Belong <- dplyr::select(DepressionMerge, T1_INQ7:T1_INQ15)
T2Belong <- dplyr::select(DepressionMerge, T2_INQ7:T2_INQ16)
T3Belong <- dplyr::select(DepressionMerge, T3_INQ7:T3_INQ16)
T1Burden <- dplyr::select(DepressionMerge, T1_INQ1:T1_INQ6)
T2Burden <- dplyr::select(DepressionMerge, T2_INQ1:T2_INQ6)
T3Burden <- dplyr::select(DepressionMerge, T3_INQ1:T3_INQ6)


alpha(T1BDI)
alpha(T2BDI)
alpha(T3BDI)
alpha(T1SIAS)
alpha(T2SIAS)
alpha(T3SIAS)
alpha(T1ACSS, check.keys = TRUE)
alpha(T2ACSS, check.keys = TRUE)
alpha(T3ACSS, check.keys = TRUE)
alpha(T1Burden)
alpha(T2Burden)
alpha(T3Burden)
alpha(T1Belong, check.keys = TRUE)
alpha(T2Belong, check.keys = TRUE)
alpha(T3Belong, check.keys = TRUE)
```