Cognitive Heterogeneity in Depressed Youth

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This is the master document containing the final analyses for the project: Semisupervised Machine Learning Reveals Three Subtypes of Cognitive Function in Depressed Youths

Steps: 1) Sample construction -We started with the CNB sample (9498 youths aged 8-22) -Youths were excluded if they did not have age, sex, gender or maternal education documented -Youths were also excluded if they had missing data for any of the 26 cognitive measures (12 accuracy, 14 speed) -712 depressed youths and 2310 remained (n= 3022)

2) Matching

- Using the R package Matchit, depressed youths were age and sex matched with typically developing youth
- Match was performed in 2 steps to allow us to enrich our TD group with children who had imaging
- Step 1: Depressed youth with imaging(200) were matched with youths with imaging. Results: 187 depressed and 187 TDs matched
- Step 2: People who were matched in Step 1 were removed from the original groups (unmatched: Depressed 525, TD 2123)
- Step 3: Subjects from TD group that do not have imaging were removed
- Step 4: Match was rerun for depressed without imaging with TDs WITH imaging
- Step 5: Groups were combined and demographics were checked to ensure that the groups were still matched
- Of note: Matchit does depend on random seeding, so each iteration generates VERY SLIGHT differences between groups
- Our Matchit was run 6/11/2018
- Final TD (n = 712) and Depressed (n = 712), for a total n = 1424

3) HYDRA

- Final matched groups were output to csv and sent to HYDRA for subtyping (code protected)

4)Cognitive analysis - Results from HYDRA revealed highest ARI (0.39) for 3 subtype solution - CNB Factor Summary Scores (Accuracy, Speed, Efficiency) were evaluated - Results: - Subtype 1: Cognition Preserved - Subtype 2: Cognition Impaired - Subtype 3: Impulsive

5) Clinical bifactor analysis

- Bifactor scores were calculated (excluding measures that were used to classify depression in initial sample construction)
- Subtypes were evaluated on 5 bifactor scores (anxious-misery, psychosis, externalizing, fear, and overall psychopathology)
- Results: -All subtypes had higher psychopathology than TDs (P(FDR)$<$ 0.05) -Subtypes 1 and 3 were indistinguishable on clinical factor scores (P(FDR) = NS) -Subtype 2 had higher fear scores than Subtypes 1 and 3 (P(FDR)$<$0.0001)

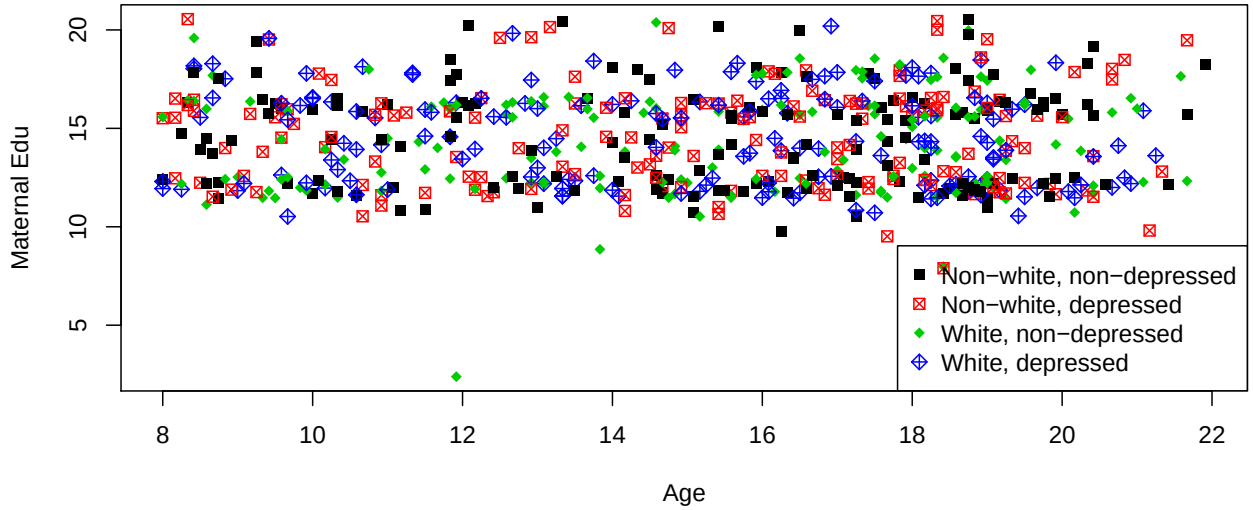
6) Anxious-misery analysis

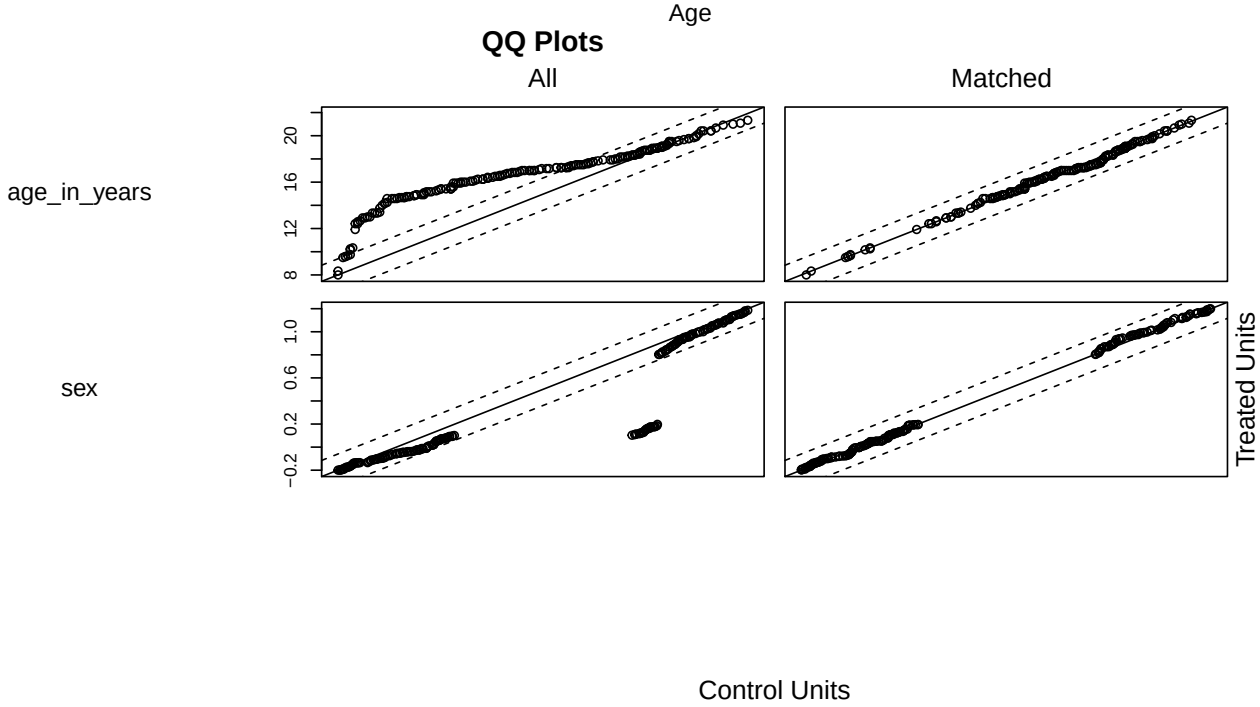
- Anxious misery factor scores were calculated
- Subtypes were evaluated on state and trait factors to verify cognitive differences were not due to state difference
- Results:
- All subtypes had significantly higher state (P(FDR) = 0.001) and trait (P(FDR)$<$0.001) anxiety

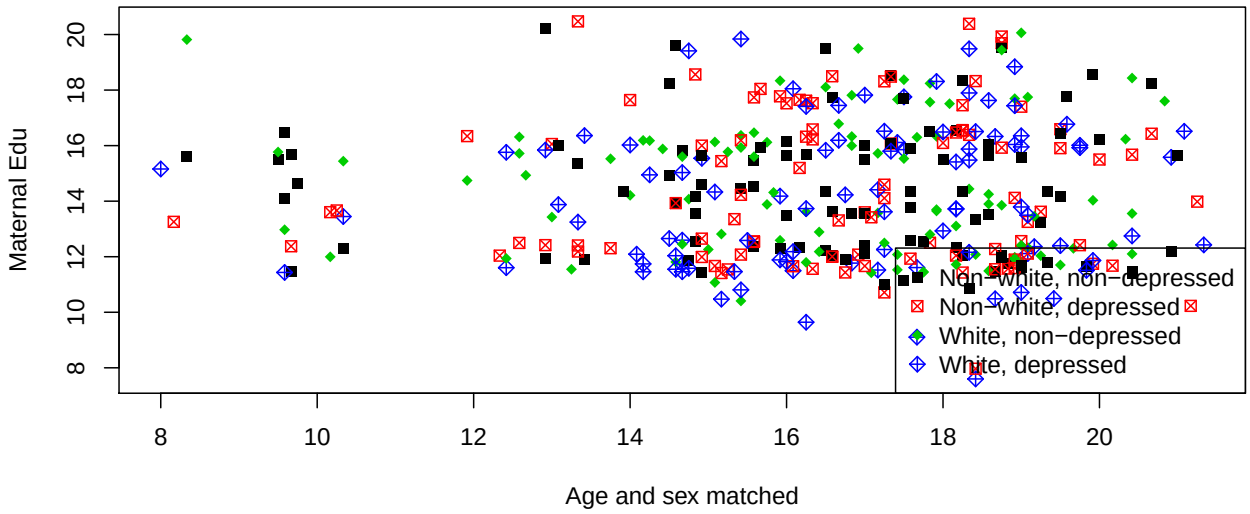
  - State Pairwise: -Subtype 1 vs TD (P=0.03) -Subtype 2 vs TD (P=0.02) -Subtype 3 vs TD (P=0.08, NS)
  - Trait Pairwise: All Subtypes vs TD (P<0.001)
- Subtypes 1-3 did NOT differ on EITHER state or trait anxiety (P=NS)

7) Nback -Using 21 functionally defined regions of interest from Satterthwaite et al, 2013, percent signal change between 2bk and 0bk was evaluated by cluster

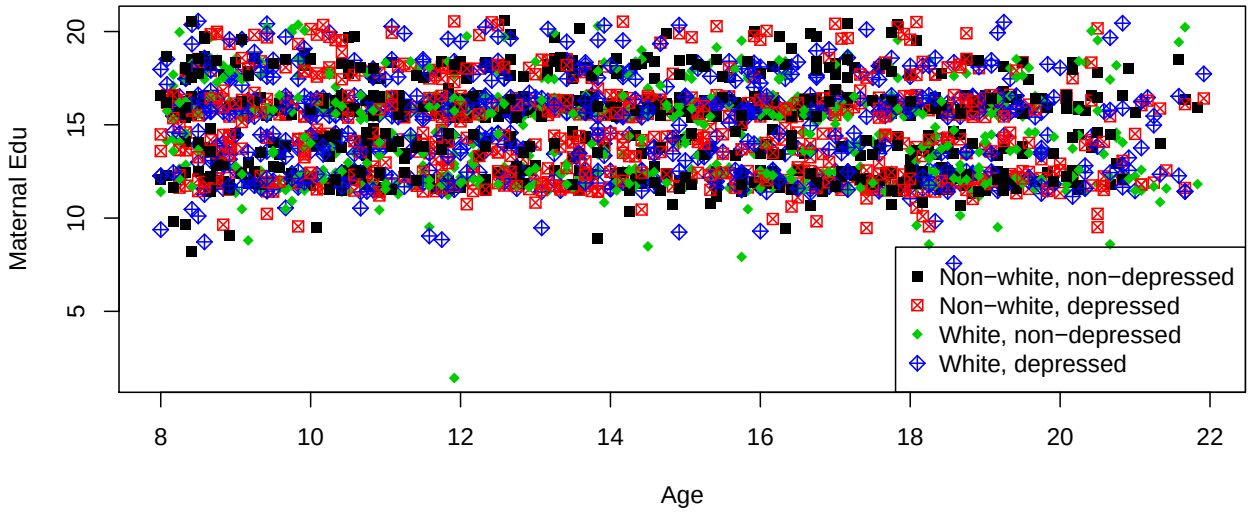
- Results:
- 6 areas showed significant differences (P(FDR)<0.05) by subtype including -right crus II -right precuneus -left precuneus -dorsal anterior cingulate -left dorsal frontal/mfg -left dorsolateral prefrontal cortex

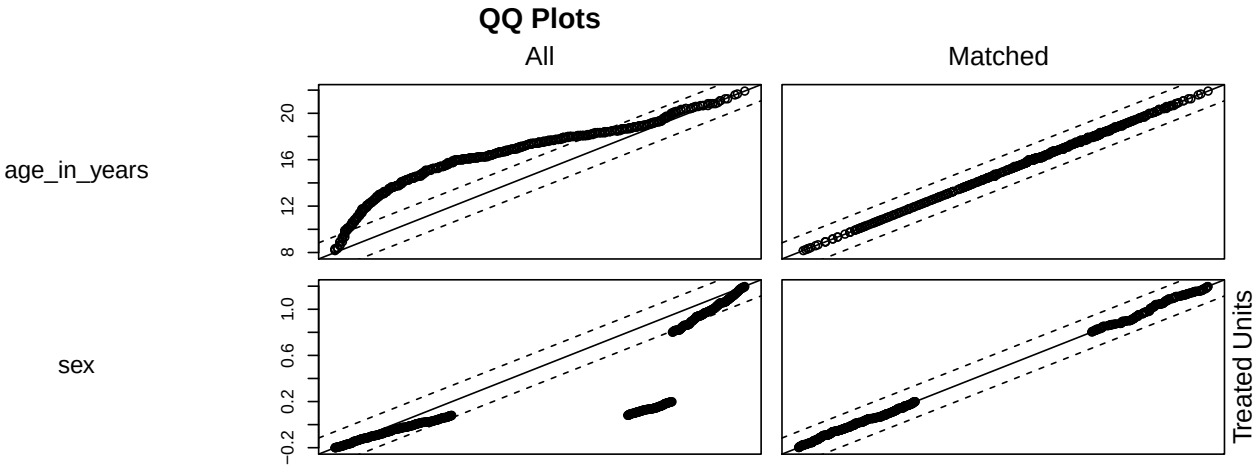


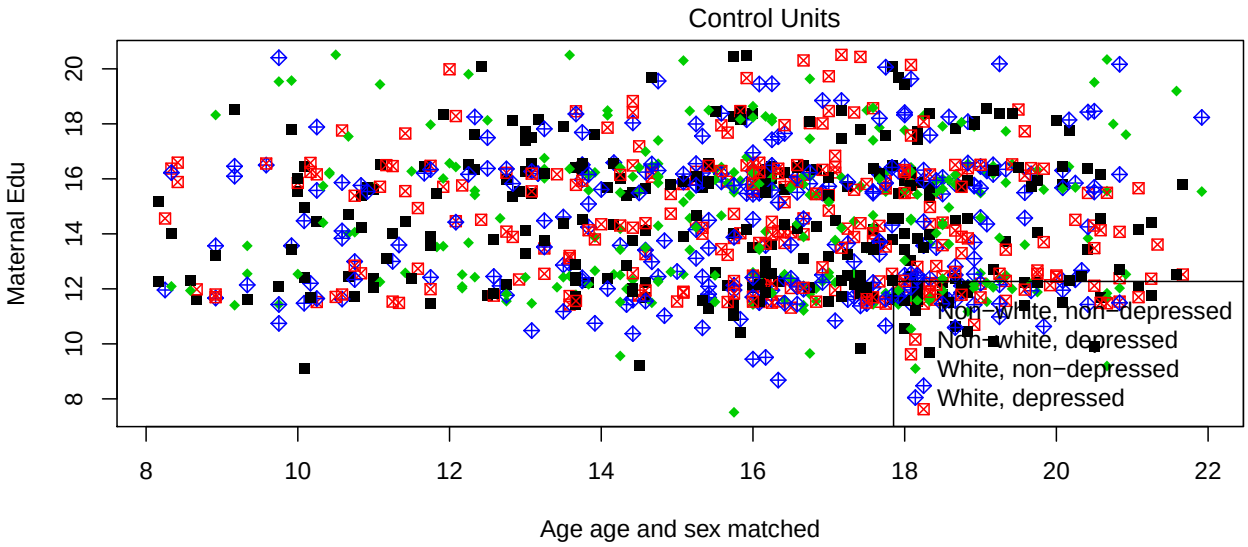





```
## [1] "Version matching on  data_age_and_sex"
##                              Stratified by Depression
##                               level         Depressed      Non-depressed
##   n                                             187             187
##   Race_binarized (mean (sd))                 0.44 (0.50)     0.53 (0.50)
##   Sex (%)                    Female           117 ( 62.6)     117 ( 62.6)
##                              Male              70 ( 37.4)      70 ( 37.4)
##   Maternal Ed (mean (sd))                   13.91 (2.35)    14.88 (2.57)
##   Age (mean (sd))                           16.57 (2.63)    16.61 (2.67)
##   Depression (%)             Depressed        187 (100.0)       0 (  0.0)
##                              Non-depressed      0 (  0.0)     187 (100.0)
##                              Stratified by Depression
##                               p      test
##   n
##   Race_binarized (mean (sd))  0.098
##   Sex (%)                     1.000
##
##   Maternal Ed (mean (sd))    <0.001
##   Age (mean (sd))             0.891
##   Depression (%)             <0.001
##
```








```
## [1] "Version matching on  data_age_and_sex"
##                              Stratified by Depression
##                               level         Depressed      Non-depressed
##   n                                             525             525
##   Race_binarized (mean (sd))                  0.59 (0.49)     0.65 (0.48)
##   Sex (%)                     Female          360 ( 68.6)     360 ( 68.6)
##                               Male            165 ( 31.4)     165 ( 31.4)
##   Maternal Ed (mean (sd))                   14.19 (2.26)    14.73 (2.46)
##   Age (mean (sd))                           15.97 (2.97)    15.97 (2.97)
##   Depression (%)              Depressed       525 (100.0)       0 (  0.0)
##                               Non-depressed     0 (  0.0)     525 (100.0)
##                              Stratified by Depression
##                               p      test
##   n
##   Race_binarized (mean (sd))  0.049
##   Sex (%)                     1.000
```

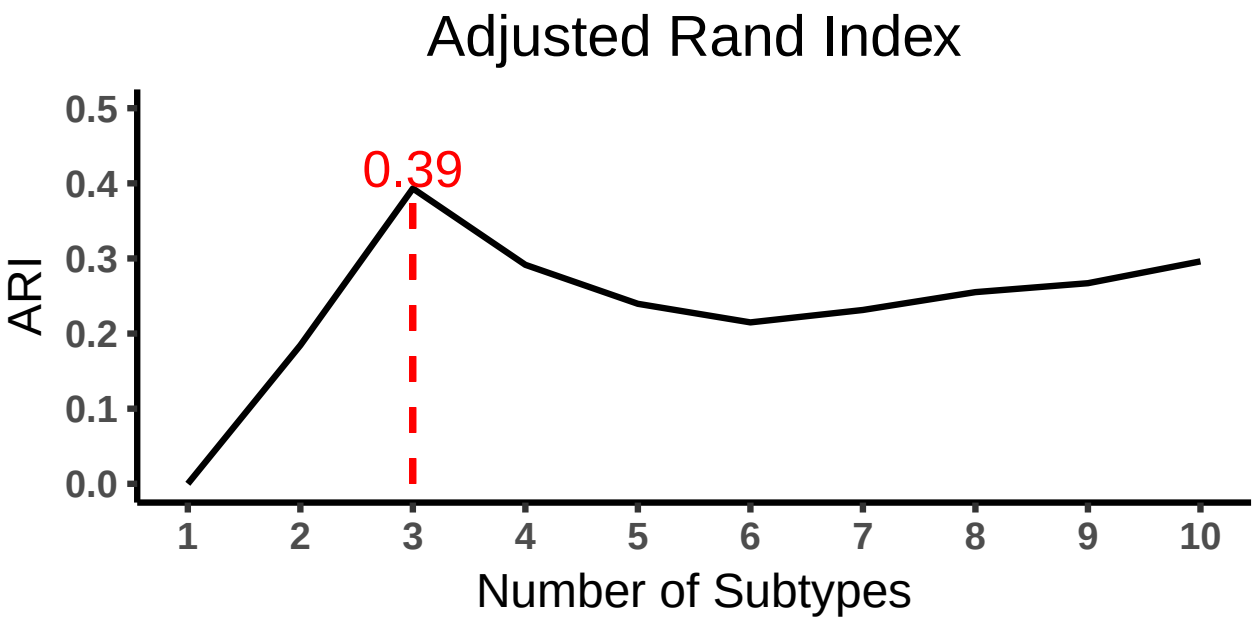
```
##
##   Maternal Ed (mean (sd))    <0.001
##   Age (mean (sd))             0.996
##   Depression (%)             <0.001
##
```

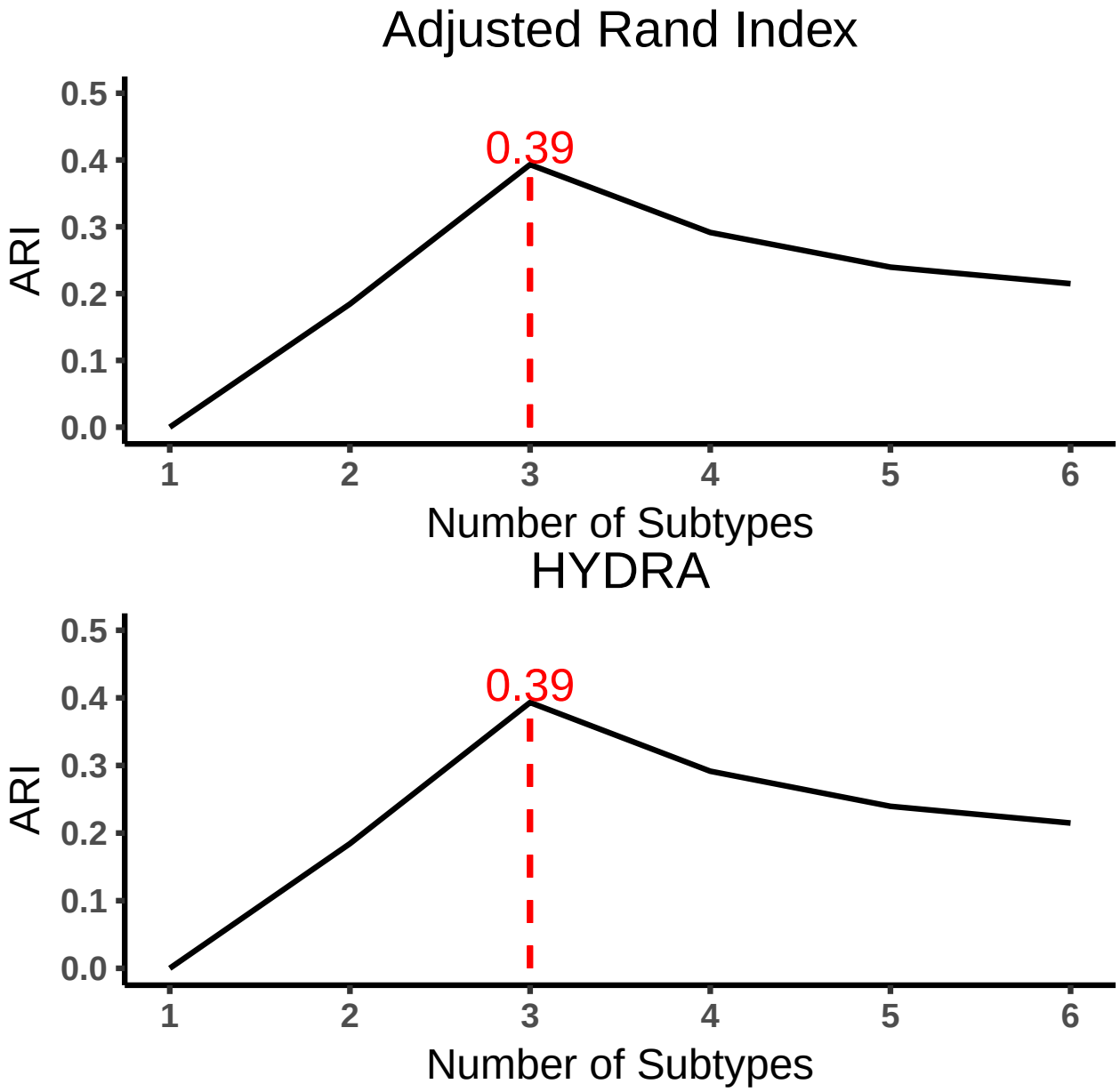
```
## [1] "Version matching on  data_age_and_sex"
##                              Stratified by Depression
##                               level         Depressed      Non-depressed
##   n                                             712            712
##   Race_binarized (mean (sd))                 0.55 (0.50)    0.62 (0.49)
##   Sex (%)                    Female           477 ( 67.0)    477 ( 67.0)
##                              Male             235 ( 33.0)    235 ( 33.0)
##   Maternal Ed (mean (sd))                   14.12 (2.29)   14.77 (2.49)
##   Age (mean (sd))                           16.13 (2.90)   16.14 (2.91)
##   Depression (%)             Depressed        712 (100.0)      0 (  0.0)
##                              Non-depressed      0 (  0.0)    712 (100.0)
##                              Stratified by Depression
##                               p      test
##   n
##   Race_binarized (mean (sd))  0.011
##   Sex (%)                     1.000
##
##   Maternal Ed (mean (sd))    <0.001
##   Age (mean (sd))             0.953
##   Depression (%)             <0.001
##
```

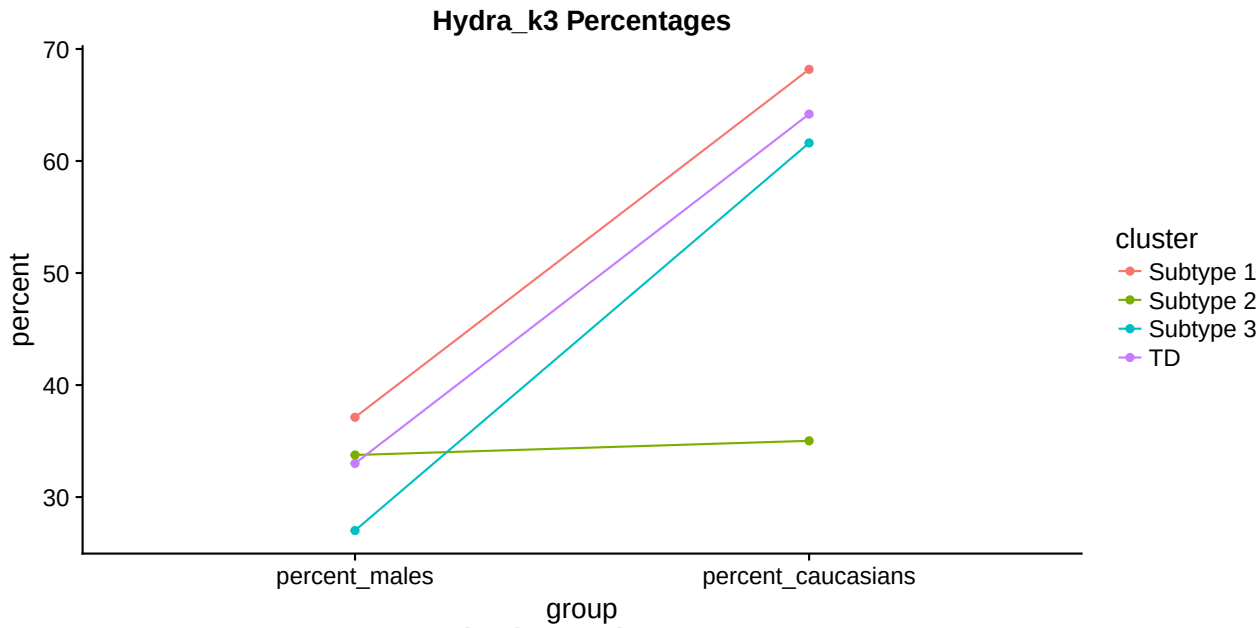
```
##                            Stratified by Depression
##                             level         Depressed      Non-depressed
##   n                                           712            712
##   Race (%)                  Caucasian        393 ( 55.2)    457 ( 64.2)
##                             Non-caucasian    319 ( 44.8)    255 ( 35.8)
##   Sex (%)                   Female           477 ( 67.0)    477 ( 67.0)
##                             Male             235 ( 33.0)    235 ( 33.0)
##   Maternal Ed (mean (sd))                   14.12 (2.29)   14.93 (2.52)
##   Age (mean (sd))                           16.13 (2.90)   16.14 (2.91)
##   Depression (%)            Depressed        712 (100.0)      0 (  0.0)
##                             Non-depressed      0 (  0.0)    712 (100.0)
##                            Stratified by Depression
##                             p      test
##   n
##   Race (%)                   0.001
##
##   Sex (%)                    1.000
##
##   Maternal Ed (mean (sd)) <0.001
##   Age (mean (sd))            0.944
##   Depression (%)            <0.001
##
```

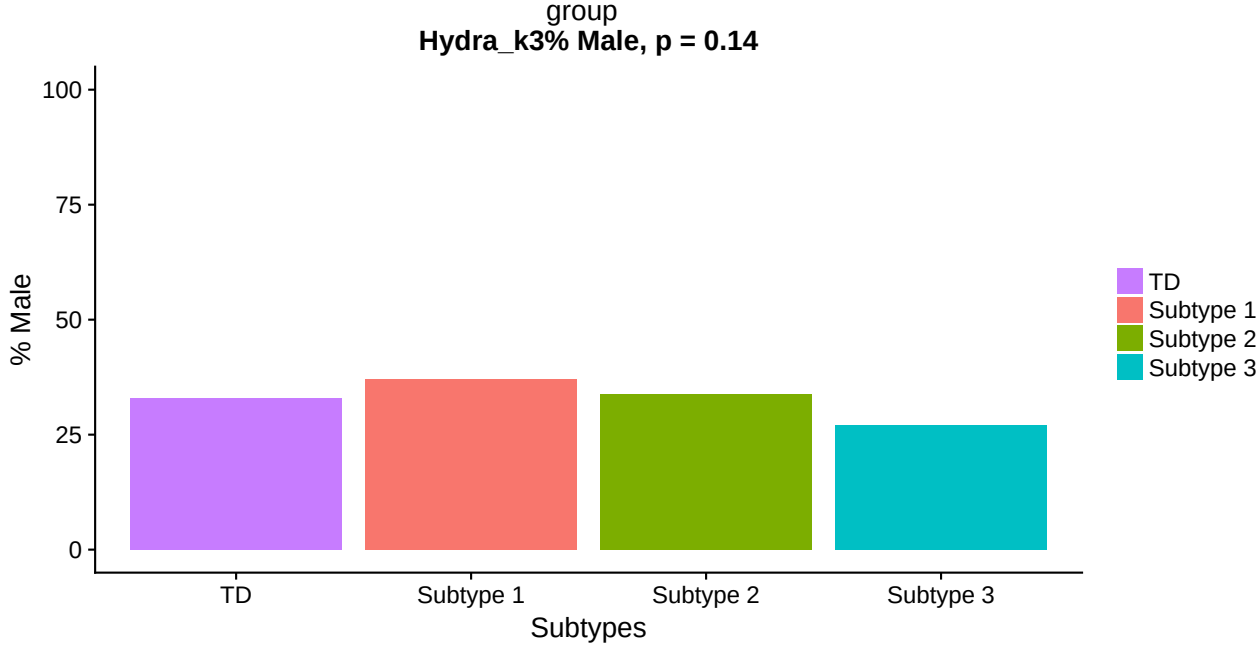
```
##                            Stratified by Cluster
##                             level         -1             1
##   n                                           712            264
##   Race (%)                  Caucasian        457 ( 64.2)    180 ( 68.2)
```

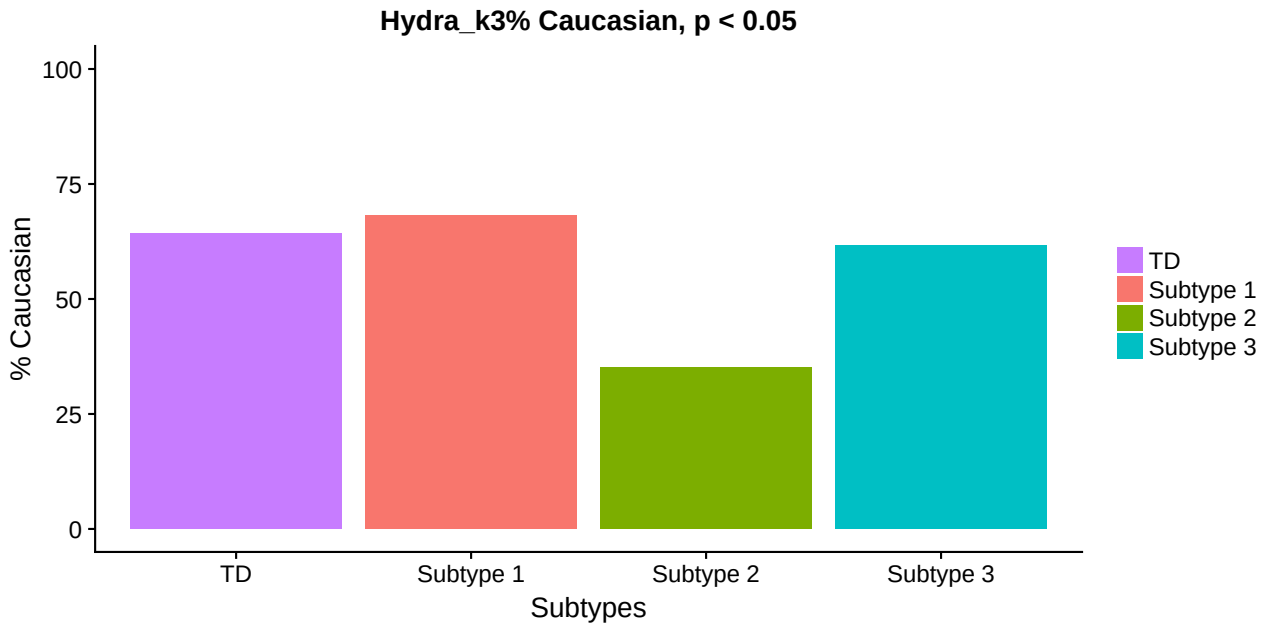
```
##                            Non-caucasian   255 ( 35.8)     84 ( 31.8)
##   Sex (%)                  Female          477 ( 67.0)    166 ( 62.9)
##                            Male            235 ( 33.0)     98 ( 37.1)
##   Maternal Ed (mean (sd))                14.93 (2.52)   14.54 (2.27)
##   Age (mean (sd))                        16.14 (2.91)   16.24 (2.63)
##   Depression (%)           Depressed         0 (  0.0)    264 (100.0)
##                            Non-depressed   712 (100.0)      0 (  0.0)
##   Cluster (%)              -1              712 (100.0)      0 (  0.0)
##                            1                 0 (  0.0)    264 (100.0)
##                            2                 0 (  0.0)      0 (  0.0)
##                            3                 0 (  0.0)      0 (  0.0)
##                           Stratified by Cluster
##                            2              3              p      test
##   n                          237            211
##   Race (%)                    83 ( 35.0)    130 ( 61.6)  <0.001
##                              154 ( 65.0)     81 ( 38.4)
##   Sex (%)                    157 ( 66.2)    154 ( 73.0)   0.138
##                               80 ( 33.8)     57 ( 27.0)
##   Maternal Ed (mean (sd)) 13.48 (2.17)   14.31 (2.29)   <0.001
##   Age (mean (sd))         16.15 (3.33)   15.97 (2.70)    0.781
##   Depression (%)             237 (100.0)    211 (100.0)  <0.001
##                                0 (  0.0)      0 (  0.0)
##   Cluster (%)                  0 (  0.0)      0 (  0.0)  <0.001
##                                0 (  0.0)      0 (  0.0)
##                              237 (100.0)      0 (  0.0)
##                                0 (  0.0)    211 (100.0)
```

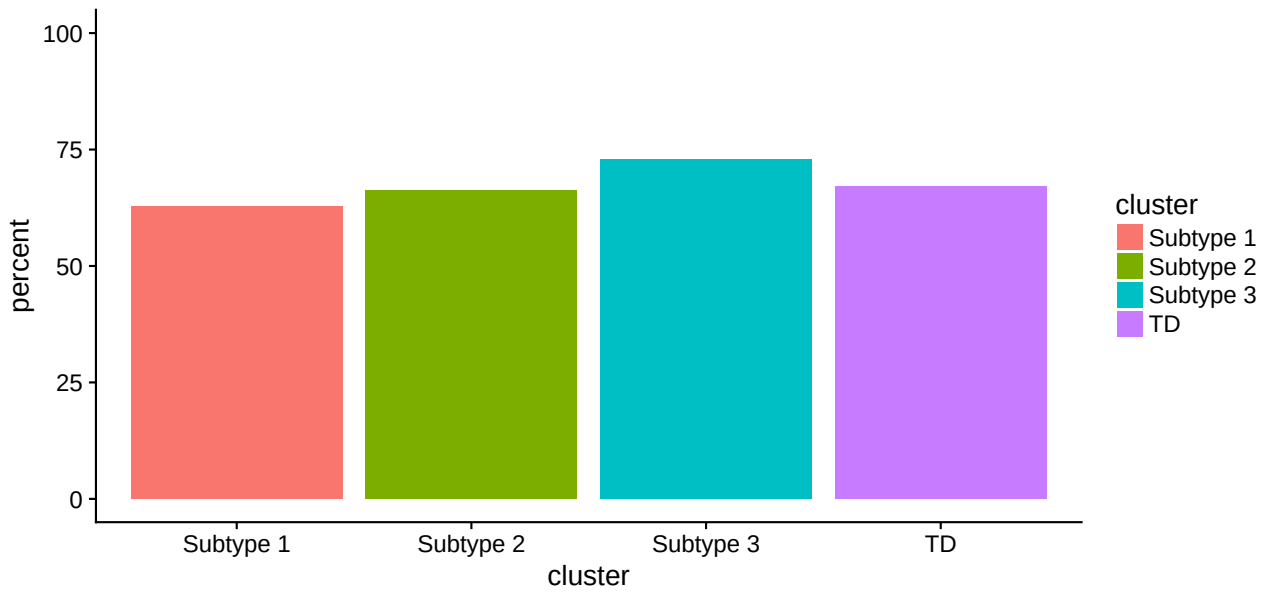


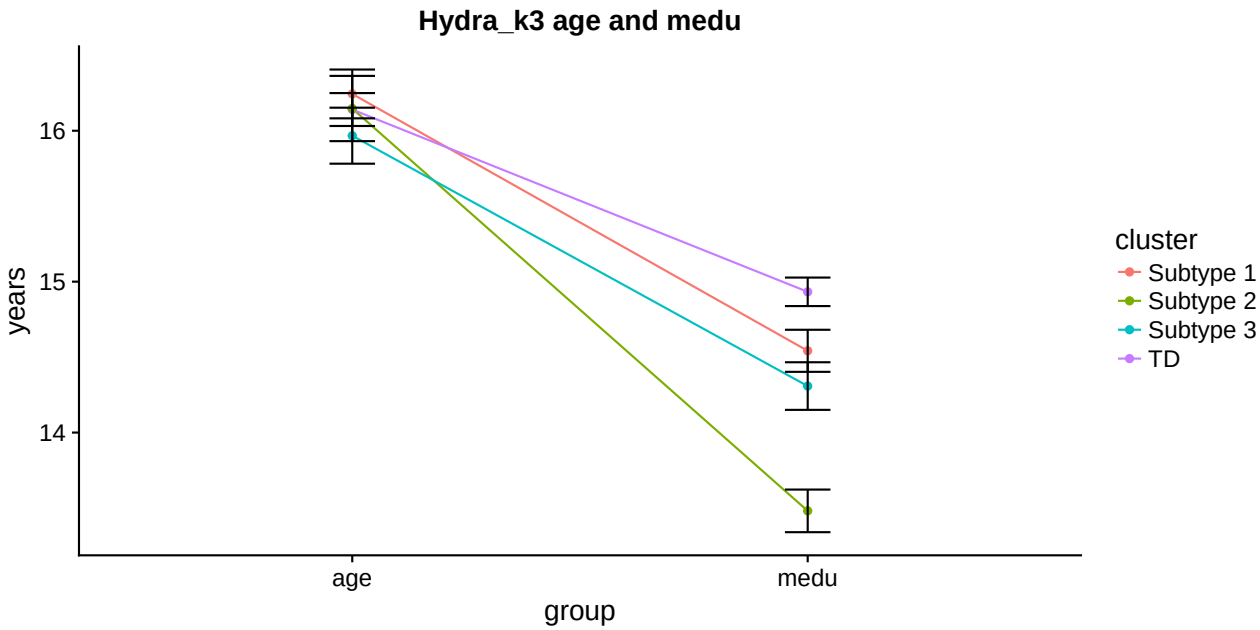

Adjusted Rand Index
0.5
0.4
0.3
0.2
0.1
0.0
ARI
0.39
1
2
3
4
5
6
Number of Subtypes
HYDRA
0.5
0.4
0.3
0.2
0.1
0.0
ARI
0.39
1
2
3
4
5
6
Number of Subtypes

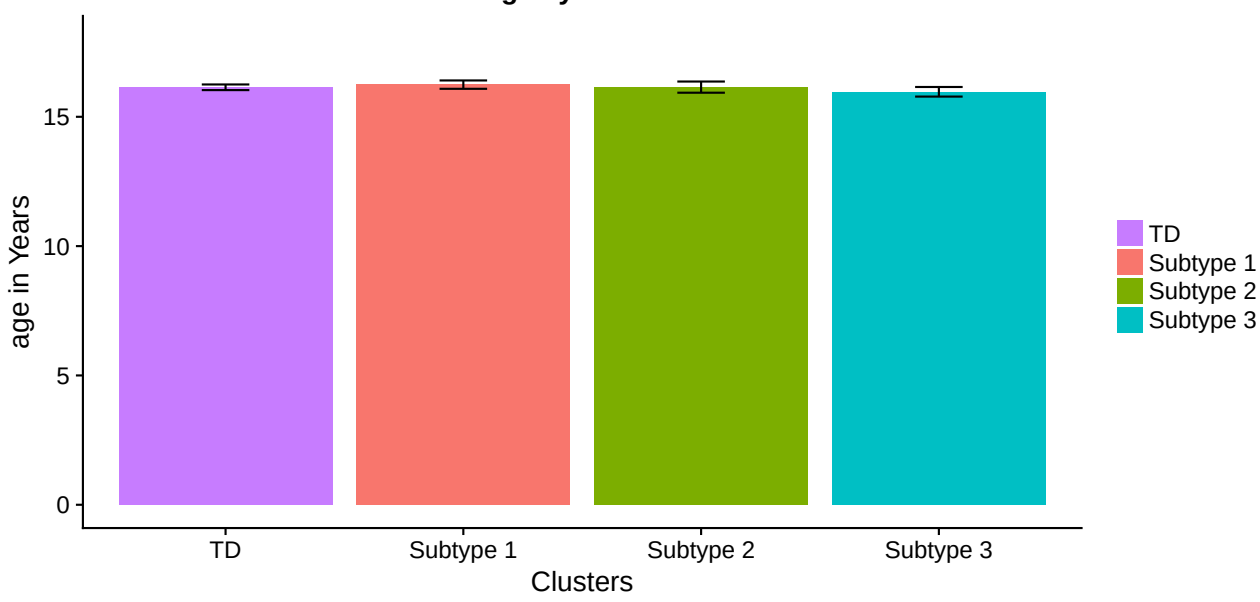

Hydra_k3 Percentages
70
60
50
40
30
percent
percent_males
percent_caucasians
group
cluster
Subtype 1
Subtype 2
Subtype 3
TD

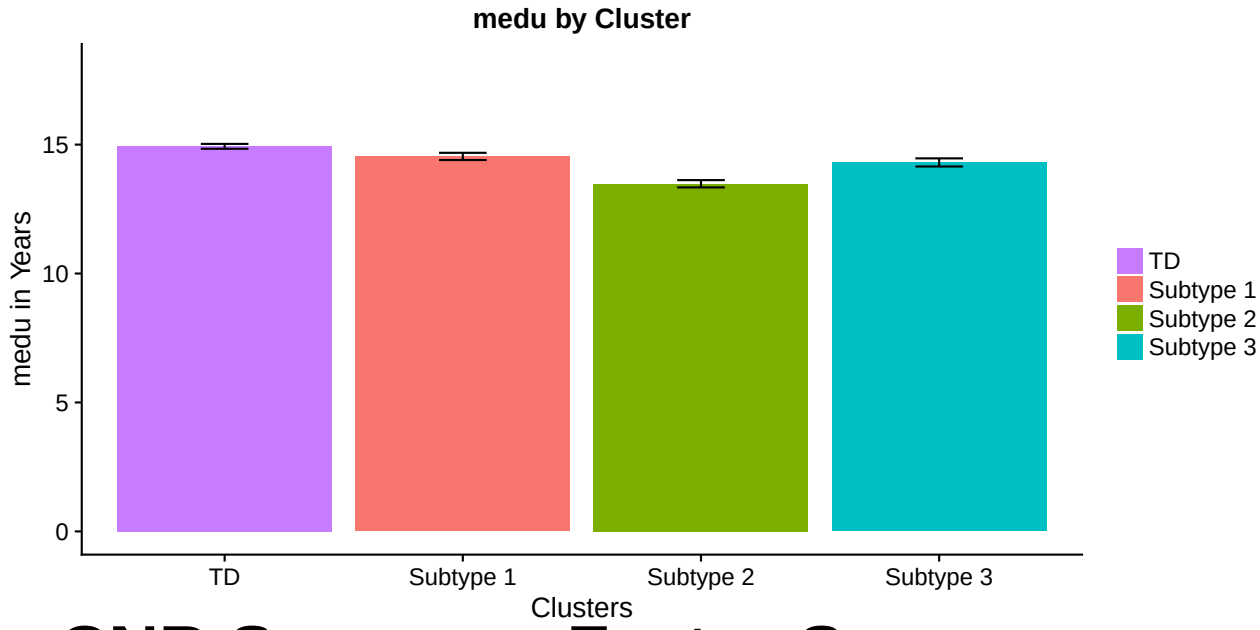

Hydra_k3% Male, p = 0.14
100
75
50
25
0
% Male
TD
Subtype 1
Subtype 2
Subtype 3
Subtypes
TD
Subtype 1
Subtype 2
Subtype 3

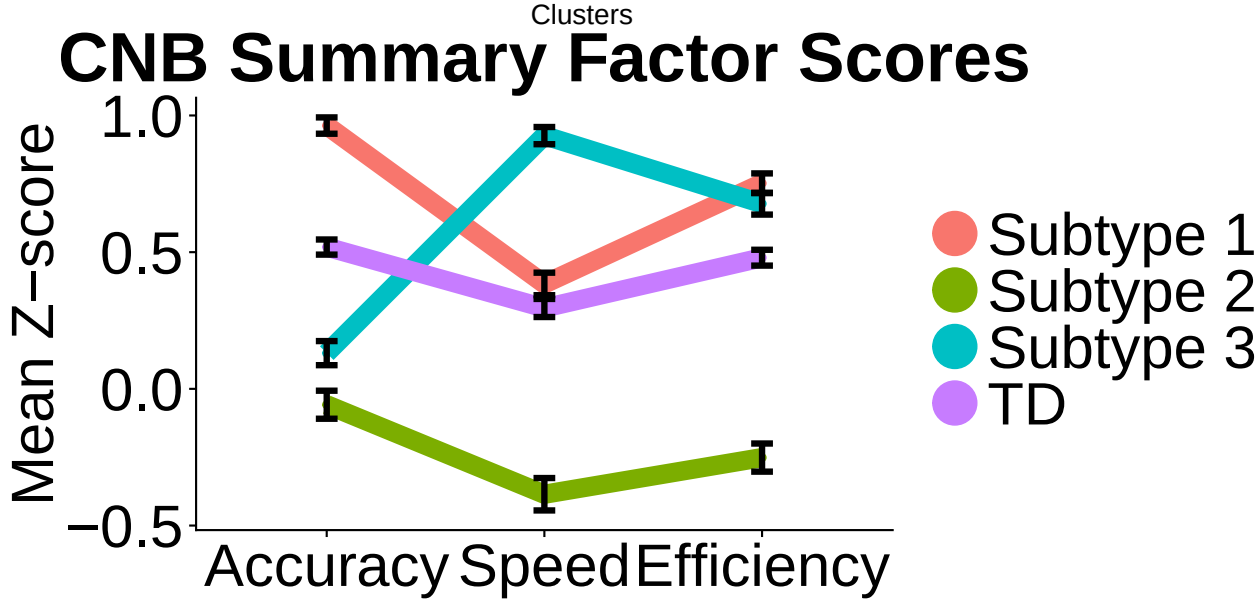

Hydra_k3% Caucasian, p < 0.05
% Caucasian
100
75
50
25
0
TD
Subtype 1
Subtype 2
Subtype 3
Subtypes
TD
Subtype 1
Subtype 2
Subtype 3

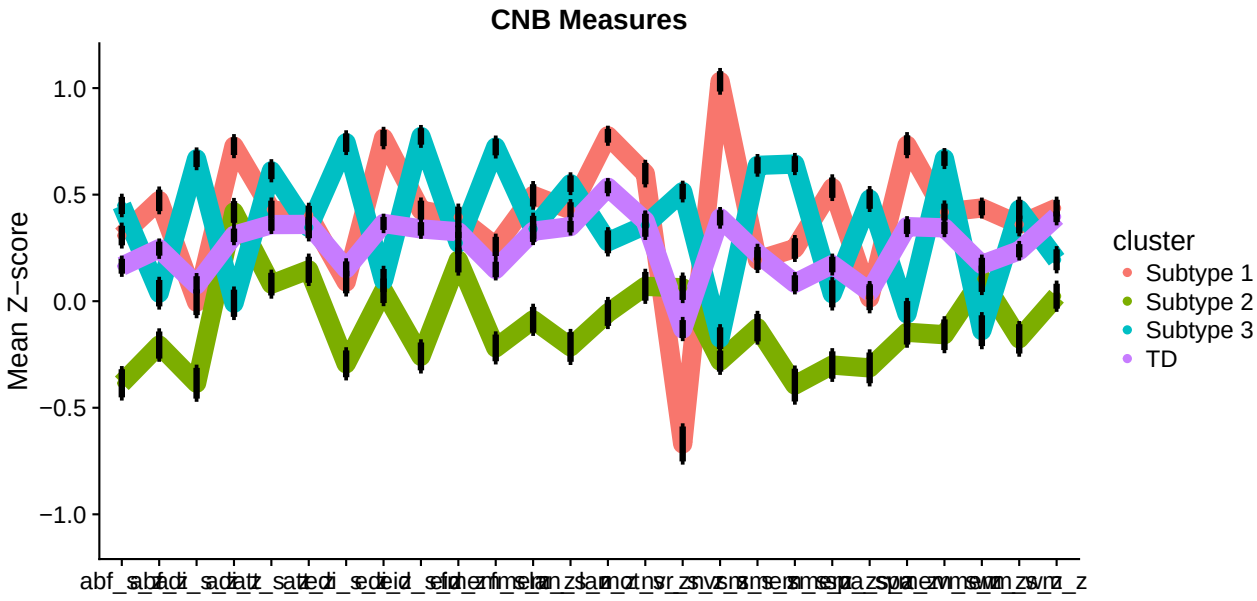

Hydra_k3% Female, p = NS
percent
100
75
50
25
0
Subtype 1
Subtype 2
Subtype 3
TD
cluster
cluster
Subtype 1
Subtype 2
Subtype 3
TD


Hydra_k3 age and medu
years
16
15
14
age
medu
group
cluster
Subtype 1
Subtype 2
Subtype 3
TD

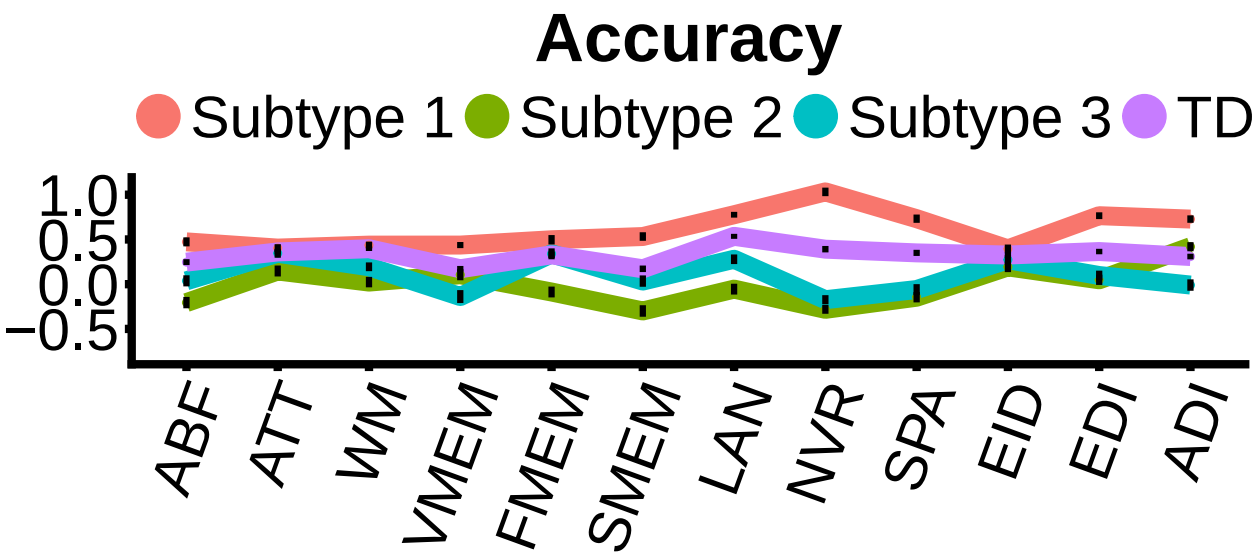

age by Cluster
age in Years
15
10
5
0
TD
Subtype 1
Subtype 2
Subtype 3
Clusters
TD
Subtype 1
Subtype 2
Subtype 3

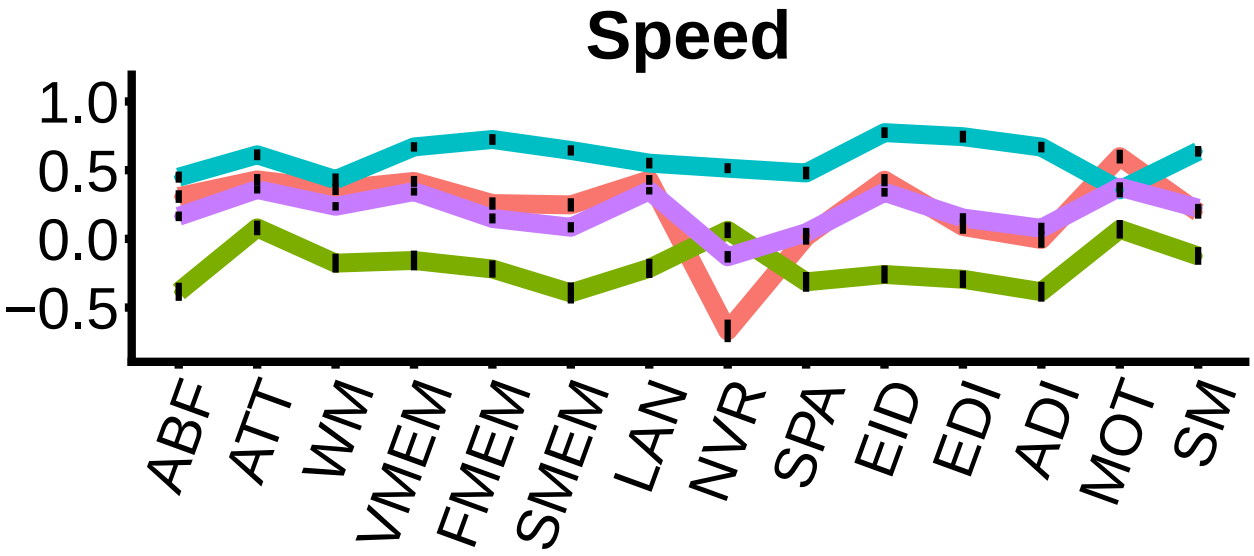

medu by Cluster
medu in Years
15
10
5
0
TD
Subtype 1
Subtype 2
Subtype 3
Clusters
TD
Subtype 1
Subtype 2
Subtype 3


CNB Summary Factor Scores
Mean Z−score
1.0
0.5
0.0
−0.5
Accuracy
Speed
Efficiency
Subtype 1
Subtype 2
Subtype 3
TD


CNB Measures
Mean Z−score
1.0
0.5
0.0
−0.5
−1.0
cluster
Subtype 1
Subtype 2
Subtype 3
TD

```
## NULL
```


Accuracy
Subtype 1
Subtype 2
Subtype 3
TD
1.0
0.5
0.0
−0.5
ABF
ATT
WM
VMEM
FMEM
SMEM
LAN
NVR
SPA
EID
EDI
ADI




```
## [1] "LM Agesq- Mean centered age that was then squared"
```

```
##    cnb_measure p_FDR_corr
## 1        abf_z          0
## 2        att_z      0.001
## 3         wm_z          0
## 4       vmem_z          0
## 5       fmem_z          0
## 6       smem_z          0
## 7        lan_z          0
## 8        nvr_z          0
## 9        spa_z          0
## 10       eid_z      0.033
## 11       edi_z          0
## 12       adi_z          0
## 13     abf_s_z          0
## 14     att_s_z          0
## 15      wm_s_z          0
## 16    vmem_s_z          0
## 17    fmem_s_z          0
## 18    smem_s_z          0
## 19     lan_s_z          0
## 20     nvr_s_z          0
## 21     spa_s_z          0
## 22     eid_s_z          0
## 23     edi_s_z          0
## 24     adi_s_z          0
## 25     mot_s_z          0
## 26      sm_s_z          0
```

```
## [1] "LM Agesq pairwise contrasts for FDR corrected values, CNB scores"
```

```
##          -1 - 1 -1 - 2 -1 - 3 1 - 2 1 - 3 2 - 3
## abf_z     0.002  0.000  0.015 0.000 0.000 0.020
## att_z     0.863  0.001  0.995 0.001 0.847 0.032
## wm_z      0.862  0.000  0.002 0.000 0.001 0.057
```

```
## vmem_z    0.000  0.722  0.000 0.000 0.000 0.013
## fmem_z    0.054  0.000  0.999 0.000 0.250 0.000
## smem_z    0.000  0.000  0.240 0.000 0.000 0.001
## lan_z     0.000  0.000  0.000 0.000 0.000 0.000
## nvr_z     0.000  0.000  0.000 0.000 0.000 0.554
## spa_z     0.000  0.000  0.000 0.000 0.000 0.727
## eid_z     0.627  0.122  0.837 0.025 0.353 0.716
## edi_z     0.000  0.000  0.000 0.000 0.000 0.919
## adi_z     0.000  0.279  0.000 0.000 0.000 0.000
## abf_s_z   0.101  0.000  0.000 0.000 0.296 0.000
## att_s_z   0.554  0.000  0.000 0.000 0.038 0.000
## wm_s_z    0.159  0.000  0.014 0.000 0.787 0.000
## vmem_s_z  0.554  0.000  0.000 0.000 0.003 0.000
## fmem_s_z  0.318  0.000  0.000 0.000 0.000 0.000
## smem_s_z  0.077  0.000  0.000 0.000 0.000 0.000
## lan_s_z   0.456  0.000  0.003 0.000 0.285 0.000
## nvr_s_z   0.000  0.071  0.000 0.000 0.000 0.000
## spa_s_z   0.971  0.000  0.000 0.001 0.000 0.000
## eid_s_z   0.440  0.000  0.000 0.000 0.000 0.000
## edi_s_z   0.762  0.000  0.000 0.000 0.000 0.000
## adi_s_z   0.672  0.000  0.000 0.000 0.000 0.000
## mot_s_z   0.003  0.000  0.991 0.000 0.015 0.003
## sm_s_z    0.954  0.000  0.000 0.000 0.000 0.000

## [1] "LM Agesq pairwise contrasts with FDR corrected values, CNB scores"

##          -1 - 1 -1 - 2 -1 - 3 1 - 2 1 - 3 2 - 3 p_FDR_corr
## abf_z     0.002  0.000  0.015 0.000 0.000 0.020          0
## att_z     0.863  0.001  0.995 0.001 0.847 0.032      0.001
## wm_z      0.862  0.000  0.002 0.000 0.001 0.057          0
## vmem_z    0.000  0.722  0.000 0.000 0.000 0.013          0
## fmem_z    0.054  0.000  0.999 0.000 0.250 0.000          0
## smem_z    0.000  0.000  0.240 0.000 0.000 0.001          0
## lan_z     0.000  0.000  0.000 0.000 0.000 0.000          0
## nvr_z     0.000  0.000  0.000 0.000 0.000 0.554          0
## spa_z     0.000  0.000  0.000 0.000 0.000 0.727          0
## eid_z     0.627  0.122  0.837 0.025 0.353 0.716      0.033
## edi_z     0.000  0.000  0.000 0.000 0.000 0.919          0
## adi_z     0.000  0.279  0.000 0.000 0.000 0.000          0
## abf_s_z   0.101  0.000  0.000 0.000 0.296 0.000          0
## att_s_z   0.554  0.000  0.000 0.000 0.038 0.000          0
## wm_s_z    0.159  0.000  0.014 0.000 0.787 0.000          0
## vmem_s_z  0.554  0.000  0.000 0.000 0.003 0.000          0
## fmem_s_z  0.318  0.000  0.000 0.000 0.000 0.000          0
## smem_s_z  0.077  0.000  0.000 0.000 0.000 0.000          0
## lan_s_z   0.456  0.000  0.003 0.000 0.285 0.000          0
## nvr_s_z   0.000  0.071  0.000 0.000 0.000 0.000          0
## spa_s_z   0.971  0.000  0.000 0.001 0.000 0.000          0
## eid_s_z   0.440  0.000  0.000 0.000 0.000 0.000          0
## edi_s_z   0.762  0.000  0.000 0.000 0.000 0.000          0
## adi_s_z   0.672  0.000  0.000 0.000 0.000 0.000          0
## mot_s_z   0.003  0.000  0.991 0.000 0.015 0.003          0
## sm_s_z    0.954  0.000  0.000 0.000 0.000 0.000          0

##  contrast   estimate         SE   df t.ratio p.value
```

```
##  -1 - 1   -0.2264986 0.06407130 1420  -3.535  0.0024
##  -1 - 2    0.4523014 0.06668061 1420   6.783  <.0001
##  -1 - 3    0.2089367 0.06969478 1420   2.998  0.0147
##  1 - 2     0.6788000 0.07956523 1420   8.531  <.0001
##  1 - 3     0.4354353 0.08210776 1420   5.303  <.0001
##  2 - 3    -0.2433648 0.08415971 1420  -2.892  0.0203
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.04312068 0.05521656 1420  -0.781  0.8631
##  -1 - 2    0.21305590 0.05746525 1420   3.708  0.0012
##  -1 - 3    0.01466661 0.06006286 1420   0.244  0.9949
##  1 - 2     0.25617658 0.06856920 1420   3.736  0.0011
##  1 - 3     0.05778729 0.07076035 1420   0.817  0.8466
##  2 - 3    -0.19838929 0.07252871 1420  -2.735  0.0320
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.0404608 0.05162219 1420  -0.784  0.8618
##  -1 - 2    0.3728930 0.05372451 1420   6.941  <.0001
##  -1 - 3    0.2017588 0.05615302 1420   3.593  0.0019
##  1 - 2     0.4133538 0.06410564 1420   6.448  <.0001
##  1 - 3     0.2422196 0.06615415 1420   3.661  0.0015
##  2 - 3    -0.1711343 0.06780740 1420  -2.524  0.0567
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.26502990 0.06131852 1420  -4.322  0.0001
##  -1 - 2    0.06679999 0.06381572 1420   1.047  0.7219
##  -1 - 3    0.31049760 0.06670039 1420   4.655  <.0001
##  1 - 2     0.33182989 0.07614677 1420   4.358  0.0001
##  1 - 3     0.57552750 0.07858006 1420   7.324  <.0001
##  2 - 3     0.24369760 0.08054384 1420   3.026  0.0135
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.16837995 0.06629148 1420  -2.540  0.0544
##  -1 - 2    0.41554090 0.06899120 1420   6.023  <.0001
##  -1 - 3   -0.01116918 0.07210982 1420  -0.155  0.9987
##  1 - 2     0.58392085 0.08232230 1420   7.093  <.0001
##  1 - 3     0.15721077 0.08495294 1420   1.851  0.2502
##  2 - 3    -0.42671008 0.08707598 1420  -4.900  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.3607104 0.06736337 1420  -5.355  <.0001
##  -1 - 2    0.4714814 0.07010674 1420   6.725  <.0001
##  -1 - 3    0.1373127 0.07327578 1420   1.874  0.2398
##  1 - 2     0.8321918 0.08365340 1420   9.948  <.0001
##  1 - 3     0.4980231 0.08632657 1420   5.769  <.0001
##  2 - 3    -0.3341687 0.08848394 1420  -3.777  0.0010
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
```

```
##  -1 - 1   -0.2414072 0.05407307 1420  -4.464  0.0001
##  -1 - 2    0.5901804 0.05627519 1420  10.487  <.0001
##  -1 - 3    0.2561681 0.05881901 1420   4.355  0.0001
##  1 - 2     0.8315876 0.06714919 1420  12.384  <.0001
##  1 - 3     0.4975753 0.06929497 1420   7.181  <.0001
##  2 - 3    -0.3340123 0.07102671 1420  -4.703  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.6404344 0.06239211 1420 -10.265  <.0001
##  -1 - 2    0.6724267 0.06493303 1420  10.356  <.0001
##  -1 - 3    0.5647885 0.06786821 1420   8.322  <.0001
##  1 - 2     1.3128611 0.07747998 1420  16.945  <.0001
##  1 - 3     1.2052228 0.07995587 1420  15.074  <.0001
##  2 - 3    -0.1076383 0.08195404 1420  -1.313  0.5545
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.3822279 0.06315518 1420  -6.052  <.0001
##  -1 - 2    0.4957128 0.06572717 1420   7.542  <.0001
##  -1 - 3    0.4095527 0.06869824 1420   5.962  <.0001
##  1 - 2     0.8779407 0.07842756 1420  11.194  <.0001
##  1 - 3     0.7917806 0.08093374 1420   9.783  <.0001
##  2 - 3    -0.0861601 0.08295634 1420  -1.039  0.7267
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.06914252 0.05765594 1420  -1.199  0.6274
##  -1 - 2    0.13245521 0.06000398 1420   2.207  0.1217
##  -1 - 3    0.05249643 0.06271634 1420   0.837  0.8368
##  1 - 2     0.20159773 0.07159849 1420   2.816  0.0254
##  1 - 3     0.12163895 0.07388644 1420   1.646  0.3530
##  2 - 3    -0.07995878 0.07573292 1420  -1.056  0.7165
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.40062763 0.05701688 1420  -7.026  <.0001
##  -1 - 2    0.31591078 0.05933890 1420   5.324  <.0001
##  -1 - 3    0.26791531 0.06202120 1420   4.320  0.0001
##  1 - 2     0.71653841 0.07080489 1420  10.120  <.0001
##  1 - 3     0.66854293 0.07306748 1420   9.150  <.0001
##  2 - 3    -0.04799548 0.07489350 1420  -0.641  0.9187
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.4184966 0.05890991 1420  -7.104  <.0001
##  -1 - 2   -0.1096468 0.06130902 1420  -1.788  0.2793
##  -1 - 3    0.3188571 0.06408037 1420   4.976  <.0001
##  1 - 2     0.3088497 0.07315569 1420   4.222  0.0002
##  1 - 3     0.7373537 0.07549341 1420   9.767  <.0001
##  2 - 3     0.4285039 0.07738005 1420   5.538  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
```

```
##  -1 - 1   -0.1438771 0.06283771 1420  -2.290  0.1009
##  -1 - 2    0.5493754 0.06539678 1420   8.401  <.0001
##  -1 - 3   -0.2852104 0.06835291 1420  -4.173  0.0002
##  1 - 2     0.6932524 0.07803333 1420   8.884  <.0001
##  1 - 3    -0.1413334 0.08052691 1420  -1.755  0.2957
##  2 - 3    -0.8345858 0.08253935 1420 -10.111  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.07003723 0.05329324 1420  -1.314  0.5540
##  -1 - 2    0.27951462 0.05546361 1420   5.040  <.0001
##  -1 - 3   -0.25266145 0.05797073 1420  -4.358  0.0001
##  1 - 2     0.34955186 0.06618078 1420   5.282  <.0001
##  1 - 3    -0.18262422 0.06829561 1420  -2.674  0.0380
##  2 - 3    -0.53217607 0.07000238 1420  -7.602  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.12340003 0.05922036 1420  -2.084  0.1589
##  -1 - 2    0.41363589 0.06163211 1420   6.711  <.0001
##  -1 - 3   -0.19420788 0.06441807 1420  -3.015  0.0139
##  1 - 2     0.53703592 0.07354122 1420   7.303  <.0001
##  1 - 3    -0.07080785 0.07589125 1420  -0.933  0.7871
##  2 - 3    -0.60784377 0.07778784 1420  -7.814  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.07404698 0.05632668 1420  -1.315  0.5537
##  -1 - 2    0.50137204 0.05862058 1420   8.553  <.0001
##  -1 - 3   -0.32524194 0.06127042 1420  -5.308  <.0001
##  1 - 2     0.57541902 0.06994778 1420   8.226  <.0001
##  1 - 3    -0.25119496 0.07218298 1420  -3.480  0.0029
##  2 - 3    -0.82661397 0.07398690 1420 -11.172  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.1084012 0.06332059 1420  -1.712  0.3177
##  -1 - 2    0.3678585 0.06589932 1420   5.582  <.0001
##  -1 - 3   -0.5748044 0.06887817 1420  -8.345  <.0001
##  1 - 2     0.4762598 0.07863298 1420   6.057  <.0001
##  1 - 3    -0.4664032 0.08114572 1420  -5.748  <.0001
##  2 - 3    -0.9426630 0.08317362 1420 -11.334  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.1630010 0.06790699 1420  -2.400  0.0774
##  -1 - 2    0.4779579 0.07067251 1420   6.763  <.0001
##  -1 - 3   -0.5593285 0.07386712 1420  -7.572  <.0001
##  1 - 2     0.6409589 0.08432848 1420   7.601  <.0001
##  1 - 3    -0.3963275 0.08702322 1420  -4.554  <.0001
##  2 - 3    -1.0372864 0.08919801 1420 -11.629  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
```

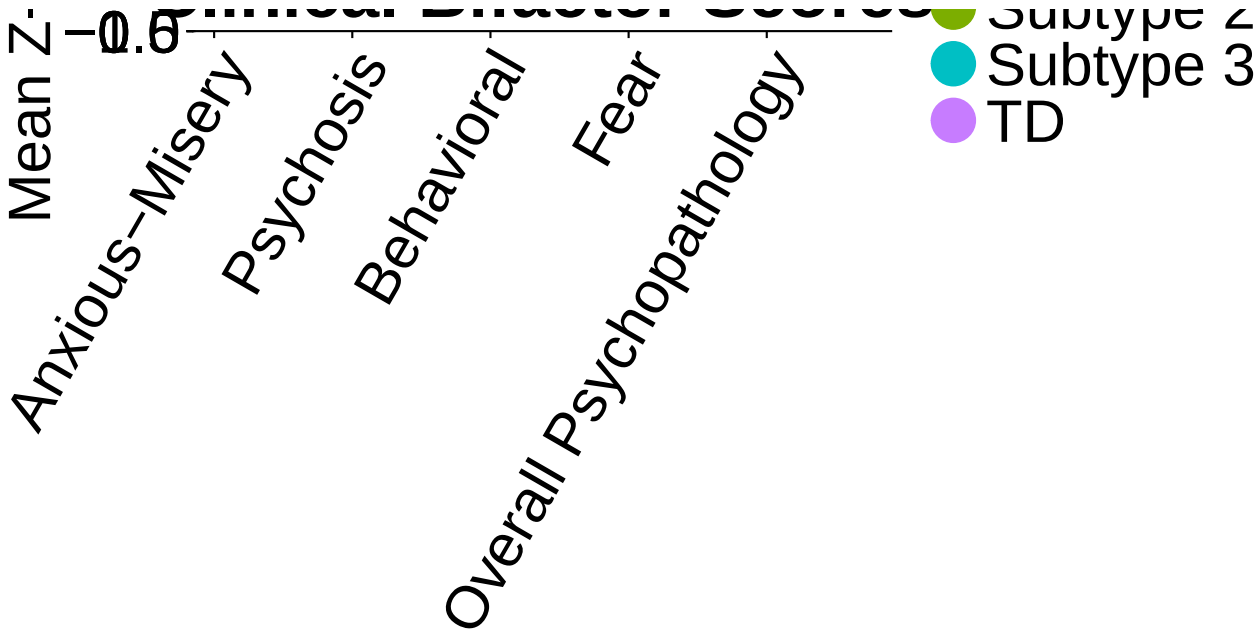
```
##  -1 - 1   -0.07902212 0.05373803 1420  -1.471  0.4557
##  -1 - 2    0.56466061 0.05592651 1420  10.096  <.0001
##  -1 - 3   -0.20133677 0.05845457 1420  -3.444  0.0033
##  1 - 2     0.64368273 0.06673314 1420   9.646  <.0001
##  1 - 3    -0.12231465 0.06886561 1420  -1.776  0.2853
##  2 - 3    -0.76599738 0.07058663 1420 -10.852  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1    0.5393300 0.07638485 1420   7.061  <.0001
##  -1 - 2   -0.1934495 0.07949563 1420  -2.433  0.0714
##  -1 - 3   -0.6450656 0.08308908 1420  -7.764  <.0001
##  1 - 2    -0.7327795 0.09485648 1420  -7.725  <.0001
##  1 - 3    -1.1843956 0.09788765 1420 -12.100  <.0001
##  2 - 3    -0.4516161 0.10033395 1420  -4.501  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1    0.02963254 0.06727858 1420   0.440  0.9714
##  -1 - 2    0.35758553 0.07001850 1420   5.107  <.0001
##  -1 - 3   -0.43475550 0.07318356 1420  -5.941  <.0001
##  1 - 2     0.32795299 0.08354811 1420   3.925  0.0005
##  1 - 3    -0.46438803 0.08621791 1420  -5.386  <.0001
##  2 - 3    -0.79234102 0.08837257 1420  -8.966  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.08812999 0.05893232 1420  -1.495  0.4405
##  -1 - 2    0.59826312 0.06133234 1420   9.754  <.0001
##  -1 - 3   -0.43402642 0.06410475 1420  -6.771  <.0001
##  1 - 2     0.68639311 0.07318353 1420   9.379  <.0001
##  1 - 3    -0.34589643 0.07552213 1420  -4.580  <.0001
##  2 - 3    -1.03228954 0.07740949 1420 -13.335  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1    0.06217608 0.06356753 1420   0.978  0.7620
##  -1 - 2    0.44591292 0.06615632 1420   6.740  <.0001
##  -1 - 3   -0.59186922 0.06914679 1420  -8.560  <.0001
##  1 - 2     0.38373684 0.07893964 1420   4.861  <.0001
##  1 - 3    -0.65404530 0.08146218 1420  -8.029  <.0001
##  2 - 3    -1.03778214 0.08349799 1420 -12.429  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1    0.08167459 0.07233600 1420   1.129  0.6716
##  -1 - 2    0.46187266 0.07528188 1420   6.135  <.0001
##  -1 - 3   -0.59117438 0.07868485 1420  -7.513  <.0001
##  1 - 2     0.38019807 0.08982852 1420   4.232  0.0001
##  1 - 3    -0.67284897 0.09269902 1420  -7.258  <.0001
##  2 - 3    -1.05304704 0.09501564 1420 -11.083  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
```

```
##  -1 - 1   -0.22218338 0.06337607 1420  -3.506  0.0026
##  -1 - 2    0.30663331 0.06595706 1420   4.649  <.0001
##  -1 - 3    0.02005391 0.06893852 1420   0.291  0.9914
##  1 - 2     0.52881669 0.07870187 1420   6.719  <.0001
##  1 - 3     0.24223729 0.08121682 1420   2.983  0.0154
##  2 - 3    -0.28657940 0.08324649 1420  -3.443  0.0033
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1    0.03048762 0.05850695 1420   0.521  0.9540
##  -1 - 2    0.34791107 0.06088965 1420   5.714  <.0001
##  -1 - 3   -0.41389316 0.06364205 1420  -6.503  <.0001
##  1 - 2     0.31742345 0.07265529 1420   4.369  0.0001
##  1 - 3    -0.44438078 0.07497701 1420  -5.927  <.0001
##  2 - 3    -0.76180423 0.07685075 1420  -9.913  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
```

```
##          abf_z     att_z     wm_z      vmem_z    fmem_z    smem_z
## contrast factor,6  factor,6  factor,6  factor,6  factor,6  factor,6
## estimate Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## SE       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## df       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## t.ratio  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## p.value  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
##          lan_z     nvr_z     spa_z     eid_z     edi_z     adi_z
## contrast factor,6  factor,6  factor,6  factor,6  factor,6  factor,6
## estimate Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## SE       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## df       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## t.ratio  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## p.value  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
##          abf_s_z   att_s_z   wm_s_z    vmem_s_z  fmem_s_z  smem_s_z
## contrast factor,6  factor,6  factor,6  factor,6  factor,6  factor,6
## estimate Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## SE       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## df       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## t.ratio  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## p.value  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
##          lan_s_z   nvr_s_z   spa_s_z   eid_s_z   edi_s_z   adi_s_z
## contrast factor,6  factor,6  factor,6  factor,6  factor,6  factor,6
## estimate Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## SE       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## df       Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## t.ratio  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
## p.value  Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6 Numeric,6
##          mot_s_z   sm_s_z
## contrast factor,6  factor,6
## estimate Numeric,6 Numeric,6
## SE       Numeric,6 Numeric,6
## df       Numeric,6 Numeric,6
## t.ratio  Numeric,6 Numeric,6
## p.value  Numeric,6 Numeric,6
```

```
##                         Stratified by Cluster
```

```
##                            level         -1             1
##   n                                        711            264
##   Race (%)                 Caucasian       456 ( 64.1)    180 ( 68.2)
##                            Non-caucasian   255 ( 35.9)     84 ( 31.8)
##   Sex (%)                  Female          477 ( 67.1)    166 ( 62.9)
##                            Male            234 ( 32.9)     98 ( 37.1)
##   Maternal Ed (mean (sd))                 14.93 (2.52)   14.54 (2.27)
##   Age (mean (sd))                         16.14 (2.91)   16.25 (2.63)
##   Depression (%)           Depressed         0 (  0.0)    264 (100.0)
##                            Non-depressed   711 (100.0)      0 (  0.0)
##   Cluster (%)              -1              711 (100.0)      0 (  0.0)
##                            1                 0 (  0.0)    264 (100.0)
##                            2                 0 (  0.0)      0 (  0.0)
##                            3                 0 (  0.0)      0 (  0.0)
##                           Stratified by Cluster
##                            2              3              p      test
##   n                          237            211
##   Race (%)                    83 ( 35.0)    130 ( 61.6)  <0.001
##                              154 ( 65.0)     81 ( 38.4)
##   Sex (%)                    157 ( 66.2)    154 ( 73.0)   0.138
##                               80 ( 33.8)     57 ( 27.0)
##   Maternal Ed (mean (sd)) 13.48 (2.17)   14.31 (2.29)   <0.001
##   Age (mean (sd))         16.15 (3.33)   15.97 (2.69)    0.775
##   Depression (%)             237 (100.0)    211 (100.0)  <0.001
##                                0 (  0.0)      0 (  0.0)
##   Cluster (%)                  0 (  0.0)      0 (  0.0)  <0.001
##                                0 (  0.0)      0 (  0.0)
##                              237 (100.0)      0 (  0.0)
##                                0 (  0.0)    211 (100.0)
```




```
## [1] "LM Agesq- Mean centered age that was then squared"
```

```
##                  clinical_measure p_FDR_corr
## 1          AnxiousMisery_Bifactor          0
## 2          Externalizing_Bifactor          0
```

```
## 3                    Fear_Bifactor          0
## 4 Overall_Psychopathology_Bifactor          0
```

```
## [1] "LM Agesq pairwise contrasts with FDR corrected values, Bifactor scores"
```

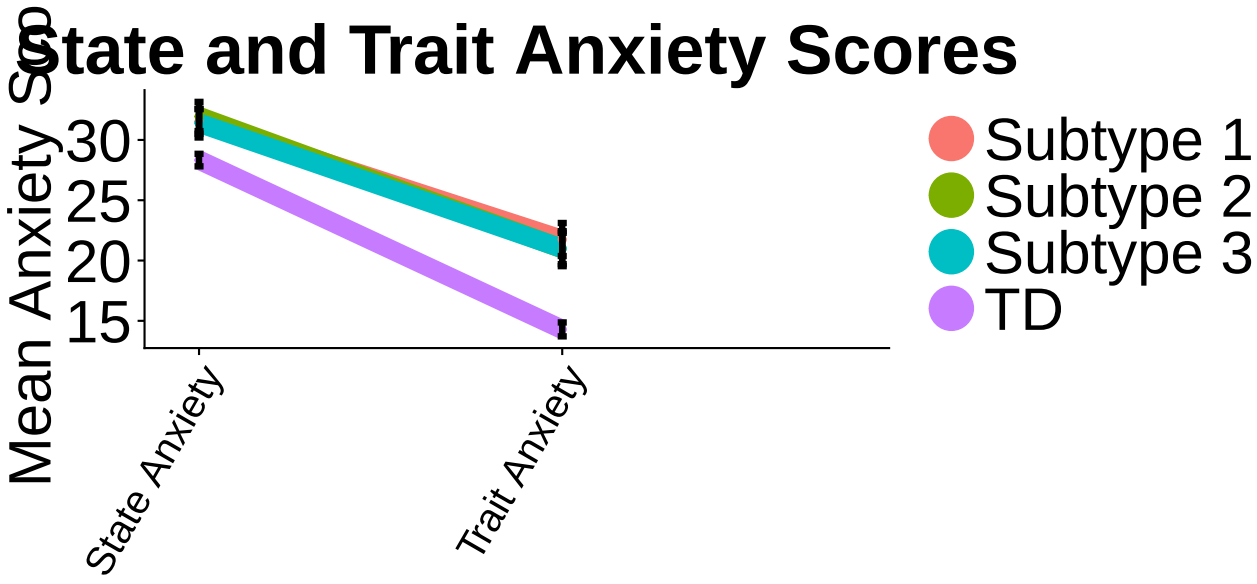
```
##                                  -1 - 1 -1 - 2 -1 - 3 1 - 2 1 - 3 2 - 3
## AnxiousMisery_Bifactor            0.000      0  0.000 0.030 0.375 0.724
## Externalizing_Bifactor            0.000      0  0.000 0.701 0.776 0.207
## Fear_Bifactor                     0.017      0  0.041 0.000 1.000 0.000
## Overall_Psychopathology_Bifactor  0.000      0  0.000 0.313 0.957 0.671
##                                  p_FDR_corr
## AnxiousMisery_Bifactor                    0
## Externalizing_Bifactor                    0
## Fear_Bifactor                             0
## Overall_Psychopathology_Bifactor          0
```

```
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.42010128 0.03330872 1419 -12.612  <.0001
##  -1 - 2   -0.30595077 0.03466471 1419  -8.826  <.0001
##  -1 - 3   -0.35156073 0.03623112 1419  -9.703  <.0001
##  1 - 2     0.11415051 0.04135567 1419   2.760  0.0298
##  1 - 3     0.06854055 0.04267721 1419   1.606  0.3755
##  2 - 3    -0.04560995 0.04374375 1419  -1.043  0.7243
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate         SE   df t.ratio p.value
##  -1 - 1   -0.6948367 0.09562916 1419  -7.266  <.0001
##  -1 - 2   -0.8233024 0.09952220 1419  -8.273  <.0001
##  -1 - 3   -0.5780063 0.10401937 1419  -5.557  <.0001
##  1 - 2    -0.1284657 0.11873193 1419  -1.082  0.7006
##  1 - 3     0.1168304 0.12252604 1419   0.954  0.7758
##  2 - 3     0.2452961 0.12558807 1419   1.953  0.2065
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast     estimate         SE   df t.ratio p.value
##  -1 - 1   -0.146798987 0.04983303 1419  -2.946  0.0172
##  -1 - 2   -0.436601969 0.05186172 1419  -8.419  <.0001
##  -1 - 3   -0.143207844 0.05420523 1419  -2.642  0.0415
##  1 - 2    -0.289802982 0.06187204 1419  -4.684  <.0001
##  1 - 3     0.003591142 0.06384918 1419   0.056  0.9999
##  2 - 3     0.293394125 0.06544483 1419   4.483  <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate         SE   df t.ratio p.value
##  -1 - 1   -0.89683717 0.03941806 1419 -22.752  <.0001
##  -1 - 2   -0.98105063 0.04102276 1419 -23.915  <.0001
##  -1 - 3   -0.92251267 0.04287648 1419 -21.516  <.0001
##  1 - 2    -0.08421346 0.04894095 1419  -1.721  0.3132
##  1 - 3    -0.02567550 0.05050487 1419  -0.508  0.9571
##  2 - 3     0.05853796 0.05176703 1419   1.131  0.6705
##
## P value adjustment: tukey method for comparing a family of 4 estimates
```

```
##          AnxiousMisery_Bifactor Externalizing_Bifactor Fear_Bifactor
## contrast factor,6               factor,6               factor,6
## estimate Numeric,6              Numeric,6              Numeric,6
```

```
## SE       Numeric,6              Numeric,6              Numeric,6
## df       Numeric,6              Numeric,6              Numeric,6
## t.ratio  Numeric,6              Numeric,6              Numeric,6
## p.value  Numeric,6              Numeric,6              Numeric,6
##          Overall_Psychopathology_Bifactor
## contrast factor,6
## estimate Numeric,6
## SE       Numeric,6
## df       Numeric,6
## t.ratio  Numeric,6
## p.value  Numeric,6
```

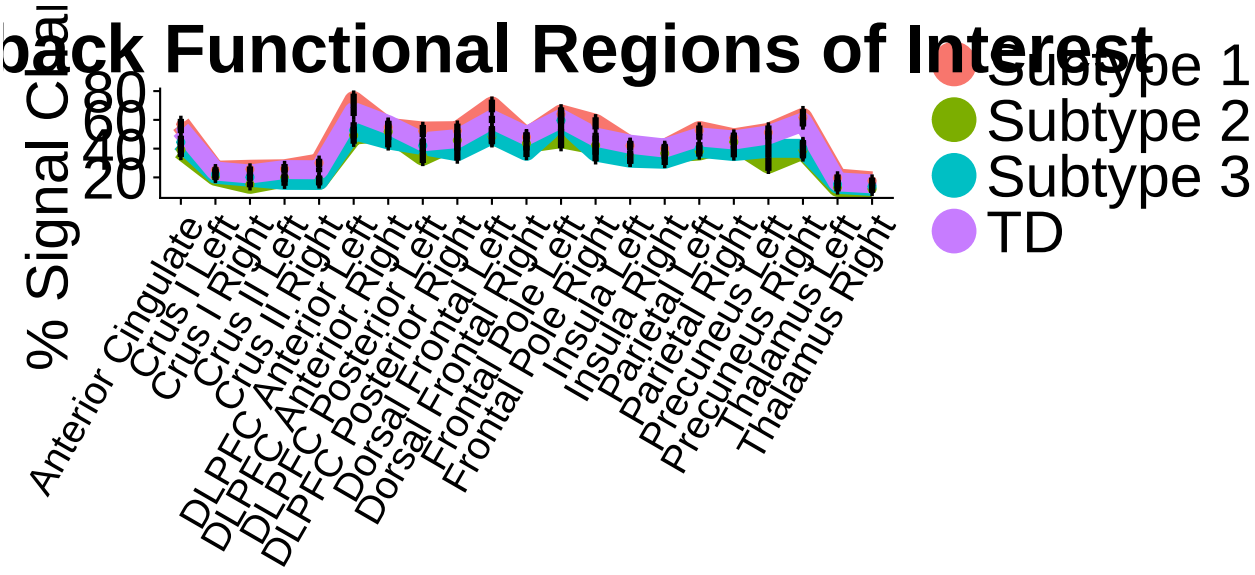
```
##                          Stratified by Cluster
##                           level         -1              1
##   n                                        215             66
##   Race (%)                Caucasian       123 ( 57.2)     43 ( 65.2)
##                           Non-caucasian    92 ( 42.8)     23 ( 34.8)
##   Sex (%)                 Female          127 ( 59.1)     38 ( 57.6)
##                           Male             88 ( 40.9)     28 ( 42.4)
##   Maternal Ed (mean (sd))               14.80 (2.63)   14.65 (2.53)
##   Age (mean (sd))                       16.52 (2.82)   16.72 (2.20)
##   Depression (%)          Depressed         0 (  0.0)     66 (100.0)
##                           Non-depressed   215 (100.0)      0 (  0.0)
##   Cluster (%)             -1              215 (100.0)      0 (  0.0)
##                           1                 0 (  0.0)     66 (100.0)
##                           2                 0 (  0.0)      0 (  0.0)
##                           3                 0 (  0.0)      0 (  0.0)
##                          Stratified by Cluster
##                           2              3              p      test
##   n                          55             48
##   Race (%)                   11 ( 20.0)     22 ( 45.8)  <0.001
##                              44 ( 80.0)     26 ( 54.2)
##   Sex (%)                    35 ( 63.6)     34 ( 70.8)   0.428
##                              20 ( 36.4)     14 ( 29.2)
##   Maternal Ed (mean (sd)) 13.22 (2.17)   13.40 (2.02)   <0.001
##   Age (mean (sd))         17.26 (2.34)   16.68 (2.00)    0.309
##   Depression (%)             55 (100.0)     48 (100.0)  <0.001
##                               0 (  0.0)      0 (  0.0)
##   Cluster (%)                 0 (  0.0)      0 (  0.0)  <0.001
##                               0 (  0.0)      0 (  0.0)
##                              55 (100.0)      0 (  0.0)
##                               0 (  0.0)     48 (100.0)
```




```
## [1] "LM Clinical"

##   clinical_measure p_FDR_corr
## 1     staiPreState      0.001
## 2     staiPreTrait          0

## [1] "Pairwise contrasts with FDR corrected values, Bifactor scores"

##              -1 - 1 -1 - 2 -1 - 3 1 - 2 1 - 3 2 - 3 p_FDR_corr
## staiPreState  0.025  0.016  0.079 0.992 1.000 0.986      0.001
## staiPreTrait  0.000  0.000  0.000 0.971 0.975 1.000          0

##  contrast   estimate       SE  df t.ratio p.value
##  -1 - 1   -3.2000705 1.127587 380  -2.838  0.0246
##  -1 - 2   -3.6152220 1.210792 380  -2.986  0.0159
##  -1 - 3   -3.0656008 1.279164 380  -2.397  0.0794
##  1 - 2    -0.4151515 1.462943 380  -0.284  0.9920
##  1 - 3     0.1344697 1.520015 380   0.088  0.9998
##  2 - 3     0.5496212 1.582722 380   0.347  0.9856
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate       SE  df t.ratio p.value
##  -1 - 1   -7.45405215 1.319571 380  -5.649  <.0001
##  -1 - 2   -6.69344609 1.416942 380  -4.724  <.0001
##  -1 - 3   -6.71162791 1.496955 380  -4.484  0.0001
##  1 - 2     0.76060606 1.712025 380   0.444  0.9707
##  1 - 3     0.74242424 1.778814 380   0.417  0.9755
##  2 - 3    -0.01818182 1.852197 380  -0.010  1.0000
##
## P value adjustment: tukey method for comparing a family of 4 estimates

##          staiPreState staiPreTrait
## contrast factor,6     factor,6
## estimate Numeric,6    Numeric,6
## SE       Numeric,6    Numeric,6
## df       Numeric,6    Numeric,6
```

```
## t.ratio  Numeric,6    Numeric,6
## p.value  Numeric,6    Numeric,6
```

```
##                            Stratified by Cluster
##                             level         -1             1
##   n                                          200            68
##   Race (%)                  Caucasian       122 ( 61.0)     45 ( 66.2)
##                             Non-caucasian    78 ( 39.0)     23 ( 33.8)
##   Sex (%)                   Female          118 ( 59.0)     40 ( 58.8)
##                             Male             82 ( 41.0)     28 ( 41.2)
##   Maternal Ed (mean (sd))                 14.93 (2.58)   14.69 (2.50)
##   Age (mean (sd))                         16.49 (2.84)   16.84 (2.20)
##   Depression (%)            Depressed         0 (  0.0)     68 (100.0)
##                             Non-depressed   200 (100.0)      0 (  0.0)
##   Cluster (%)               -1              200 (100.0)      0 (  0.0)
##                             1                 0 (  0.0)     68 (100.0)
##                             2                 0 (  0.0)      0 (  0.0)
##                             3                 0 (  0.0)      0 (  0.0)
##                            Stratified by Cluster
##                             2              3              p      test
##   n                            53             47
##   Race (%)                     12 ( 22.6)     21 ( 44.7)  <0.001
##                                41 ( 77.4)     26 ( 55.3)
##   Sex (%)                      34 ( 64.2)     34 ( 72.3)   0.359
##                                19 ( 35.8)     13 ( 27.7)
##   Maternal Ed (mean (sd)) 13.32 (2.09)   13.68 (2.19)   <0.001
##   Age (mean (sd))          16.91 (2.45)   16.86 (1.91)    0.574
##   Depression (%)               53 (100.0)     47 (100.0)  <0.001
##                                 0 (  0.0)      0 (  0.0)
##   Cluster (%)                   0 (  0.0)      0 (  0.0)  <0.001
##                                 0 (  0.0)      0 (  0.0)
##                                53 (100.0)      0 (  0.0)
##                                 0 (  0.0)     47 (100.0)
```




```
## [1] "LM N-back uncorrected"
```

```
##                               p_anova
## nback_func_sc_crusI_r      0.020566198
## nback_func_sc_crusI_l      0.592177123
## nback_func_sc_crusII_r     0.010177645
## nback_func_sc_crusII_l     0.138542621
## nback_func_sc_insula_r     0.372442679
## nback_func_sc_insula_l     0.084128490
## nback_func_sc_dlpfc_ant_l  0.006097825
## nback_func_sc_dlpfc_ant_r  0.366464241
## nback_func_sc_dlpfc_post_l 0.045265130
## nback_func_sc_dlpfc_post_r 0.416186069
## nback_func_sc_dacc         0.014181529
## nback_func_sc_mfg_l        0.008944937
## nback_func_sc_mfg_r        0.129844195
## nback_func_sc_fp_r         0.076570570
## nback_func_sc_fp_l         0.308815633
## nback_func_sc_thal_r       0.462755211
## nback_func_sc_thal_l       0.412949344
## nback_func_sc_parietal_l   0.021300605
## nback_func_sc_precun_l     0.008365549
## nback_func_sc_precun_r     0.003328413
## nback_func_sc_parietal_r   0.327245394
```

```
## [1] "LM anova scores task active areas, uncorrected"
```

```
##                            p_anova_task_active
## nback_func_sc_crusI_r                0.020566198
## nback_func_sc_crusI_l                0.592177123
## nback_func_sc_crusII_r               0.010177645
## nback_func_sc_crusII_l               0.138542621
## nback_func_sc_insula_r               0.372442679
## nback_func_sc_insula_l               0.084128490
## nback_func_sc_dlpfc_ant_l            0.006097825
## nback_func_sc_dlpfc_ant_r            0.366464241
## nback_func_sc_dlpfc_post_l           0.045265130
## nback_func_sc_dlpfc_post_r           0.416186069
## nback_func_sc_dacc                   0.014181529
## nback_func_sc_mfg_l                  0.008944937
## nback_func_sc_mfg_r                  0.129844195
## nback_func_sc_fp_r                   0.076570570
## nback_func_sc_fp_l                   0.308815633
## nback_func_sc_thal_r                 0.462755211
## nback_func_sc_thal_l                 0.412949344
## nback_func_sc_parietal_l             0.021300605
## nback_func_sc_precun_l               0.008365549
## nback_func_sc_precun_r               0.003328413
## nback_func_sc_parietal_r             0.327245394
```

```
## [1] "FDR corrected"
```

```
##                parcellation p_FDR_corr
## 1    nback_func_sc_crusII_r     0.0427
## 2 nback_func_sc_dlpfc_ant_l     0.0427
## 3        nback_func_sc_dacc     0.0496
## 4       nback_func_sc_mfg_l     0.0427
## 5    nback_func_sc_precun_l     0.0427
```

```
## 6    nback_func_sc_precun_r     0.0427
```

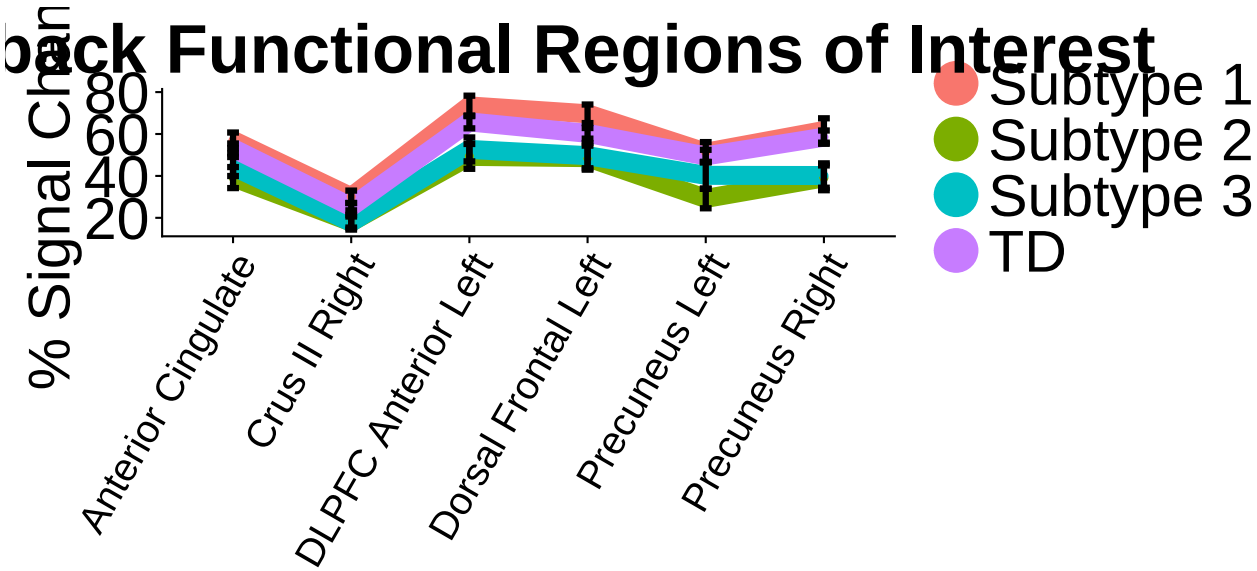
```
##                parcellation p_FDR_corr
## 1    nback_func_sc_crusII_r     0.0427
## 2 nback_func_sc_dlpfc_ant_l     0.0427
## 3        nback_func_sc_dacc     0.0496
## 4       nback_func_sc_mfg_l     0.0427
## 5    nback_func_sc_precun_l     0.0427
## 6    nback_func_sc_precun_r     0.0427
```

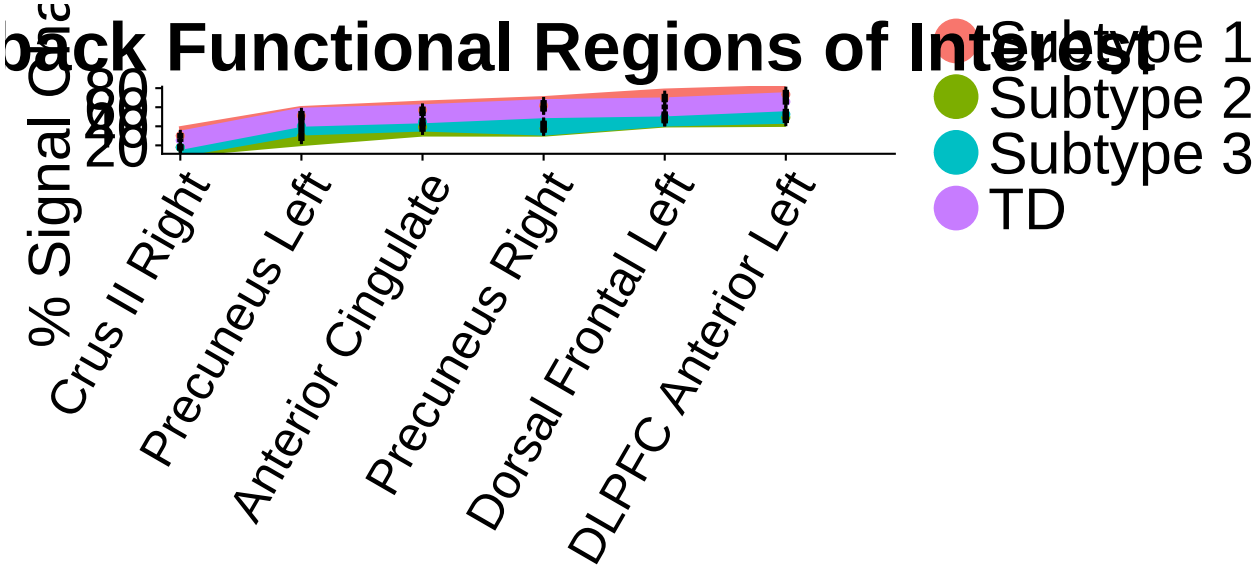
```
## [1] "LM pairwise contrasts and FDR corrrected values Jneurosci parcellations"
```

```
##                           -1 - 1 -1 - 2 -1 - 3 1 - 2 1 - 3 2 - 3
## nback_func_sc_crusII_r     0.490  0.195  0.215 0.031 0.036 1.000
## nback_func_sc_dlpfc_ant_l  0.633  0.070  0.213 0.017 0.056 0.989
## nback_func_sc_dacc         0.892  0.044  0.359 0.031 0.219 0.895
## nback_func_sc_mfg_l        0.346  0.225  0.281 0.022 0.031 1.000
## nback_func_sc_precun_l     0.998  0.009  0.472 0.028 0.523 0.581
## nback_func_sc_precun_r     0.978  0.032  0.051 0.045 0.062 1.000
##                           p_FDR_corr
## nback_func_sc_crusII_r        0.0427
## nback_func_sc_dlpfc_ant_l     0.0427
## nback_func_sc_dacc            0.0496
## nback_func_sc_mfg_l           0.0427
## nback_func_sc_precun_l        0.0427
## nback_func_sc_precun_r        0.0427
```

```
##  contrast   estimate       SE  df t.ratio p.value
##  -1 - 1   -4.7060176 3.321337 363  -1.417  0.4896
##  -1 - 2    7.2602715 3.654505 363   1.987  0.1949
##  -1 - 3    7.4221066 3.832165 363   1.937  0.2145
##  1 - 2    11.9662891 4.339656 363   2.757  0.0310
##  1 - 3    12.1281243 4.485887 363   2.704  0.0360
##  2 - 3     0.1618352 4.738866 363   0.034  1.0000
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast  estimate       SE  df t.ratio p.value
##  -1 - 1   -7.017476 5.895000 363  -1.190  0.6333
##  -1 - 2   15.867504 6.486336 363   2.446  0.0704
##  -1 - 3   13.199881 6.801663 363   1.941  0.2129
##  1 - 2    22.884980 7.702402 363   2.971  0.0166
##  1 - 3    20.217356 7.961946 363   2.539  0.0557
##  2 - 3    -2.667623 8.410955 363  -0.317  0.9889
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast  estimate       SE  df t.ratio p.value
##  -1 - 1   -3.288923 4.609558 363  -0.714  0.8917
##  -1 - 2   13.349527 5.071950 363   2.632  0.0437
##  -1 - 3    8.704182 5.318517 363   1.637  0.3594
##  1 - 2    16.638450 6.022844 363   2.763  0.0306
##  1 - 3    11.993106 6.225793 363   1.926  0.2188
##  2 - 3    -4.645345 6.576893 363  -0.706  0.8946
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate       SE  df t.ratio p.value
##  -1 - 1   -8.6463879 5.208043 363  -1.660  0.3464
```

```
##  -1 - 2   10.9549248 5.730469 363   1.912  0.2249
##  -1 - 3   10.7416769 6.009050 363   1.788  0.2810
##  1 - 2    19.6013127 6.804824 363   2.881  0.0218
##  1 - 3    19.3880648 7.034123 363   2.756  0.0311
##  2 - 3    -0.2132479 7.430808 363  -0.029  1.0000
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast    estimate       SE  df t.ratio p.value
##  -1 - 1    -0.9781342 5.615490 363  -0.174  0.9981
##  -1 - 2    19.5583353 6.178788 363   3.165  0.0091
##  -1 - 3     9.3671445 6.479163 363   1.446  0.4717
##  1 - 2     20.5364695 7.337193 363   2.799  0.0276
##  1 - 3     10.3452787 7.584431 363   1.364  0.5228
##  2 - 3    -10.1911908 8.012151 363  -1.272  0.5814
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##  contrast   estimate       SE  df t.ratio p.value
##  -1 - 1   -2.4913349 6.204687 363  -0.402  0.9781
##  -1 - 2   18.7619780 6.827088 363   2.748  0.0318
##  -1 - 3   18.4156023 7.158980 363   2.572  0.0511
##  1 - 2    21.2533129 8.107038 363   2.622  0.0449
##  1 - 3    20.9069372 8.380217 363   2.495  0.0624
##  2 - 3    -0.3463757 8.852814 363  -0.039  1.0000
##
## P value adjustment: tukey method for comparing a family of 4 estimates
##          nback_func_sc_crusII_r nback_func_sc_dlpfc_ant_l
## contrast factor,6               factor,6
## estimate Numeric,6              Numeric,6
## SE       Numeric,6              Numeric,6
## df       Numeric,6              Numeric,6
## t.ratio  Numeric,6              Numeric,6
## p.value  Numeric,6              Numeric,6
##          nback_func_sc_dacc nback_func_sc_mfg_l nback_func_sc_precun_l
## contrast factor,6           factor,6            factor,6
## estimate Numeric,6          Numeric,6           Numeric,6
## SE       Numeric,6          Numeric,6           Numeric,6
## df       Numeric,6          Numeric,6           Numeric,6
## t.ratio  Numeric,6          Numeric,6           Numeric,6
## p.value  Numeric,6          Numeric,6           Numeric,6
##          nback_func_sc_precun_r
## contrast factor,6
## estimate Numeric,6
## SE       Numeric,6
## df       Numeric,6
## t.ratio  Numeric,6
## p.value  Numeric,6
```


back Functional Regions of Interest
% Signal Chan
80
60
40
20
Anterior Cingulate
Crus II Right
DLPFC Anterior Left
Dorsal Frontal Left
Precuneus Left
Precuneus Right
Subtype 1
Subtype 2
Subtype 3
TD


back Functional Regions of Interest
% Signal Cha
Crus II Right
Precuneus Left
Anterior Cingulate
Precuneus Right
Dorsal Frontal Left
DLPFC Anterior Left
Subtype 1
Subtype 2
Subtype 3
TD