Big Five Employment Measures and ADHD

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## Read in and clean data

Re-read in the dataset, this time with numeric variables:

Participants were recruited from the Rice University undergraduate subject pool. We excluded 1 participant who did not respond to any of the ADHD screener items and 3 participants who preferred not to report their ADHD status. This resulted in a final sample of 291 participants. The sample was mostly comprised of women (64.9%) and was racially diverse (37% white; 7% black; 49% asian; 0% indian; 0% mideast; 16% latino\_hispanic; 2% nativeam; and 0% prefer\_not. Note that percentages sum to more than 100 because some participants selected more than one racial identity.). The average (SD) age was 18.96 (1.03).

## ADHD Data

To study the relationship between ADHD, the five major personality traits, and the six facets of conscientiousness, we first examined correlations between these variables and self-reported symptom severity on the screener questionnaire. Next, to examine group mean differences, we compared those who screened positive for ADHD on the symptom screener with those who did not. The majority of participants who disclosed that they had ADHD or were unsure indeed screened positive for ADHD. Surprisingly, over half of those who responded “No” screened positive for ADHD as well. This could be due to underdiagnosis in this population given that they must have maintained a high level of academic achievement to be admitted to the university. As such, a typical indicator of ADHD in children, poor scholastic achievement, was likely not present for many of the respondents.

Although we had originally planned to compare mean levels of each trait across those who self-identified as having versus not having ADHD using an independent samples *t*-test, doing so was not practically feasible as only 11 out of 291 (4%) participants self-identified as having ADHD. For the purposes of this analysis, we grouped those who reported “Yes” ( *N* = 11) and “Not sure” ( *N* = 60) into one group and those who reported “No” ( *N* = 220) into another group.

##   
## FALSE TRUE  
## No 102 118  
## Not sure 10 50  
## Yes 3 8

Now we’ll actually properly score the screener responses:

1. How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?
2. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?
3. How often do you have difficulty unwinding and relaxing when you have time to yourself?
4. When you’re in a conversation, how often do you find yourself finishing the sentences of the people you are talking to before they can finish them themselves?
5. How often do you put things off until the last minute?
6. How often do you depend on others to keep your life in order and attend to details?

There was a signficant difference in ADHD symptom severity by ADHD self-identification, [1] “*F*(2, 288) = 20.53, *p* < .001, partial $\\eta^2$ = 0.12” .

## # A tibble: 3 × 9  
## term group1 group2 null.value estimate conf.low conf.high p.adj  
## \* <chr> <chr> <chr> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 adhd\_yn No Not sure 0 3.10 1.90 4.29 0.0000000103  
## 2 adhd\_yn No Yes 0 2.77 0.235 5.31 0.0284   
## 3 adhd\_yn Not sure Yes 0 -0.324 -3.02 2.37 0.957   
## # ℹ 1 more variable: p.adj.signif <chr>

## # A tibble: 3 × 2  
## adhd\_yn `paste0(...)`  
## <chr> <chr>   
## 1 No 13.1 (3.6)   
## 2 Not sure 16.2 (2.9)   
## 3 Yes 15.9 (3.3)

## Big five traits

Alpha reliabilities for Big 5:

self-efficacy Cronbach’s = 0.90

orderliness Cronbach’s = 0.85

dutifulness Cronbach’s = 0.71

achievement-striving Cronbach’s = 0.80

self-discipline Cronbach’s = 0.77

cautiousness Cronbach’s = 0.91  
Conscientiousness Cronbach’s = 0.91  
Neuroticism Cronbach’s = 0.90  
Openness Cronbach’s = 0.82  
Extraversion Cronbach’s = 0.89  
Agreeableness Cronbach’s = 0.85

# Get correlations

Look at correlations between ADHD composite and traits and facets:

ADHD symptom severity was not significantly associated with Age, *r*(289) = .03, *p* = .63  
ADHD symptom severity was not significantly associated with Open, *r*(289) = .03, *p* = .56  
ADHD symptom severity was negatively associated with Extr, *r*(289) = -.13, *p* = .03  
ADHD symptom severity was not significantly associated with Agree, *r*(289) = -.08, *p* = .15  
ADHD symptom severity was positively associated with Neur, *r*(289) = .47, *p* < .001  
ADHD symptom severity was negatively associated with Consc, *r*(289) = -.43, *p* < .001  
ADHD symptom severity was negatively associated with Self-Efficacy, *r*(289) = -.37, *p* < .001  
ADHD symptom severity was negatively associated with Orderliness, *r*(289) = -.25, *p* < .001  
ADHD symptom severity was negatively associated with Dutifulness, *r*(289) = -.31, *p* < .001  
ADHD symptom severity was negatively associated with Achievement-Striving, *r*(289) = -.17, *p* = .004  
ADHD symptom severity was negatively associated with Self-Discipline, *r*(289) = -.40, *p* < .001  
ADHD symptom severity was negatively associated with Cautiousness, *r*(289) = -.31, *p* < .001

# Compare means

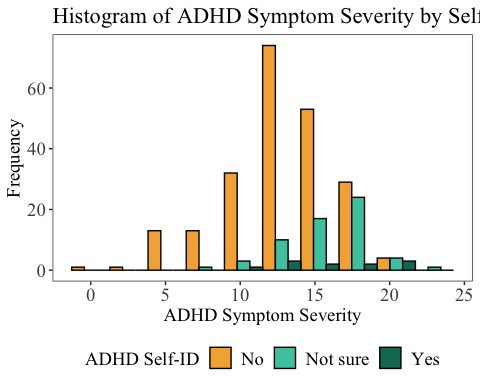
Look at means on conscientiousness facets:

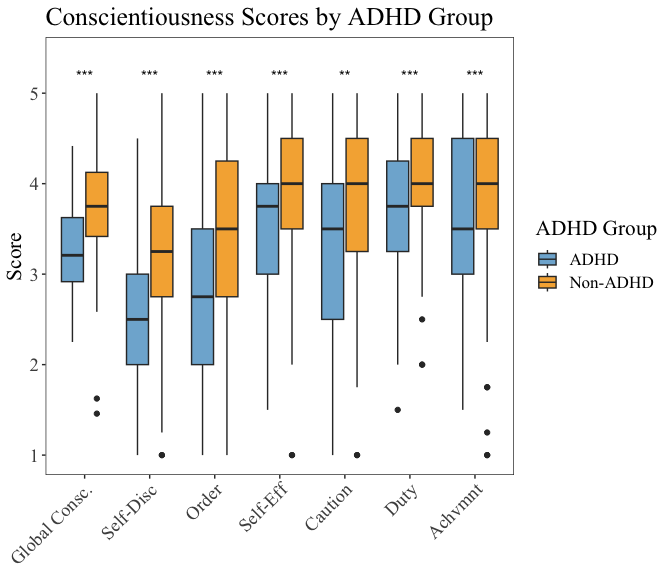
People in the ADHD group reported similar scores on open relative to the non-ADHD group, *t*(289) = 1.55, *p* = .12, Mdiff (95% CI) = 0.11 (-0.03, 0.24), *d* = 0.21  
People in the ADHD group scored significantly lower than people in the non-ADHD group on consc, *t*(289) = -6.33, *p* < .001, Mdiff (95% CI) = -0.47 (-0.62, -0.32), *d* = -0.87  
People in the ADHD group scored significantly lower than people in the non-ADHD group on extr, *t*(289) = -2.09, *p* = .04, Mdiff (95% CI) = -0.17 (-0.33, -0.01), *d* = -0.29  
People in the ADHD group scored significantly lower than people in the non-ADHD group on agree, *t*(289) = -2.24, *p* = .03, Mdiff (95% CI) = -0.14 (-0.27, -0.02), *d* = -0.31  
People in the ADHD group scored significantly higher than people in the non-ADHD group on neur, *t*(289) = 4.72, *p* < .001, Mdiff (95% CI) = 0.40 (0.23, 0.56), *d* = 0.65  
People in the ADHD group scored significantly lower than people in the non-ADHD group on self-efficacy, *t*(289) = -4.10, *p* < .001, Mdiff (95% CI) = -0.42 (-0.63, -0.22), *d* = -0.56  
People in the ADHD group scored significantly lower than people in the non-ADHD group on orderliness, *t*(289) = -5.07, *p* < .001, Mdiff (95% CI) = -0.68 (-0.94, -0.42), *d* = -0.69  
People in the ADHD group scored significantly lower than people in the non-ADHD group on dutifulness, *t*(289) = -3.52, *p* < .001, Mdiff (95% CI) = -0.30 (-0.47, -0.13), *d* = -0.48  
People in the ADHD group scored significantly lower than people in the non-ADHD group on achievement-striving, *t*(289) = -2.73, *p* = .007, Mdiff (95% CI) = -0.28 (-0.48, -0.08), *d* = -0.37  
People in the ADHD group scored significantly lower than people in the non-ADHD group on self-discipline, *t*(289) = -5.75, *p* < .001, Mdiff (95% CI) = -0.63 (-0.84, -0.41), *d* = -0.79  
People in the ADHD group scored significantly lower than people in the non-ADHD group on cautiousness, *t*(289) = -4.01, *p* < .001, Mdiff (95% CI) = -0.52 (-0.78, -0.26), *d* = -0.55

## `summarise()` has grouped output by 'adhd\_grp'. You can override using the  
## `.groups` argument.

# Plot conscientiousness facet scores

Plots for Brown Bag:





## Warning: Removed 1 rows containing missing values (`geom\_text()`).



## Warning: Removed 1 rows containing missing values (`geom\_text()`).

## [1] "self-discipline comparisons"

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, orderliness) = -0.2468 and r.jh (asrs\_sum, selfdiscipline) = -0.3983  
## Difference: r.jk - r.jh = 0.1516  
## Related correlation: r.kh = 0.4588  
## Data: tmp.rename: j = asrs\_sum, k = orderliness, h = selfdiscipline  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 2.6611, p-value = 0.0078  
## Null hypothesis rejected  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: 0.0402 0.2626  
## Null hypothesis rejected (Interval does not include 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, dutifulness) = -0.3097 and r.jh (asrs\_sum, selfdiscipline) = -0.3983  
## Difference: r.jk - r.jh = 0.0886  
## Related correlation: r.kh = 0.4036  
## Data: tmp.rename: j = asrs\_sum, k = dutifulness, h = selfdiscipline  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 1.5069, p-value = 0.1318  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0265 0.2037  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, selfefficacy) = -0.3696 and r.jh (asrs\_sum, selfdiscipline) = -0.3983  
## Difference: r.jk - r.jh = 0.0288  
## Related correlation: r.kh = 0.5797  
## Data: tmp.rename: j = asrs\_sum, k = selfefficacy, h = selfdiscipline  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 0.5872, p-value = 0.5571  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0672 0.1249  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, cautiousness) = -0.308 and r.jh (asrs\_sum, selfdiscipline) = -0.3983  
## Difference: r.jk - r.jh = 0.0903  
## Related correlation: r.kh = 0.3846  
## Data: tmp.rename: j = asrs\_sum, k = cautiousness, h = selfdiscipline  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 1.5120, p-value = 0.1305  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0266 0.2071  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, achievementstriving) = -0.1696 and r.jh (asrs\_sum, selfdiscipline) = -0.3983  
## Difference: r.jk - r.jh = 0.2288  
## Related correlation: r.kh = 0.546  
## Data: tmp.rename: j = asrs\_sum, k = achievementstriving, h = selfdiscipline  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 4.3154, p-value = 0.0000  
## Null hypothesis rejected  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: 0.1254 0.3314  
## Null hypothesis rejected (Interval does not include 0)

## [1] "self-efficacy comparisons"

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, orderliness) = -0.2468 and r.jh (asrs\_sum, selfefficacy) = -0.3696  
## Difference: r.jk - r.jh = 0.1228  
## Related correlation: r.kh = 0.2525  
## Data: tmp.rename: j = asrs\_sum, k = orderliness, h = selfefficacy  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 1.8314, p-value = 0.0670  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0085 0.2532  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, dutifulness) = -0.3097 and r.jh (asrs\_sum, selfefficacy) = -0.3696  
## Difference: r.jk - r.jh = 0.0599  
## Related correlation: r.kh = 0.3918  
## Data: tmp.rename: j = asrs\_sum, k = dutifulness, h = selfefficacy  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 1.0004, p-value = 0.3171  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0573 0.1770  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, selfefficacy) = -0.3696 and r.jh (asrs\_sum, achievementstriving) = -0.1696  
## Difference: r.jk - r.jh = -0.2  
## Related correlation: r.kh = 0.4471  
## Data: tmp.rename: j = asrs\_sum, k = selfefficacy, h = achievementstriving  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = -3.4030, p-value = 0.0007  
## Null hypothesis rejected  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.3136 -0.0852  
## Null hypothesis rejected (Interval does not include 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, selfefficacy) = -0.3696 and r.jh (asrs\_sum, cautiousness) = -0.308  
## Difference: r.jk - r.jh = -0.0616  
## Related correlation: r.kh = 0.2931  
## Data: tmp.rename: j = asrs\_sum, k = selfefficacy, h = cautiousness  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = -0.9567, p-value = 0.3387  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.1873 0.0644  
## Null hypothesis retained (Interval includes 0)

## [1] "dutifulness comparisons"

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, dutifulness) = -0.3097 and r.jh (asrs\_sum, achievementstriving) = -0.1696  
## Difference: r.jk - r.jh = -0.1401  
## Related correlation: r.kh = 0.3655  
## Data: tmp.rename: j = asrs\_sum, k = dutifulness, h = achievementstriving  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = -2.1996, p-value = 0.0278  
## Null hypothesis rejected  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.2635 -0.0155  
## Null hypothesis rejected (Interval does not include 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, dutifulness) = -0.3097 and r.jh (asrs\_sum, cautiousness) = -0.308  
## Difference: r.jk - r.jh = -0.0017  
## Related correlation: r.kh = 0.4088  
## Data: tmp.rename: j = asrs\_sum, k = dutifulness, h = cautiousness  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = -0.0280, p-value = 0.9776  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.1190 0.1157  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, orderliness) = -0.2468 and r.jh (asrs\_sum, dutifulness) = -0.3097  
## Difference: r.jk - r.jh = 0.0629  
## Related correlation: r.kh = 0.2303  
## Data: tmp.rename: j = asrs\_sum, k = orderliness, h = dutifulness  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 0.9113, p-value = 0.3622  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0723 0.1975  
## Null hypothesis retained (Interval includes 0)

## [1] "cautiousness comparisons"

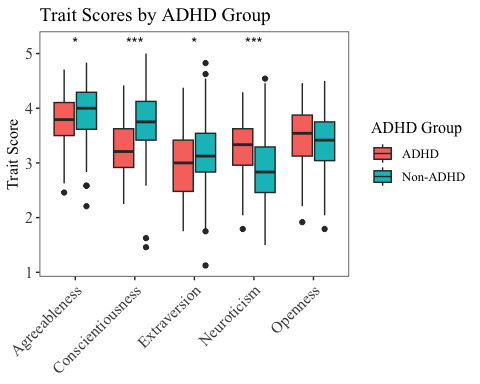
##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, orderliness) = -0.2468 and r.jh (asrs\_sum, cautiousness) = -0.308  
## Difference: r.jk - r.jh = 0.0612  
## Related correlation: r.kh = 0.2653  
## Data: tmp.rename: j = asrs\_sum, k = orderliness, h = cautiousness  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = 0.9068, p-value = 0.3645  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.0710 0.1929  
## Null hypothesis retained (Interval includes 0)

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, cautiousness) = -0.308 and r.jh (asrs\_sum, achievementstriving) = -0.1696  
## Difference: r.jk - r.jh = -0.1384  
## Related correlation: r.kh = 0.4294  
## Data: tmp.rename: j = asrs\_sum, k = cautiousness, h = achievementstriving  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = -2.2886, p-value = 0.0221  
## Null hypothesis rejected  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.2557 -0.0201  
## Null hypothesis rejected (Interval does not include 0)

## [1] "orderliness achievement striving comparisons"

##   
## Results of a comparison of two overlapping correlations based on dependent groups  
##   
## Comparison between r.jk (asrs\_sum, orderliness) = -0.2468 and r.jh (asrs\_sum, achievementstriving) = -0.1696  
## Difference: r.jk - r.jh = -0.0772  
## Related correlation: r.kh = 0.3055  
## Data: tmp.rename: j = asrs\_sum, k = orderliness, h = achievementstriving  
## Group size: n = 291  
## Null hypothesis: r.jk is equal to r.jh  
## Alternative hypothesis: r.jk is not equal to r.jh (two-sided)  
## Alpha: 0.05  
##   
## hittner2003: Hittner, May, and Silver's (2003) modification of Dunn and Clark's z (1969) using a backtransformed average Fisher's (1921) Z procedure  
## z = -1.1460, p-value = 0.2518  
## Null hypothesis retained  
##   
## zou2007: Zou's (2007) confidence interval  
## 95% confidence interval for r.jk - r.jh: -0.2081 0.0547  
## Null hypothesis retained (Interval includes 0)

# Plot Big Five scores



## Warning: Removed 1 rows containing missing values (`geom\_text()`).

Get standardized mean difference table:

| Variable | ADHD | Non-ADHD | mdiff | d |
| --- | --- | --- | --- | --- |
| Self-Efficacy | 3.55 (0.88) | 3.97 (0.71) | -0.42 (-0.63, -0.22) | 0.56\*\*\* |
| Orderliness | 2.79 (1.04) | 3.47 (0.97) | -0.68 (-0.94, -0.42) | 0.69\*\*\* |
| Dutifulness | 3.73 (0.70) | 4.02 (0.60) | -0.30 (-0.47, -0.13) | 0.48\*\*\* |
| Achievement-Striving | 3.66 (0.77) | 3.94 (0.75) | -0.28 (-0.48, -0.08) | 0.37\*\* |
| Self-Discipline | 2.61 (0.75) | 3.23 (0.81) | -0.63 (-0.84, -0.41) | 0.79\*\*\* |
| Cautiousness | 3.29 (1.08) | 3.81 (0.91) | -0.52 (-0.78, -0.26) | 0.55\*\*\* |
| Conscientiousness | 3.27 (0.53) | 3.74 (0.55) | -0.47 (-0.62, -0.32) | 0.87\*\*\* |

## Measurement invariance

Set up the invariance analysis:

Configural Invariance:

##   
## CONFIGURAL INVARIANCE

Metric invariance:

##   
## METRIC INVARIANCE

##   
## Chi-Squared Difference Test  
##   
## Df AIC BIC Chisq Chisq diff RMSEA Df diff Pr(>Chisq)  
## config 474 16385 17023 802.99   
## metric 492 16362 16934 816.26 13.269 0 18 0.7754

## Warning in write.table(sep = ",", append = TRUE, file =  
## "output/partial\_invariance\_comps.csv", : appending column names to file

## Warning in write.table(sep = ",", append = TRUE, file =  
## "output/partial\_invariance\_comps.csv", : appending column names to file

## ################### Nested Model Comparison #########################  
##   
## Chi-Squared Difference Test  
##   
## Df AIC BIC Chisq Chisq diff RMSEA Df diff Pr(>Chisq)  
## config 474 16385 17023 802.99   
## metric 492 16362 16934 816.26 13.269 0 18 0.7754  
##   
## ####################### Model Fit Indices ###########################  
## chisq df pvalue rmsea cfi tli srmr aic bic  
## config 802.994† 474 .000 .069 .909 .894 .071† 16384.872 17022.830   
## metric 816.263 492 .000 .068† .911† .900† .072 16362.141† 16934.104†  
##   
## ################## Differences in Fit Indices #######################  
## df rmsea cfi tli srmr aic bic  
## metric - config 18 -0.002 0.001 0.005 0 -22.731 -88.727

Scalar invariance:

##   
## SCALAR INVARIANCE

##   
## Chi-Squared Difference Test  
##   
## Df AIC BIC Chisq Chisq diff RMSEA Df diff Pr(>Chisq)   
## metric 492 16362 16934 816.26   
## scalar 510 16365 16871 855.03 38.767 0.089354 18 0.003062 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Warning in write.table(append = TRUE, sep = ",", file =  
## "output/partial\_invariance\_comps.csv", : appending column names to file

## Warning in write.table(append = TRUE, sep = ",", file =  
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## ################### Nested Model Comparison #########################  
##   
## Chi-Squared Difference Test  
##   
## Df AIC BIC Chisq Chisq diff RMSEA Df diff Pr(>Chisq)   
## metric 492 16362 16934 816.26   
## scalar 510 16365 16871 855.03 38.767 0.089354 18 0.003062 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## ####################### Model Fit Indices ###########################  
## chisq df pvalue rmsea cfi tli srmr aic bic  
## metric 816.263† 492 .000 .068† .911† .900† .072† 16362.141† 16934.104   
## scalar 855.030 510 .000 .068 .905 .897 .073 16364.908 16870.875†  
##   
## ################## Differences in Fit Indices #######################  
## df rmsea cfi tli srmr aic bic  
## scalar - metric 18 0.001 -0.006 -0.003 0.002 2.767 -63.229

Inspect the items that are likely sources of non-invariance:

## The modification index tests the improvement in model fit if the equality constraints for individual parameters were released. This test suggested that releasing equality constraints on the intercepts of two items from the dutifulness scale ("Tell the truth" and "Break rules"), one item from the self-discipline scale ("Have difficulty starting tasks"), and one item from the cautiousness scale ("Act without thinking") would improve model fit.

## The modification index test also indicated that releasing the equality constraint on the loading of one item on the cautiousness scale ("Act without thinking") would improve model fit.

## Warning in write.table(append = TRUE, sep = ",", file =  
## "output/partial\_invariance\_comps.csv", : appending column names to file

## Warning in write.table(append = TRUE, sep = ",", file =  
## "output/partial\_invariance\_comps.csv", : appending column names to file

## ################### Nested Model Comparison #########################  
##   
## Chi-Squared Difference Test  
##   
## Df AIC BIC Chisq Chisq diff RMSEA Df diff Pr(>Chisq)  
## metric 492 16362 16934 816.26   
## partial.scalar 505 16344 16868 823.62 7.3536 0 13 0.883  
##   
## ####################### Model Fit Indices ###########################  
## chisq df pvalue rmsea cfi tli srmr aic  
## metric 816.263† 492 .000 .068 .911 .900 .072† 16362.141   
## partial.scalar 823.617 505 .000 .066† .912† .904† .072 16343.495†  
## bic  
## metric 16934.104   
## partial.scalar 16867.794†  
##   
## ################## Differences in Fit Indices #######################  
## df rmsea cfi tli srmr aic bic  
## partial.scalar - metric 13 -0.001 0.002 0.004 0.001 -18.646 -66.31

## [1] "caution =~ C6\_4" "C3\_2 ~1 " "C3\_3 ~1 " "C5\_4 ~1 "   
## [5] "C6\_4 ~1 "

## var\_desc original\_varname  
## C3\_2 conscientiousness - Tell the truth. C3\_2  
## C3\_3\_R conscientiousness - Break rules. C3\_3\_R  
## C5\_4 conscientiousness - Have difficulty starting tasks. C5\_4  
## C6\_4 conscientiousness - Act without thinking. C6\_4  
## clean\_var\_desc facet  
## C3\_2 Tell the truth dutifulness  
## C3\_3\_R Break rules dutifulness  
## C5\_4 Have difficulty starting tasks self-discipline  
## C6\_4 Act without thinking cautiousness

## lavaan 0.6.15 ended normally after 125 iterations  
##   
## Estimator ML  
## Optimization method NLMINB  
## Number of model parameters 180  
## Number of equality constraints 37  
##   
## Number of observations per group: Used Total  
## Non-ADHD 220 220  
## ADHD 69 71  
##   
## Model Test User Model:  
##   
## Test statistic 823.617  
## Degrees of freedom 505  
## P-value (Chi-square) 0.000  
## Test statistic for each group:  
## Non-ADHD 454.090  
## ADHD 369.527  
##   
## Parameter Estimates:  
##   
## Standard errors Standard  
## Information Expected  
## Information saturated (h1) model Structured  
##   
##   
## Group 1 [Non-ADHD]:  
##   
## Latent Variables:  
## Estimate Std.Err z-value P(>|z|)  
## selfeff =~   
## C1\_1 1.000   
## C1\_2 (.p2.) 1.032 0.059 17.631 0.000  
## C1\_3 (.p3.) 1.059 0.064 16.572 0.000  
## C1\_4 (.p4.) 0.993 0.061 16.246 0.000  
## order =~   
## C2\_1 1.000   
## C2\_2 (.p6.) 1.298 0.130 9.972 0.000  
## C2\_3 (.p7.) 1.651 0.138 12.008 0.000  
## C2\_4 (.p8.) 1.573 0.133 11.784 0.000  
## duty =~   
## C3\_1 1.000   
## C3\_2 (.10.) 0.751 0.080 9.403 0.000  
## C3\_3 (.11.) 0.537 0.103 5.194 0.000  
## C3\_4 (.12.) 1.079 0.083 12.933 0.000  
## achieve =~   
## C4\_1 1.000   
## C4\_2 (.14.) 0.899 0.082 11.032 0.000  
## C4\_3 (.15.) 0.931 0.095 9.819 0.000  
## C4\_4 (.16.) 1.218 0.113 10.815 0.000  
## selfdisc =~   
## C5\_1 1.000   
## C5\_2 (.18.) 0.890 0.091 9.768 0.000  
## C5\_3 (.19.) 1.276 0.115 11.080 0.000  
## C5\_4 (.20.) 0.981 0.112 8.740 0.000  
## caution =~   
## C6\_1 1.000   
## C6\_2 (.22.) 1.145 0.072 15.966 0.000  
## C6\_3 (.23.) 1.173 0.073 16.161 0.000  
## C6\_4 1.078 0.079 13.620 0.000  
##   
## Covariances:  
## Estimate Std.Err z-value P(>|z|)  
## selfeff ~~   
## order 0.117 0.034 3.409 0.001  
## duty 0.195 0.034 5.661 0.000  
## achieve 0.264 0.042 6.240 0.000  
## selfdisc 0.310 0.046 6.723 0.000  
## caution 0.208 0.042 4.927 0.000  
## order ~~   
## duty 0.074 0.032 2.334 0.020  
## achieve 0.134 0.038 3.572 0.000  
## selfdisc 0.223 0.044 5.040 0.000  
## caution 0.105 0.040 2.631 0.009  
## duty ~~   
## achieve 0.168 0.036 4.607 0.000  
## selfdisc 0.235 0.041 5.737 0.000  
## caution 0.183 0.040 4.579 0.000  
## achieve ~~   
## selfdisc 0.314 0.051 6.166 0.000  
## caution 0.259 0.048 5.333 0.000  
## selfdisc ~~   
## caution 0.251 0.050 5.060 0.000  
##   
## Intercepts:  
## Estimate Std.Err z-value P(>|z|)  
## .C1\_1 (.70.) 4.144 0.050 83.153 0.000  
## .C1\_2 (.71.) 3.946 0.054 73.040 0.000  
## .C1\_3 (.72.) 3.746 0.057 65.303 0.000  
## .C1\_4 (.73.) 4.032 0.054 74.952 0.000  
## .C2\_1 (.74.) 3.819 0.067 56.904 0.000  
## .C2\_2 (.75.) 3.245 0.081 40.282 0.000  
## .C2\_3 (.76.) 3.423 0.080 42.862 0.000  
## .C2\_4 (.77.) 3.382 0.080 42.461 0.000  
## .C3\_1 (.78.) 4.185 0.048 88.066 0.000  
## .C3\_2 4.050 0.051 79.271 0.000  
## .C3\_3 3.732 0.068 55.201 0.000  
## .C3\_4 (.81.) 4.133 0.053 77.557 0.000  
## .C4\_1 (.82.) 3.759 0.061 61.505 0.000  
## .C4\_2 (.83.) 4.279 0.050 85.669 0.000  
## .C4\_3 (.84.) 4.103 0.060 68.245 0.000  
## .C4\_4 (.85.) 3.612 0.072 50.061 0.000  
## .C5\_1 (.86.) 3.477 0.064 54.192 0.000  
## .C5\_2 (.87.) 3.716 0.059 62.657 0.000  
## .C5\_3 (.88.) 3.028 0.078 38.944 0.000  
## .C5\_4 2.700 0.077 34.913 0.000  
## .C6\_1 (.90.) 3.627 0.068 53.457 0.000  
## .C6\_2 (.91.) 3.845 0.068 56.937 0.000  
## .C6\_3 (.92.) 3.795 0.068 55.925 0.000  
## .C6\_4 3.968 0.068 57.972 0.000  
## selfeff 0.000   
## order 0.000   
## duty 0.000   
## achieve 0.000   
## selfdsc 0.000   
## caution 0.000   
##   
## Variances:  
## Estimate Std.Err z-value P(>|z|)  
## .C1\_1 0.133 0.019 6.916 0.000  
## .C1\_2 0.218 0.027 8.182 0.000  
## .C1\_3 0.289 0.033 8.670 0.000  
## .C1\_4 0.243 0.028 8.569 0.000  
## .C2\_1 0.693 0.071 9.712 0.000  
## .C2\_2 0.909 0.096 9.488 0.000  
## .C2\_3 0.278 0.056 4.977 0.000  
## .C2\_4 0.426 0.061 6.950 0.000  
## .C3\_1 0.166 0.029 5.734 0.000  
## .C3\_2 0.376 0.040 9.352 0.000  
## .C3\_3 0.904 0.088 10.256 0.000  
## .C3\_4 0.258 0.038 6.827 0.000  
## .C4\_1 0.459 0.053 8.628 0.000  
## .C4\_2 0.218 0.030 7.271 0.000  
## .C4\_3 0.520 0.057 9.084 0.000  
## .C4\_4 0.642 0.075 8.533 0.000  
## .C5\_1 0.531 0.060 8.821 0.000  
## .C5\_2 0.480 0.053 9.030 0.000  
## .C5\_3 0.698 0.083 8.399 0.000  
## .C5\_4 0.885 0.093 9.546 0.000  
## .C6\_1 0.453 0.049 9.222 0.000  
## .C6\_2 0.252 0.034 7.451 0.000  
## .C6\_3 0.203 0.031 6.529 0.000  
## .C6\_4 0.320 0.038 8.320 0.000  
## selfeff 0.425 0.052 8.211 0.000  
## order 0.426 0.077 5.506 0.000  
## duty 0.352 0.050 7.062 0.000  
## achieve 0.434 0.074 5.901 0.000  
## selfdisc 0.448 0.078 5.781 0.000  
## caution 0.612 0.089 6.876 0.000  
##   
##   
## Group 2 [ADHD]:  
##   
## Latent Variables:  
## Estimate Std.Err z-value P(>|z|)  
## selfeff =~   
## C1\_1 1.000   
## C1\_2 (.p2.) 1.032 0.059 17.631 0.000  
## C1\_3 (.p3.) 1.059 0.064 16.572 0.000  
## C1\_4 (.p4.) 0.993 0.061 16.246 0.000  
## order =~   
## C2\_1 1.000   
## C2\_2 (.p6.) 1.298 0.130 9.972 0.000  
## C2\_3 (.p7.) 1.651 0.138 12.008 0.000  
## C2\_4 (.p8.) 1.573 0.133 11.784 0.000  
## duty =~   
## C3\_1 1.000   
## C3\_2 (.10.) 0.751 0.080 9.403 0.000  
## C3\_3 (.11.) 0.537 0.103 5.194 0.000  
## C3\_4 (.12.) 1.079 0.083 12.933 0.000  
## achieve =~   
## C4\_1 1.000   
## C4\_2 (.14.) 0.899 0.082 11.032 0.000  
## C4\_3 (.15.) 0.931 0.095 9.819 0.000  
## C4\_4 (.16.) 1.218 0.113 10.815 0.000  
## selfdisc =~   
## C5\_1 1.000   
## C5\_2 (.18.) 0.890 0.091 9.768 0.000  
## C5\_3 (.19.) 1.276 0.115 11.080 0.000  
## C5\_4 (.20.) 0.981 0.112 8.740 0.000  
## caution =~   
## C6\_1 1.000   
## C6\_2 (.22.) 1.145 0.072 15.966 0.000  
## C6\_3 (.23.) 1.173 0.073 16.161 0.000  
## C6\_4 1.189 0.098 12.124 0.000  
##   
## Covariances:  
## Estimate Std.Err z-value P(>|z|)  
## selfeff ~~   
## order -0.044 0.074 -0.595 0.552  
## duty 0.264 0.084 3.145 0.002  
## achieve 0.192 0.082 2.342 0.019  
## selfdisc 0.256 0.082 3.134 0.002  
## caution 0.028 0.098 0.291 0.771  
## order ~~   
## duty 0.046 0.065 0.709 0.478  
## achieve 0.112 0.068 1.653 0.098  
## selfdisc 0.157 0.067 2.345 0.019  
## caution 0.152 0.086 1.765 0.077  
## duty ~~   
## achieve 0.186 0.073 2.549 0.011  
## selfdisc 0.146 0.068 2.153 0.031  
## caution 0.139 0.088 1.574 0.115  
## achieve ~~   
## selfdisc 0.258 0.076 3.382 0.001  
## caution 0.243 0.094 2.574 0.010  
## selfdisc ~~   
## caution 0.117 0.085 1.377 0.168  
##   
## Intercepts:  
## Estimate Std.Err z-value P(>|z|)  
## .C1\_1 (.70.) 4.144 0.050 83.153 0.000  
## .C1\_2 (.71.) 3.946 0.054 73.040 0.000  
## .C1\_3 (.72.) 3.746 0.057 65.303 0.000  
## .C1\_4 (.73.) 4.032 0.054 74.952 0.000  
## .C2\_1 (.74.) 3.819 0.067 56.904 0.000  
## .C2\_2 (.75.) 3.245 0.081 40.282 0.000  
## .C2\_3 (.76.) 3.423 0.080 42.862 0.000  
## .C2\_4 (.77.) 3.382 0.080 42.461 0.000  
## .C3\_1 (.78.) 4.185 0.048 88.066 0.000  
## .C3\_2 3.756 0.108 34.836 0.000  
## .C3\_3 3.277 0.125 26.249 0.000  
## .C3\_4 (.81.) 4.133 0.053 77.557 0.000  
## .C4\_1 (.82.) 3.759 0.061 61.505 0.000  
## .C4\_2 (.83.) 4.279 0.050 85.669 0.000  
## .C4\_3 (.84.) 4.103 0.060 68.245 0.000  
## .C4\_4 (.85.) 3.612 0.072 50.061 0.000  
## .C5\_1 (.86.) 3.477 0.064 54.192 0.000  
## .C5\_2 (.87.) 3.716 0.059 62.657 0.000  
## .C5\_3 (.88.) 3.028 0.078 38.944 0.000  
## .C5\_4 2.431 0.125 19.415 0.000  
## .C6\_1 (.90.) 3.627 0.068 53.457 0.000  
## .C6\_2 (.91.) 3.845 0.068 56.937 0.000  
## .C6\_3 (.92.) 3.795 0.068 55.925 0.000  
## .C6\_4 3.739 0.097 38.489 0.000  
## selfeff -0.393 0.113 -3.481 0.000  
## order -0.464 0.104 -4.450 0.000  
## duty -0.139 0.101 -1.371 0.170  
## achieve -0.262 0.105 -2.486 0.013  
## selfdsc -0.558 0.109 -5.105 0.000  
## caution -0.390 0.130 -2.985 0.003  
##   
## Variances:  
## Estimate Std.Err z-value P(>|z|)  
## .C1\_1 0.272 0.062 4.363 0.000  
## .C1\_2 0.264 0.063 4.205 0.000  
## .C1\_3 0.368 0.080 4.624 0.000  
## .C1\_4 0.500 0.098 5.078 0.000  
## .C2\_1 0.805 0.143 5.619 0.000  
## .C2\_2 0.796 0.147 5.432 0.000  
## .C2\_3 0.189 0.074 2.574 0.010  
## .C2\_4 0.261 0.075 3.462 0.001  
## .C3\_1 0.181 0.052 3.491 0.000  
## .C3\_2 0.676 0.121 5.599 0.000  
## .C3\_3 1.001 0.173 5.780 0.000  
## .C3\_4 0.123 0.052 2.346 0.019  
## .C4\_1 0.575 0.114 5.043 0.000  
## .C4\_2 0.510 0.100 5.128 0.000  
## .C4\_3 0.488 0.097 5.019 0.000  
## .C4\_4 0.319 0.089 3.595 0.000  
## .C5\_1 0.581 0.115 5.073 0.000  
## .C5\_2 0.686 0.128 5.346 0.000  
## .C5\_3 0.392 0.102 3.856 0.000  
## .C5\_4 0.548 0.109 5.037 0.000  
## .C6\_1 0.969 0.171 5.668 0.000  
## .C6\_2 0.112 0.034 3.297 0.001  
## .C6\_3 0.143 0.038 3.722 0.000  
## .C6\_4 0.228 0.050 4.511 0.000  
## selfeff 0.641 0.130 4.938 0.000  
## order 0.478 0.114 4.195 0.000  
## duty 0.493 0.105 4.704 0.000  
## achieve 0.469 0.115 4.066 0.000  
## selfdisc 0.402 0.103 3.908 0.000  
## caution 0.882 0.186 4.729 0.000