STAI Stability Analysis

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# Methods

@spielberger2010

## Participants

* trial 1: 105 participants
* trial 2: 87 participants

-> add: age, sex and education?

## Material

* description of context in which data was collected

## Data analysis

Analysis was conducted in R (R Core Team, 2017) and figures were produced using the package ggplot2 (Wickham, 2009).

# Results

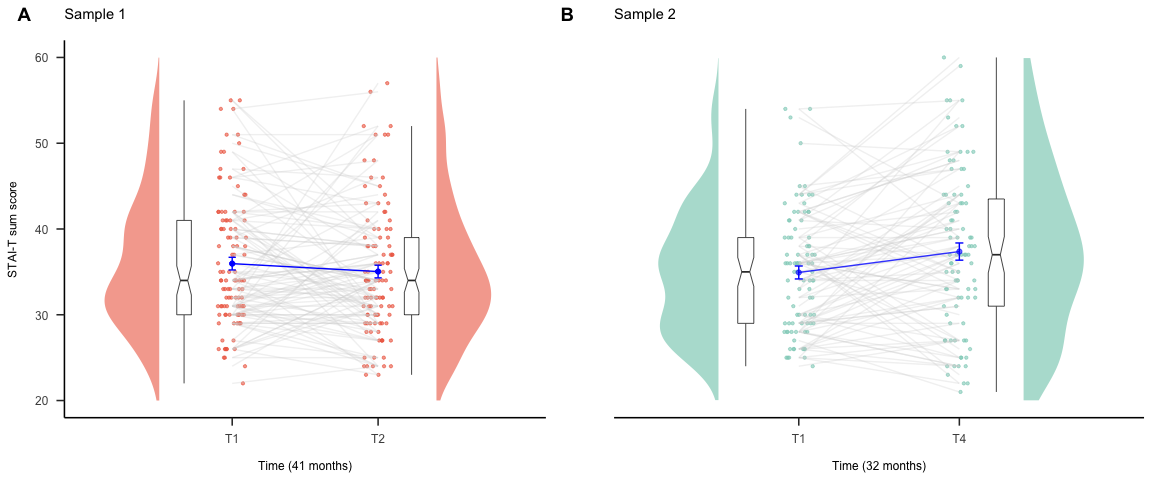


Illustration of STAI-T scores for (A) Study 1 in red and (B) Study 2 in green which depicts the sample average (blue) at both time-points (A: 41 month apart; B: 32 month apart), individual data points (A: red dots, B: green dots) as well as box and density plots at both time points. Note that the STAI-T scores of the same individual at both measurement time points are connected through a grey line.

(#tab:unnamed-chunk-8)

*Item Analysis and item stability.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Discrimination | Difficulty | Discrimination | Difficulty | ICC(2,1) | LL | UL |
| 1 | .33 | .46 | .58 | .47 | .26\*\* | .10 | .40 |
| 2 | .39 | .54 | .44 | .53 | .43\*\* | .29 | .56 |
| 3 | .57 | .40 | .41 | .37 | .26\*\* | .10 | .40 |
| 4 | .52 | .30 | .57 | .30 | .14 | -.02 | .30 |
| 5 | .37 | .45 | .36 | .43 | .40\*\* | .25 | .52 |
| 6 | .44 | .57 | .43 | .56 | .04 | -.12 | .20 |
| 7 | .45 | .53 | .45 | .52 | .32\*\* | .17 | .46 |
| 8 | .46 | .39 | .60 | .39 | .29\*\* | .14 | .43 |
| 9 | .49 | .55 | .53 | .51 | .36\*\* | .21 | .49 |
| 10 | .63 | .41 | .57 | .41 | .28\*\* | .12 | .42 |
| 11 | .60 | .42 | .67 | .40 | .41\*\* | .27 | .54 |
| 12 | .43 | .47 | .49 | .45 | .52\*\* | .39 | .63 |
| 13 | .35 | .47 | .47 | .45 | .35\*\* | .20 | .48 |
| 14 | .46 | .45 | .49 | .44 | .32\*\* | .17 | .46 |
| 15 | .43 | .37 | .55 | .39 | .35\*\* | .20 | .48 |
| 16 | .53 | .42 | .63 | .40 | .29\*\* | .14 | .43 |
| 17 | .45 | .45 | .50 | .44 | .29\*\* | .14 | .43 |
| 18 | .55 | .41 | .51 | .40 | .23\*\* | .07 | .38 |
| 19 | .67 | .48 | .62 | .44 | .39\*\* | .25 | .52 |
| 20 | .46 | .46 | .43 | .46 | .39\*\* | .24 | .52 |

*Note.* Total number of participants was . Cronbach’s resulted in .87 and .89 for the first and the second measurement. \ The definition choice was absolute agreement. \ \* < .05 \*\* < .01

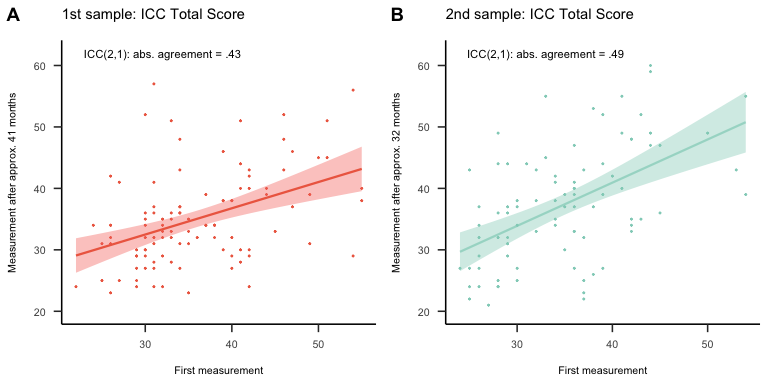
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*Item Analysis and item stability.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Discrimination | Difficulty | Discrimination | Difficulty | ICC(2,1) | LL | UL |
| 1 | .54 | .47 | .63 | .49 | .48\*\* | .33 | .61 |
| 2 | .46 | .57 | .39 | .56 | .37\*\* | .21 | .51 |
| 3 | .40 | .34 | .54 | .37 | .30\*\* | .13 | .45 |
| 4 | .34 | .31 | .58 | .32 | .10 | -.08 | .27 |
| 5 | .35 | .43 | .49 | .41 | .45\*\* | .29 | .58 |
| 6 | .50 | .57 | .41 | .58 | .22\* | .05 | .38 |
| 7 | .35 | .45 | .58 | .52 | .38\*\* | .22 | .52 |
| 8 | .50 | .39 | .57 | .41 | .30\*\* | .14 | .46 |
| 9 | .51 | .51 | .67 | .56 | .35\*\* | .19 | .49 |
| 10 | .66 | .41 | .67 | .46 | .49\*\* | .34 | .62 |
| 11 | .66 | .43 | .61 | .44 | .52\*\* | .38 | .64 |
| 12 | .44 | .43 | .59 | .47 | .47\*\* | .33 | .60 |
| 13 | .26 | .45 | .60 | .46 | .48\*\* | .34 | .61 |
| 14 | .33 | .46 | .47 | .49 | .13 | -.05 | .30 |
| 15 | .39 | .37 | .64 | .42 | .18\* | .01 | .34 |
| 16 | .64 | .40 | .73 | .46 | .37\*\* | .21 | .51 |
| 17 | .48 | .42 | .60 | .48 | .37\*\* | .21 | .52 |
| 18 | .48 | .46 | .58 | .43 | .44\*\* | .29 | .58 |
| 19 | .57 | .45 | .73 | .50 | .49\*\* | .34 | .61 |
| 20 | .44 | .42 | .56 | .52 | .23\*\* | .06 | .38 |

*Note.* Total number of participants was . Cronbach’s resulted in .87 and .92 for the first and the fourth measurement. \ The definition choice was absolute agreement. \ \* < .05 \*\* < .01

## `geom\_smooth()` using formula 'y ~ x'  
## `geom\_smooth()` using formula 'y ~ x'



Retest Reliability. Shown are correlations in achieved total score between two measurements for sample one (A) and sample two (B). Single points represent individual participants.

The twofactorial ANOVA showed a temporal effect on the total score (, , , ), whereas the individual items had no effect (, , , ).

## Linear mixed model fit by REML ['lmerMod']  
## Formula: score ~ timepoint \* item + (1 | id)  
## Data: tb.ANOVA.ID  
##   
## REML criterion at convergence: 24216.2  
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -3.2584 -0.4604 0.0025 0.4730 3.3011   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## id (Intercept) 40.45 6.360   
## Residual 16.85 4.105   
## Number of obs: 4200, groups: id, 105  
##   
## Fixed effects:  
## Estimate Std. Error t value  
## (Intercept) 3.596e+01 7.387e-01 48.682  
## timepoint2 -9.238e-01 5.665e-01 -1.631  
## item2 -3.641e-13 5.665e-01 0.000  
## item3 -3.641e-13 5.665e-01 0.000  
## item4 -3.641e-13 5.665e-01 0.000  
## item5 -3.641e-13 5.665e-01 0.000  
## item6 -3.641e-13 5.665e-01 0.000  
## item7 -3.641e-13 5.665e-01 0.000  
## item8 -3.641e-13 5.665e-01 0.000  
## item9 -3.641e-13 5.665e-01 0.000  
## item10 -3.641e-13 5.665e-01 0.000  
## item11 -3.641e-13 5.665e-01 0.000  
## item12 -3.641e-13 5.665e-01 0.000  
## item13 -3.641e-13 5.665e-01 0.000  
## item14 -3.641e-13 5.665e-01 0.000  
## item15 -3.641e-13 5.665e-01 0.000  
## item16 -3.641e-13 5.665e-01 0.000  
## item17 -3.641e-13 5.665e-01 0.000  
## item18 -3.641e-13 5.665e-01 0.000  
## item19 -3.641e-13 5.665e-01 0.000  
## item20 -3.641e-13 5.665e-01 0.000  
## timepoint2:item2 2.746e-15 8.011e-01 0.000  
## timepoint2:item3 2.746e-15 8.011e-01 0.000  
## timepoint2:item4 2.746e-15 8.011e-01 0.000  
## timepoint2:item5 2.746e-15 8.011e-01 0.000  
## timepoint2:item6 2.746e-15 8.011e-01 0.000  
## timepoint2:item7 2.746e-15 8.011e-01 0.000  
## timepoint2:item8 2.746e-15 8.011e-01 0.000  
## timepoint2:item9 2.746e-15 8.011e-01 0.000  
## timepoint2:item10 2.746e-15 8.011e-01 0.000  
## timepoint2:item11 2.746e-15 8.011e-01 0.000  
## timepoint2:item12 2.746e-15 8.011e-01 0.000  
## timepoint2:item13 2.746e-15 8.011e-01 0.000  
## timepoint2:item14 2.746e-15 8.011e-01 0.000  
## timepoint2:item15 2.746e-15 8.011e-01 0.000  
## timepoint2:item16 2.746e-15 8.011e-01 0.000  
## timepoint2:item17 2.746e-15 8.011e-01 0.000  
## timepoint2:item18 2.746e-15 8.011e-01 0.000  
## timepoint2:item19 2.746e-15 8.011e-01 0.000  
## timepoint2:item20 2.746e-15 8.011e-01 0.000

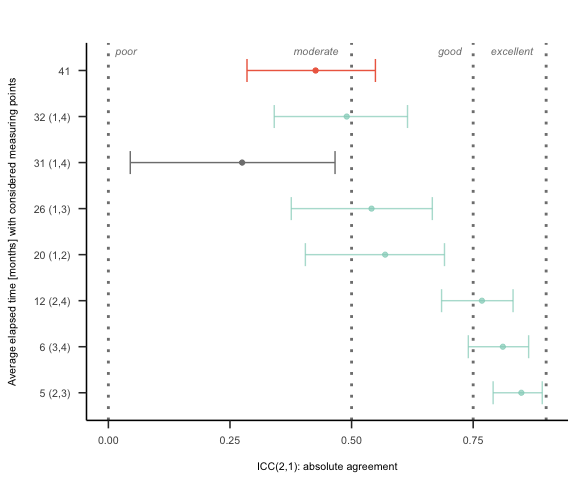
##   
## Correlation matrix not shown by default, as p = 40 > 12.  
## Use print(summary(fitS1), correlation=TRUE) or  
## vcov(summary(fitS1)) if you need it

The twofactorial ANOVA showed that it made no difference in terms of total score whether participants completed the STAI-T before, during, or after lockdown (, , , ). Therefore, further analysis is done without differentiating between the three subgroups. Instead, we consider the complete data set.

## Analysis of Variance Table  
## npar Sum Sq Mean Sq F value  
## timePoint 1 258.299 258.299 7.5762  
## partLockdown 2 27.061 13.530 0.3969  
## timePoint:partLockdown 2 31.838 15.919 0.4669

## # Effect Size for ANOVA (Type III)  
##   
## Parameter | Omega2 (partial) | 90% CI  
## --------------------------------------------------------  
## timePoint | 0.05 | [0.00, 0.14]  
## partLockdown | -0.01 | [0.00, 0.00]  
## timePoint:partLockdown | -0.01 | [0.00, 0.00]

## $lsmeans  
## timePoint partLockdown lsmean SE df lower.CL upper.CL  
## 1 after 35.4 1.78 133 31.8 38.9  
## 4 after 36.5 1.78 133 33.0 40.0  
## 1 before 34.1 1.23 133 31.7 36.6  
## 4 before 37.3 1.23 133 34.9 39.7  
## 1 within 36.4 1.91 133 32.6 40.2  
## 4 within 38.5 1.91 133 34.7 42.3  
##   
## Degrees-of-freedom method: kenward-roger   
## Confidence level used: 0.95   
##   
## $contrasts  
## contrast estimate SE df t.ratio p.value  
## 1 after - 4 after -1.136 1.76 84 -0.645 0.9871  
## 1 after - 1 before 1.233 2.16 133 0.571 0.9928  
## 1 after - 4 before -1.941 2.16 133 -0.898 0.9464  
## 1 after - 1 within -1.005 2.61 133 -0.385 0.9989  
## 1 after - 4 within -3.163 2.61 133 -1.211 0.8307  
## 4 after - 1 before 2.370 2.16 133 1.096 0.8820  
## 4 after - 4 before -0.804 2.16 133 -0.372 0.9991  
## 4 after - 1 within 0.132 2.61 133 0.050 1.0000  
## 4 after - 4 within -2.026 2.61 133 -0.776 0.9711  
## 1 before - 4 before -3.174 1.22 84 -2.607 0.1069  
## 1 before - 1 within -2.238 2.27 133 -0.984 0.9222  
## 1 before - 4 within -4.396 2.27 133 -1.933 0.3866  
## 4 before - 1 within 0.936 2.27 133 0.412 0.9985  
## 4 before - 4 within -1.222 2.27 133 -0.537 0.9945  
## 1 within - 4 within -2.158 1.89 84 -1.139 0.8636  
##   
## Degrees-of-freedom method: kenward-roger   
## P value adjustment: tukey method for comparing a family of 6 estimates



ICC for different samples and different time intervals with 95 % confidence intervals. The gray entry indicates the results for the STAI-S, the red one represents the results for the first sample (STAI-T) and the turquoise one represents the results for the second sample (STAI-T) with its different time intervals. Missing data in brackets indicate that there were only two mesaurements in total.