Supplementary materials

“Later-life education slows cognitive decline: a long-term prospective interventional study”

Bindoff, A. D., Summers, M. J., Hill, E., Alty, J., Vickers, J. C.

2020-06-17

Table S1.

|  |  |  |  |
| --- | --- | --- | --- |
| *Term* | *Chi.sq* | *df* | *p.value* |
| test | 13.2 | 17 | 0.722 |
| Time | 291.5 | 1 | <0.001 |
| group | 10.6 | 1 | 0.001 |
| test:Time | 489.8 | 17 | <0.001 |
| test:group | 31.6 | 17 | 0.017 |
| Time:group | 23.7 | 1 | <0.001 |
| test:Time:group | 31.9 | 17 | 0.016 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Term* | *Chi.sq* | *df* | *p.value* |
| Prior CR | 41.5 | 1 | <0.001 |
| age\_z | 58.5 | 1 | <0.001 |
| test | 6.6 | 17 | 0.99 |
| Time | 222.3 | 1 | <0.001 |
| group | 2.2 | 1 | 0.14 |
| age\_z:test | 203.0 | 17 | <0.001 |
| test:Time | 402.6 | 17 | <0.001 |
| Time:group | 24.0 | 1 | <0.001 |
| test:group | 27.8 | 17 | 0.05 |
| test:Time:group | 28.2 | 17 | 0.04 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **value** | | **value** | |
| *Predictors* | *Estimates* | *CI* | *Estimates* | *CI* |
| (Intercept) | -0.205 | -0.368 – -0.042 | -0.127 | -0.284 – 0.030 |
| test: cowat tot z | 0.120 | -0.091 – 0.332 | 0.066 | -0.143 – 0.275 |
| test: lmi unit tot z | -0.195 | -0.389 – -0.001 | -0.235 | -0.430 – -0.040 |
| test: lmii unit tot z | -0.167 | -0.362 – 0.028 | -0.203 | -0.397 – -0.009 |
| test: pal ftm score z | -0.064 | -0.269 – 0.141 | -0.102 | -0.304 – 0.101 |
| test: reversed log pal te 6 score z | 0.016 | -0.191 – 0.222 | -0.023 | -0.226 – 0.180 |
| test: ravlt arcl raw z | 0.045 | -0.165 – 0.255 | -0.012 | -0.220 – 0.196 |
| test: ravlt t 15 tot z | 0.030 | -0.177 – 0.237 | -0.016 | -0.220 – 0.189 |
| test: rcft rcl raw z | -0.283 | -0.475 – -0.091 | -0.320 | -0.511 – -0.129 |
| test: rvp a z | -0.105 | -0.309 – 0.099 | -0.126 | -0.327 – 0.076 |
| test: ssp len z | -0.106 | -0.316 – 0.103 | -0.157 | -0.363 – 0.048 |
| test: reversed log stroop c time z | -0.022 | -0.229 – 0.186 | -0.045 | -0.249 – 0.160 |
| test: reversed log swm be z | 0.054 | -0.165 – 0.273 | 0.021 | -0.197 – 0.238 |
| test: reversed log tmt b time z | -0.077 | -0.273 – 0.119 | -0.117 | -0.306 – 0.073 |
| test: wais com raw z | -0.064 | -0.254 – 0.126 | -0.121 | -0.309 – 0.068 |
| test: wais ds raw z | 0.157 | -0.064 – 0.377 | 0.107 | -0.112 – 0.326 |
| test: wais lns raw z | 0.085 | -0.117 – 0.286 | 0.048 | -0.154 – 0.249 |
| test: reversed log wais voc raw z | -0.031 | -0.216 – 0.153 | -0.081 | -0.263 – 0.101 |
| Time | -0.008 | -0.037 – 0.020 | 0.001 | -0.029 – 0.031 |
| Educational intervention group: Intervention | 0.078 | -0.106 – 0.261 | 0.015 | -0.165 – 0.196 |
| testcowat\_tot\_z:Time | 0.044 | 0.004 – 0.084 | 0.049 | 0.007 – 0.091 |
| testlmi\_unit\_tot\_z:Time | 0.086 | 0.047 – 0.126 | 0.106 | 0.065 – 0.147 |
| testlmii\_unit\_tot\_z:Time | 0.085 | 0.046 – 0.125 | 0.108 | 0.066 – 0.149 |
| testpal\_ftm\_score\_z:Time | 0.026 | -0.014 – 0.066 | 0.071 | 0.029 – 0.113 |
| testreversed\_log\_pal\_te6\_score\_z:Time | 0.036 | -0.004 – 0.076 | 0.063 | 0.021 – 0.105 |
| testravlt\_arcl\_raw\_z:Time | -0.039 | -0.078 – 0.001 | -0.017 | -0.058 – 0.025 |
| testravlt\_t15\_tot\_z:Time | -0.054 | -0.094 – -0.015 | -0.013 | -0.055 – 0.028 |
| testrcft\_rcl\_raw\_z:Time | 0.103 | 0.064 – 0.143 | 0.121 | 0.079 – 0.162 |
| testrvp\_a\_z:Time | 0.042 | 0.001 – 0.082 | 0.073 | 0.031 – 0.115 |
| testssp\_len\_z:Time | 0.050 | 0.009 – 0.090 | 0.086 | 0.044 – 0.128 |
| testreversed\_log\_stroop\_c\_time\_z:Time | 0.026 | -0.014 – 0.066 | 0.063 | 0.021 – 0.105 |
| testreversed\_log\_swm\_be\_z:Time | -0.007 | -0.048 – 0.033 | 0.024 | -0.019 – 0.066 |
| testreversed\_log\_tmt\_b\_time\_z:Time | 0.039 | -0.001 – 0.079 | 0.078 | 0.037 – 0.120 |
| testwais\_com\_raw\_z:Time | -0.016 | -0.056 – 0.023 | -0.020 | -0.061 – 0.022 |
| testwais\_ds\_raw\_z:Time | -0.001 | -0.041 – 0.039 | 0.004 | -0.039 – 0.046 |
| testwais\_lns\_raw\_z:Time | -0.007 | -0.046 – 0.033 | 0.016 | -0.025 – 0.058 |
| testreversed\_log\_wais\_voc\_raw\_z:Time | -0.011 | -0.051 – 0.028 | -0.024 | -0.065 – 0.018 |
| testcowat\_tot\_z:groupIntervention | -0.098 | -0.336 – 0.141 | -0.117 | -0.357 – 0.122 |
| testlmi\_unit\_tot\_z:groupIntervention | 0.075 | -0.144 – 0.294 | 0.007 | -0.216 – 0.230 |
| testlmii\_unit\_tot\_z:groupIntervention | 0.027 | -0.193 – 0.247 | -0.039 | -0.261 – 0.184 |
| testpal\_ftm\_score\_z:groupIntervention | 0.132 | -0.100 – 0.363 | -0.006 | -0.238 – 0.226 |
| testreversed\_log\_pal\_te6\_score\_z:groupIntervention | 0.055 | -0.177 – 0.288 | -0.040 | -0.273 – 0.192 |
| testravlt\_arcl\_raw\_z:groupIntervention | 0.166 | -0.071 – 0.402 | 0.069 | -0.170 – 0.307 |
| testravlt\_t15\_tot\_z:groupIntervention | 0.171 | -0.062 – 0.404 | 0.029 | -0.206 – 0.263 |
| testrcft\_rcl\_raw\_z:groupIntervention | 0.179 | -0.038 – 0.395 | 0.116 | -0.103 – 0.334 |
| testrvp\_a\_z:groupIntervention | 0.100 | -0.129 – 0.330 | 0.001 | -0.230 – 0.232 |
| testssp\_len\_z:groupIntervention | 0.292 | 0.056 – 0.528 | 0.165 | -0.071 – 0.401 |
| testreversed\_log\_stroop\_c\_time\_z:groupIntervention | 0.102 | -0.132 – 0.336 | -0.044 | -0.279 – 0.190 |
| testreversed\_log\_swm\_be\_z:groupIntervention | 0.058 | -0.188 – 0.304 | -0.040 | -0.290 – 0.210 |
| testreversed\_log\_tmt\_b\_time\_z:groupIntervention | 0.174 | -0.046 – 0.395 | 0.004 | -0.213 – 0.222 |
| testwais\_com\_raw\_z:groupIntervention | 0.146 | -0.069 – 0.360 | 0.180 | -0.037 – 0.396 |
| testwais\_ds\_raw\_z:groupIntervention | -0.040 | -0.288 – 0.208 | -0.083 | -0.334 – 0.169 |
| testwais\_lns\_raw\_z:groupIntervention | 0.077 | -0.150 – 0.304 | -0.015 | -0.246 – 0.216 |
| testreversed\_log\_wais\_voc\_raw\_z:groupIntervention | 0.126 | -0.082 – 0.334 | 0.180 | -0.029 – 0.388 |
| Time:groupIntervention | 0.043 | 0.010 – 0.075 | 0.043 | 0.011 – 0.075 |
| testcowat\_tot\_z:Time:groupIntervention | -0.050 | -0.096 – -0.005 | -0.055 | -0.101 – -0.009 |
| testlmi\_unit\_tot\_z:Time:groupIntervention | -0.024 | -0.069 – 0.021 | -0.025 | -0.070 – 0.020 |
| testlmii\_unit\_tot\_z:Time:groupIntervention | -0.010 | -0.055 – 0.036 | -0.013 | -0.058 – 0.032 |
| testpal\_ftm\_score\_z:Time:groupIntervention | -0.015 | -0.061 – 0.030 | -0.020 | -0.066 – 0.026 |
| testreversed\_log\_pal\_te6\_score\_z:Time:groupIntervention | -0.031 | -0.077 – 0.014 | -0.033 | -0.079 – 0.013 |
| testravlt\_arcl\_raw\_z:Time:groupIntervention | -0.005 | -0.051 – 0.040 | -0.002 | -0.048 – 0.043 |
| testravlt\_t15\_tot\_z:Time:groupIntervention | 0.015 | -0.030 – 0.061 | 0.013 | -0.032 – 0.058 |
| testrcft\_rcl\_raw\_z:Time:groupIntervention | -0.032 | -0.078 – 0.013 | -0.029 | -0.074 – 0.016 |
| testrvp\_a\_z:Time:groupIntervention | -0.023 | -0.069 – 0.024 | -0.025 | -0.071 – 0.021 |
| testssp\_len\_z:Time:groupIntervention | -0.084 | -0.130 – -0.038 | -0.083 | -0.130 – -0.037 |
| testreversed\_log\_stroop\_c\_time\_z:Time:groupIntervention | -0.033 | -0.079 – 0.013 | -0.028 | -0.074 – 0.018 |
| testreversed\_log\_swm\_be\_z:Time:groupIntervention | -0.011 | -0.057 – 0.035 | -0.017 | -0.063 – 0.030 |
| testreversed\_log\_tmt\_b\_time\_z:Time:groupIntervention | -0.049 | -0.094 – -0.003 | -0.034 | -0.080 – 0.011 |
| testwais\_com\_raw\_z:Time:groupIntervention | 0.001 | -0.045 – 0.046 | -0.005 | -0.051 – 0.040 |
| testwais\_ds\_raw\_z:Time:groupIntervention | -0.025 | -0.071 – 0.020 | -0.022 | -0.067 – 0.024 |
| testwais\_lns\_raw\_z:Time:groupIntervention | -0.033 | -0.079 – 0.012 | -0.033 | -0.078 – 0.012 |
| testreversed\_log\_wais\_voc\_raw\_z:Time:groupIntervention | -0.011 | -0.056 – 0.034 | -0.016 | -0.061 – 0.030 |
| Prior Cognitive Reserve(z) |  |  | 0.143 | 0.100 – 0.187 |
| age z |  |  | -0.086 | -0.156 – -0.016 |
| age\_z:testcowat\_tot\_z |  |  | 0.022 | -0.070 – 0.115 |
| age\_z:testlmi\_unit\_tot\_z |  |  | -0.126 | -0.211 – -0.042 |
| age\_z:testlmii\_unit\_tot\_z |  |  | -0.128 | -0.212 – -0.043 |
| age\_z:testpal\_ftm\_score\_z |  |  | -0.244 | -0.332 – -0.155 |
| age\_z:testreversed\_log\_pal\_te6\_score\_z |  |  | -0.179 | -0.268 – -0.090 |
| age\_z:testravlt\_arcl\_raw\_z |  |  | -0.148 | -0.239 – -0.056 |
| age\_z:testravlt\_t15\_tot\_z |  |  | -0.233 | -0.323 – -0.144 |
| age\_z:testrcft\_rcl\_raw\_z |  |  | -0.126 | -0.209 – -0.043 |
| age\_z:testrvp\_a\_z |  |  | -0.206 | -0.295 – -0.118 |
| age\_z:testssp\_len\_z |  |  | -0.212 | -0.303 – -0.121 |
| age\_z:testreversed\_log\_stroop\_c\_time\_z |  |  | -0.273 | -0.363 – -0.183 |
| age\_z:testreversed\_log\_swm\_be\_z |  |  | -0.179 | -0.276 – -0.082 |
| age\_z:testreversed\_log\_tmt\_b\_time\_z |  |  | -0.310 | -0.391 – -0.228 |
| age\_z:testwais\_com\_raw\_z |  |  | 0.083 | 0.001 – 0.164 |
| age\_z:testwais\_ds\_raw\_z |  |  | -0.032 | -0.129 – 0.066 |
| age\_z:testwais\_lns\_raw\_z |  |  | -0.149 | -0.237 – -0.061 |
| age\_z:testreversed\_log\_wais\_voc\_raw\_z |  |  | 0.123 | 0.045 – 0.201 |
| **Random Effects** | | | | |
| σ2 | 0.39 | | 0.39 | |
| τ00 | 0.50 Participant | | 0.44 Participant | |
| τ11 | 0.77 Participant.testcowat\_tot\_z | | 0.74 Participant.testcowat\_tot\_z | |
|  | 0.59 Participant.testlmi\_unit\_tot\_z | | 0.59 Participant.testlmi\_unit\_tot\_z | |
|  | 0.60 Participant.testlmii\_unit\_tot\_z | | 0.58 Participant.testlmii\_unit\_tot\_z | |
|  | 0.70 Participant.testpal\_ftm\_score\_z | | 0.67 Participant.testpal\_ftm\_score\_z | |
|  | 0.71 Participant.testreversed\_log\_pal\_te6\_score\_z | | 0.67 Participant.testreversed\_log\_pal\_te6\_score\_z | |
|  | 0.75 Participant.testravlt\_arcl\_raw\_z | | 0.73 Participant.testravlt\_arcl\_raw\_z | |
|  | 0.72 Participant.testravlt\_t15\_tot\_z | | 0.69 Participant.testravlt\_t15\_tot\_z | |
|  | 0.57 Participant.testrcft\_rcl\_raw\_z | | 0.55 Participant.testrcft\_rcl\_raw\_z | |
|  | 0.68 Participant.testrvp\_a\_z | | 0.65 Participant.testrvp\_a\_z | |
|  | 0.75 Participant.testssp\_len\_z | | 0.70 Participant.testssp\_len\_z | |
|  | 0.73 Participant.testreversed\_log\_stroop\_c\_time\_z | | 0.69 Participant.testreversed\_log\_stroop\_c\_time\_z | |
|  | 0.85 Participant.testreversed\_log\_swm\_be\_z | | 0.83 Participant.testreversed\_log\_swm\_be\_z | |
|  | 0.60 Participant.testreversed\_log\_tmt\_b\_time\_z | | 0.53 Participant.testreversed\_log\_tmt\_b\_time\_z | |
|  | 0.54 Participant.testwais\_com\_raw\_z | | 0.53 Participant.testwais\_com\_raw\_z | |
|  | 0.87 Participant.testwais\_ds\_raw\_z | | 0.85 Participant.testwais\_ds\_raw\_z | |
|  | 0.66 Participant.testwais\_lns\_raw\_z | | 0.66 Participant.testwais\_lns\_raw\_z | |
|  | 0.49 Participant.testreversed\_log\_wais\_voc\_raw\_z | | 0.46 Participant.testreversed\_log\_wais\_voc\_raw\_z | |
| ρ01 | -0.49 | | -0.46 | |
|  | -0.43 | | -0.38 | |
|  | -0.46 | | -0.41 | |
|  | -0.56 | | -0.56 | |
|  | -0.64 | | -0.61 | |
|  | -0.56 | | -0.51 | |
|  | -0.50 | | -0.48 | |
|  | -0.55 | | -0.54 | |
|  | -0.44 | | -0.45 | |
|  | -0.59 | | -0.61 | |
|  | -0.46 | | -0.51 | |
|  | -0.59 | | -0.60 | |
|  | -0.46 | | -0.50 | |
|  | -0.51 | | -0.50 | |
|  | -0.51 | | -0.49 | |
|  | -0.45 | | -0.44 | |
|  | -0.34 | | -0.31 | |
| ICC | 0.60 | | 0.59 | |
| N | 485 Participant | | 485 Participant | |
| Observations | 37291 | | 37291 | |
| Marginal R2 / Conditional R2 | 0.020 / 0.608 | | 0.079 / 0.620 | |

Experimental group trajectories for each cognitive test instrument, with and without adjustment for prior cognitive reserve and age. Reported p-values are taken from analysis of deviance tables. Tables of coefficients are also shown which include 95% confidence intervals.

Table S2.

## $emtrends

## test = reversed\_log\_bnt\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.00114 0.01524 37028 -0.028732 0.0310

## Intervention 0.04422 0.00954 37028 0.025532 0.0629

##

## test = cowat\_tot\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.05002 0.01562 37028 0.019400 0.0806

## Intervention 0.03792 0.01008 37028 0.018166 0.0577

##

## test = lmi\_unit\_tot\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.10738 0.01532 37028 0.077365 0.1374

## Intervention 0.12571 0.00988 37028 0.106342 0.1451

##

## test = lmii\_unit\_tot\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.10884 0.01530 37028 0.078855 0.1388

## Intervention 0.13907 0.00981 37028 0.119853 0.1583

##

## test = pal\_ftm\_score\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.07191 0.01550 37028 0.041528 0.1023

## Intervention 0.09528 0.00972 37028 0.076226 0.1143

##

## test = reversed\_log\_pal\_te6\_score\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.06444 0.01543 37028 0.034199 0.0947

## Intervention 0.07430 0.00960 37028 0.055485 0.0931

##

## test = ravlt\_arcl\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control -0.01539 0.01530 37028 -0.045373 0.0146

## Intervention 0.02540 0.00978 37028 0.006218 0.0446

##

## test = ravlt\_t15\_tot\_z:

## group Time.trend SE df lower.CL upper.CL

## Control -0.01219 0.01530 37028 -0.042165 0.0178

## Intervention 0.04396 0.00980 37028 0.024754 0.0632

##

## test = rcft\_rcl\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.12172 0.01525 37028 0.091835 0.1516

## Intervention 0.13582 0.00956 37028 0.117083 0.1546

##

## test = rvp\_a\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.07391 0.01586 37028 0.042817 0.1050

## Intervention 0.09204 0.01013 37028 0.072178 0.1119

##

## test = ssp\_len\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.08708 0.01562 37028 0.056462 0.1177

## Intervention 0.04668 0.00974 37028 0.027587 0.0658

##

## test = reversed\_log\_stroop\_c\_time\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.06444 0.01554 37028 0.033983 0.0949

## Intervention 0.07977 0.00985 37028 0.060454 0.0991

##

## test = reversed\_log\_swm\_be\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.02465 0.01585 37028 -0.006406 0.0557

## Intervention 0.05096 0.01004 37028 0.031283 0.0706

##

## test = reversed\_log\_tmt\_b\_time\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.07922 0.01541 37028 0.049020 0.1094

## Intervention 0.08782 0.00965 37028 0.068904 0.1067

##

## test = wais\_com\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control -0.01857 0.01529 37028 -0.048536 0.0114

## Intervention 0.01919 0.00964 37028 0.000305 0.0381

##

## test = wais\_ds\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.00484 0.01562 37028 -0.025771 0.0355

## Intervention 0.02614 0.01014 37028 0.006263 0.0460

##

## test = wais\_lns\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control 0.01724 0.01545 37028 -0.013034 0.0475

## Intervention 0.02744 0.00993 37028 0.007970 0.0469

##

## test = reversed\_log\_wais\_voc\_raw\_z:

## group Time.trend SE df lower.CL upper.CL

## Control -0.02242 0.01547 37028 -0.052735 0.0079

## Intervention 0.00512 0.00994 37028 -0.014370 0.0246

##

## Confidence level used: 0.95

##

## $contrasts

## test = reversed\_log\_bnt\_raw\_z:

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

## Control - Intervention -0.04309 0.0165 37028 -2.618 0.0088

##

## test = cowat\_tot\_z:

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

## Control - Intervention 0.01210 0.0165 37028 0.731 0.4646

##

## test = lmi\_unit\_tot\_z:

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

## Control - Intervention -0.01832 0.0162 37028 -1.133 0.2574

##

## test = lmii\_unit\_tot\_z:

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

## Control - Intervention -0.03024 0.0162 37028 -1.863 0.0625

##

## test = pal\_ftm\_score\_z:

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

## Control - Intervention -0.02337 0.0167 37028 -1.402 0.1610

##

## test = reversed\_log\_pal\_te6\_score\_z:

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

## Control - Intervention -0.00986 0.0167 37028 -0.592 0.5542

##

## test = ravlt\_arcl\_raw\_z:

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

## Control - Intervention -0.04078 0.0163 37028 -2.507 0.0122

##

## test = ravlt\_t15\_tot\_z:

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

## Control - Intervention -0.05614 0.0162 37028 -3.457 0.0005

##

## test = rcft\_rcl\_raw\_z:

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

## Control - Intervention -0.01411 0.0164 37028 -0.858 0.3908

##

## test = rvp\_a\_z:

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

## Control - Intervention -0.01813 0.0169 37028 -1.071 0.2841

##

## test = ssp\_len\_z:

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

## Control - Intervention 0.04041 0.0169 37028 2.395 0.0166

##

## test = reversed\_log\_stroop\_c\_time\_z:

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

## Control - Intervention -0.01533 0.0166 37028 -0.924 0.3553

##

## test = reversed\_log\_swm\_be\_z:

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

## Control - Intervention -0.02630 0.0170 37028 -1.547 0.1218

##

## test = reversed\_log\_tmt\_b\_time\_z:

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

## Control - Intervention -0.00861 0.0166 37028 -0.520 0.6033

##

## test = wais\_com\_raw\_z:

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

## Control - Intervention -0.03777 0.0164 37028 -2.299 0.0215

##

## test = wais\_ds\_raw\_z:

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

## Control - Intervention -0.02129 0.0165 37028 -1.294 0.1956

##

## test = wais\_lns\_raw\_z:

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

## Control - Intervention -0.01020 0.0164 37028 -0.623 0.5334

##

## test = reversed\_log\_wais\_voc\_raw\_z:

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

## Control - Intervention -0.02753 0.0164 37028 -1.678 0.0933

Estimated marginal mean trends for experimental groups, adjusted for prior cognitive reserve and age.

Table S3.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **value** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | -0.223 | -0.315 – -0.131 | **<0.001** |
| Prior Cognitive Reserve(z) | 0.147 | 0.105 – 0.190 | **<0.001** |
| Time | 0.063 | 0.045 – 0.080 | **<0.001** |
| scale(age\_1) | -0.183 | -0.278 – -0.087 | **<0.001** |
| Educational intervention group: Intervention | 0.051 | -0.055 – 0.157 | 0.344 |
| Time:scale(age\_1) | -0.027 | -0.037 – -0.017 | **<0.001** |
| Time:groupIntervention | 0.007 | -0.013 – 0.026 | 0.498 |
| scale(age\_1):groupIntervention | -0.001 | -0.108 – 0.107 | 0.991 |
| Time:scale(age\_1):groupIntervention | 0.009 | -0.002 – 0.020 | 0.122 |
| **Random Effects** | | | |
| σ2 | 0.73 | | |
| τ00 Participant | 0.20 | | |
| ICC | 0.21 | | |
| N Participant | 485 | | |
| Observations | 37291 | | |
| Marginal R2 / Conditional R2 | 0.070 / 0.268 | | |

Three-way age x Time x group interaction, adjusted for prior cognitive reserve.

Table S4.

|  |  |  |  |
| --- | --- | --- | --- |
| *Term* | *Chi.sq* | *df* | *p.value* |
| Time | 120.2 | 1 | <0.001 |
| scale(Academic Load) | 6.4 | 1 | 0.01 |
| Time:scale(Academic Load) | 3.3 | 1 | 0.07 |

|  |  |  |
| --- | --- | --- |
|  | **value** | |
| *Predictors* | *Estimates* | *CI* |
| (Intercept) | -0.103 | -0.149 – -0.058 |
| Time | 0.029 | 0.024 – 0.034 |
| scale(Academic Load) | 0.061 | 0.014 – 0.107 |
| Time : scale(Academic Load) | 0.004 | -0.000 – 0.009 |
| **Random Effects** | | |
| σ2 | 0.73 | |
| τ00 Participant | 0.24 | |
| τ11 Participant.Time | 0.00 | |
| ρ01 Participant | 0.54 | |
| ICC | 0.26 | |
| N Participant | 485 | |
| Observations | 37291 | |
| Marginal R2 / Conditional R2 | 0.009 / 0.271 | |

|  |  |  |  |
| --- | --- | --- | --- |
| *Term* | *Chi.sq* | *df* | *p.value* |
| Prior CR | 46.7 | 1 | <0.001 |
| scale(age\_1) | 103.8 | 1 | <0.001 |
| Time | 244.0 | 1 | <0.001 |
| test | 4.9 | 17 | 1.00 |
| scale(Academic Load) | 1.5 | 1 | 0.23 |
| Time:test | 329.4 | 17 | <0.001 |
| Time:scale(Academic Load) | 4.8 | 1 | 0.03 |
| test:scale(Academic Load) | 44.5 | 17 | <0.001 |
| Time:test:scale(Academic Load) | 9.2 | 17 | 0.93 |

Testing the association between academic load (in %FTE) and cognitive test-specific trajectories, adjusted for age and prior cognitive reserve.

Table S5.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Term* | *SS* | *num. df* | *denom. df* | *F* | *p.value* |
| group | 4.9 | 1 | 515.0 | 6.6 | 0.01 |
| Time | 53.1 | 1 | 37219.8 | 72.2 | <0.001 |
| Prior CR | 11.7 | 1 | 519.0 | 15.9 | <0.001 |
| group:Time | 8.6 | 1 | 37219.8 | 11.7 | <0.001 |
| group:Prior CR | 0.1 | 1 | 519.0 | 0.1 | 0.77 |
| Time:Prior CR | 0.3 | 1 | 37262.5 | 0.4 | 0.53 |
| group:Time:Prior CR | 0.0 | 1 | 37262.5 | 0.0 | 0.90 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Term* | *SS* | *num. df* | *denom. df* | *F* | *p.value* |
| age\_z | 47.9 | 1 | 541.6 | 65.3 | <0.001 |
| Time | 163.3 | 1 | 1616.6 | 222.3 | <0.001 |
| group | 0.7 | 1 | 519.1 | 0.9 | 0.34 |
| Prior CR | 19.3 | 1 | 524.6 | 26.3 | <0.001 |
| age\_z:Time | 58.0 | 1 | 37260.7 | 78.9 | <0.001 |
| Time:group | 3.2 | 1 | 37239.3 | 4.4 | 0.04 |
| Time:Prior CR | 1.7 | 1 | 37278.9 | 2.3 | 0.13 |
| group:Prior CR | 0.1 | 1 | 524.3 | 0.2 | 0.66 |
| Time:group:Prior CR | 0.0 | 1 | 37279.8 | 0.1 | 0.82 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **value** | | **value** | |
| *Predictors* | *Estimates* | *CI* | *Estimates* | *CI* |
| (Intercept) | -0.222 | -0.324 – -0.121 | -0.217 | -0.310 – -0.125 |
| Educational intervention group: Intervention | 0.149 | 0.035 – 0.263 | 0.051 | -0.055 – 0.158 |
| Time | 0.014 | 0.005 – 0.024 | 0.059 | 0.047 – 0.071 |
| Prior Cognitive Reserve(z) | 0.104 | 0.008 – 0.201 | 0.121 | 0.033 – 0.209 |
| groupIntervention:Time | 0.019 | 0.008 – 0.030 |  |  |
| groupIntervention:Prior CR | 0.017 | -0.094 – 0.128 | 0.023 | -0.078 – 0.123 |
| Time:Prior CR | 0.002 | -0.007 – 0.012 | 0.004 | -0.006 – 0.013 |
| groupIntervention:Time:Prior CR | -0.001 | -0.012 – 0.011 |  |  |
| age z |  |  | -0.182 | -0.226 – -0.138 |
| age\_z:Time |  |  | -0.021 | -0.025 – -0.016 |
| Time:groupIntervention |  |  | 0.012 | 0.001 – 0.023 |
| Time:groupIntervention:Prior CR |  |  | 0.001 | -0.010 – 0.013 |
| **Random Effects** | | | | |
| σ2 | 0.74 | | 0.73 | |
| τ00 | 0.24 Participant | | 0.20 Participant | |
| ICC | 0.25 | | 0.21 | |
| N | 485 Participant | | 485 Participant | |
| Observations | 37291 | | 37291 | |
| Marginal R2 / Conditional R2 | 0.025 / 0.268 | | 0.070 / 0.268 | |

Testing the association between prior cognitive reserve and experimental group trajectories, with and without adjusting for the main effect of age and the interaction between age and Time.