Supplementary Material

This online supplemental material contains further details on:

* **Section 1.** Checkup of all analyses with groups based on divergent cut-off points
* **Section 2.** Mean differences between the group values of individual competence measurements
* **Section 3.** Repeated measures ANCOVA of mathematical development with gradual addition of the covariates
* **Section 4.** Check of the explanatory value of sex for group differences in mathematics
* **Section 5.** Comparison of analyses with the initial central executive measurement vs. the utilized central executive measurement

# Section 1. Checkup of all analyses with groups based on divergent cut-off points

**Supplementary Figure 1.** Development of mathematical (K-4), vocabulary (K-3), and grammar (K-1) skills in groups (cut-off point -1.1 *SD*) with different forms of pre-school measured learning difficulties (MD/LD: *n* = 15; MD: *n* = 20; LD: *n* = 22) vs. typically achieving children (TA: *n* = 244) under the control of covariates w/o vs. w/ working memory.

**Supplementary Figure 2***.* Development of mathematical (K-4), vocabulary (K-3), and grammar (K-1) skills in groups (cut-off point -0.9 *SD*) with different forms of pre-school measured learning difficulties (MD/LD: *n* = 21; MD: *n* = 32; LD: *n* = 24) vs. typically achieving children (TA: *n* = 224) under the control of covariates w/o vs. w/ working memory.

Supplementary Table . *Differences between the group values (cut-off point -1.1 SD) of individual competence measurements under the control of covariates with vs. without working memory control*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MD/LD\*MD | | | MD/LD\*LD | | | MD/LD\*TA | | | MD\*LD | | | MD\*TA | | LD\*TA | |
| *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | *diff (SEdiff)* | |
| working memory | | | working memory | | | working memory | | | working memory | | | working memory | | working memory | |
| w/o | w/ | w/o | | w/ | w/o | | w/ | w/o | | w/ | w/o | | w/ | w/o | w/ |
| Mathematics |  | | | | | | | | | | | | | | | |
| t1 | 0.05 (0.22) | 0.10 (0.21) | **1.44  (0.23)** | | **1.09  (0.22)** | **1.89 (0.18)** | | **1.48 (0.17)** | **1.39 (0.19)** | | **1.19 (0.18)** | **1.84  (0.13)** | | **1.58  (0.13)** | 0.45 (0.14) | 0.39 (0.13) |
| t2 | 0.52 (0.25) | 0.29  (0.24) | 0.79  (0.25) | | 0.33  (0.24) | **1.66 (0.20)** | | **1.12 (0.20)** | 0.28  (0.21) | | 0.04  (0.20) | **1.14  (0.15)** | | **0.83  (0.14)** | **0.86 (0.15)** | **0.79  (0.15)** |
| t3 | 0.10  (0.25) | 0.32  (0.24) | 0.57  (0.25) | | 0.08  (0.24) | **1.31 (0.20)** | | **0.74  (0.20)** | 0.67  (0.21) | | 0.40  (0.20) | **1.42 (0.15)** | | **1.06  (0.14)** | **0.74 (0.15)** | **0.66  (0.15)** |
| t4 | 0.11 (0.25) | 0.31  (0.24) | 0.50 (0.25) | | 0.10  (0.25) | **1.20 (0.20)** | | **0.74  (0.20)** | 0.61  (0.21) | | 0.41  (0.20) | **1.31  (0.15)** | | **1.05  (0.14)** | **0.70 (0.16)** | 0.64  (0.15) |
| Vocabulary |  | | | | | | | | | | | | | | | |
| t1 | **1.58 (0.18)** | **1.52 (0.20)** | 0.24 (0.20) | | 0.12 (0.20) | **2.08 (0.16)** | | **1.94 (0.16)** | **1.34 (0.14)** | | **1.40 (0.16)** | **0.50 (0.08)** | | 0.42 (0.12) | **1.84  (0.12)** | **1.82 (0.12)** |
| t2 | **1.40  (0.21)** | **1.31  (0.22)** | 0.31 (0.22) | | 0.13 (0.22) | **1.96 (0.18)** | | **1.75 (0.18)** | **1.09 (0.17)** | | **1.18 (0.18)** | **0.57 (0.11)** | | 0.44 (0.13) | **1.65  (0.14)** | **1.62  (0.14)** |
| t3 | **0.83  (0.21)** | **0.73 (0.23)** | 0.07  (0.23) | | 0.12  (0.23) | **1.29 (0.19)** | | **1.06 (0.19)** | **0.76 (0.17)** | | **0.85  (0.19)** | 0.47 (0.09) | | 0.34 (0.14) | **1.22  (0.14)** | **1.19  (0.14)** |
| Grammar |  | | | | | | | | | | | | | | | |
| t1 | 1.57  (0.19) | 1.46  (0.21) | **0.04 (0.21)** | | **0.16 (0.21)** | **1.92 (0.17)** | | **1.68 (0.17)** | **1.53 (0.15)** | | **1.62 (0.17)** | 0.35 (0.09) | | 0.22 (0.12) | **1.88 (0.13)** | **1.84  (0.13)** |
| t2 | **1.00  (0.20)** | 0.81  (0.22) | 0.78  (0.23) | | 0.44  (0.22) | **1.85 (0.18)** | | **1.45 (0.18)** | 0.22  (0.16) | | 0.37  (0.18) | **0.86 (0.09)** | | **0.65  (0.13)** | **1.08  (0.14)** | **1.01  (0.13)** |

Notes. Significant differences (p < .05) between group values of the individual competence measurements are in bold. MD/LD = children with combined learning difficulties in mathematics and linguistics (n = 15); MD = children with mathematical learning difficulties (n = 20); LD = children with linguistic learning difficulties (n = 22); TA = typical achieving children (n = 244).

Supplementary Table . *Differences between the group values (cut-off point -.9 SD) of individual competence measurements under the control of covariates with vs. without working memory control*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MD/LD\*MD | | | MD/LD\*LD | | | MD/LD\*TA | | | MD\*LD | | | MD\*TA | | LD\*TA | |
| *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | *diff (SEdiff)* | |
| working memory | | | working memory | | | working memory | | | working memory | | | working memory | | working memory | |
| w/o | w/ | w/o | | w/ | w/o | | w/ | w/o | | w/ | w/o | | w/ | w/o | w/ |
| Mathematics |  | | | | | | | | | | | | | | | |
| t1 | 0.24  (0.18) | 0.10  (0.17) | **1.45 (0.17)** | | **1.14 (0.16)** | **1.91 (0.14)** | | **1.58 (0.14)** | **1.18 (0.15)** | | **1.05 (0.14)** | **1.68 (0.11)** | | **1.48 (0.10)** | **0.49  (0.10)** | 0.43  (0.10) |
| t2 | 0**.98 (0.20)** | 0.74  (0.19) | **0.80 (0.20)** | | 0.76  (0.19) | **1.94 (0.16)** | | **1.48 (0.16)** | 0.16  (0.17) | | 0.02  (0.16) | **0.96 (0.13)** | | **0.75  (0.12)** | **0.80  (0.12)** | **0.72  (0.11)** |
| t3 | 0.47  (0.21) | 0.48  (0.20) | **0.88  (0.20)** | | 0.25  (0.19) | **1.48 (0.17)** | | **0.99  (0.16)** | 0.41  (0.17) | | 0.23  (0.16) | **1.01 (0.13)** | | **0.74  (0.12)** | **0.60 (0.12)** | 0.51  (0.11) |
| t4 | 0.05  (0.20) | 0.18 (0.20) | 0.44  (0.20) | | 0.09  (0.20) | **1.12 (0.17)** | | **0.70 (0.16)** | 0.39  (0.17) | | 0.27 (0.16) | **1.07 (0.13)** | | **0.88  (0.12)** | **0.68  (0.12)** | **0.61  (0.11)** |
| Vocabulary |  | | | | | | | | | | | | | | | |
| t1 | **1.86 (0.16)** | **1.81 (0.16)** | **0.73 (0.15)** | | **0.65 (0.15)** | **2.21 (0.13)** | | **2.11 (0.13)** | **1.14 (0.13)** | | **1.17 (0.13)** | 0.35  (0.10) | | **0.30 (0.10)** | **1.48 (0.09)** | **1.46 (0.09)** |
| t2 | **1.47 (0.18)** | **1.46 (0.18)** | 0.36  (0.17) | | 0.23 (0.17) | **1.87 (0.14)** | | **1.70 (0.14)** | **1.11 (0.15)** | | **1.17 (0.15)** | **0.39 (0.11)** | | 0.30  (0.11) | **1.50 (0.10)** | **1.47 (0.10)** |
| t3 | **0.99  (0.19)** | **0.96  (0.19)** | 0.23  (0.18) | | 0.06  (0.18) | **1.37 (0.15)** | | **1.17 (0.15)** | **0.76 (0.15)** | | **0.81  (0.15)** | 0.38  (0.12) | | 0.30  (0.12) | **1.14 (0.11)** | **1.11 (0.11)** |
| Grammar |  | | | | | | | | | | | | | | | |
| t1 | **1.49 (0.16)** | **1.37 (0.16)** | 0.07  (0.16) | | 0.22  (0.16) | **1.86 (0.13)** | | **1.67 (0.13)** | **1.55 (0.13)** | | **1.59 (0.13)** | **0.37  (0.10)** | | 0.29  (0.10) | **1.92 (0.09)** | **1.88 (0.09)** |
| t2 | **0.91  (0.18)** | 0.64  (0.18) | **0.57  (0.18)** | | 0.25  (0.17) | **1.63 (0.14)** | | **1.23 (0.14)** | 0.35  (0.15) | | 0.39  (0.15) | **0.72  (0.11)** | | **0.59  (0.11)** | **1.06 (0.11)** | **0.98  (0.10)** |

Notes. Significant differences (p < .05) between group values of the individual competence measurements are in bold. MD/LD = children with combined learning difficulties in mathematics and linguistics (n = 21); MD = children with mathematical learning difficulties (n = 24); LD = children with linguistic learning difficulties (n = 32); TA = typical achieving children (n = 224).

# Mean-differences between the group values of individual competence measurements

Supplementary Table . *Differences between the group values of individual competence measurements under the control of covariates w/o vs. with working memory control*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MD/LD\*MD | | | MD/LD\*LD | | | MD/LD\*TA | | | MD\*LD | | | MD\*TA | | LD\*TA | |
| *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | | *diff (SEdiff)* | | *diff (SEdiff)* | |
| working memory | | | working memory | | | working memory | | | working memory | | | working memory | | working memory | |
| w/o | w/ | w/o | | w/ | w/o | | w/ | w/o | | w/ | w/o | | w/ | w/o | w/ |
| Mathematics |  | | | | | | | | | | | | | | | |
| t1 | 0.23  (0.20) | 0.06  (0.19) | **1.46 (0.20)** | | **1.13 (0.19)** | **1.95 (0.16)** | | **1.59 (0.16)** | **1.23 (0.16)** | | **1.07 (0.15)** | **1.72 (0.11)** | | **1.53 (0.10)** | **0.49  (0.12)** | 0.46  (0.12) |
| t2 | 0.73  (0.22) | 0.47  (0.21) | **1.06 (0.23)** | | 0.62  (0.22) | **1.86 (0.18)** | | **1.37 (0.18)** | 0.33  (0.18) | | 0.15  (0.17) | **1.13 (0.12)** | | **0.90  (0.12)** | **0.80  (0.14)** | **0.75  (0.13)** |
| t3 | 0.23  (0.22) | 0.04  (0.21) | 0.77  (0.23) | | 0.29  (0.22) | **1.36 (0.19)** | | **0.82  (0.18)** | 0.55  (0.19) | | 0.34  (0.18) | **1.13 (0.13)** | | **0.87  (0.12)** | **0.58  (0.14)** | 0.53  (0.13) |
| t4 | 0.15  (0.22) | 0.09  (0.22) | 0.70  (0.23) | | 0.31  (0.23) | **1.34 (0.19)** | | **0.90  (0.18)** | 0.55  (0.18) | | 0.40  (0.18) | **1.18 (0.13)** | | **0.99  (0.12)** | **0.64  (0.14)** | **0.40  (0.13)** |
| Vocabulary |  | | | | | | | | | | | | | | | |
| t1 | **1.83 (0.17)** | **1.77 (0.17)** | **0.70 (0.18)** | | **0.59 (0.18)** | **2.21 (0.14)** | | **2.09 (0.14)** | **1.13 (0.15)** | | **1.18 (0.15)** | **0.38  (0.10)** | | **0.33  (0.10)** | **1.52 (0.11)** | **1.50 (0.11)** |
| t2 | **1.45 (0.19)** | **1.35 (0.19)** | 0.36  (0.20) | | 0.18  (0.20) | **1.88 (0.16)** | | **1.69 (0.16)** | **1.09 (0.16)** | | **1.17 (0.16)** | **0.44  (0.11)** | | 0.34  (0.11) | **1.53 (0.12)** | **1.51 (0.12)** |
| t3 | **0.88  (0.20)** | **0.76  (0.20)** | 0.29  (0.21) | | 0.10  (0.21) | **1.35 (0.17)** | | **1.13 (0.17)** | 0.59 (0.17) | | 0.67  (0.17) | 0.47  (0.12) | | 0.37  (0.12) | **1.06 (0.13)** | **1.04 (0.13)** |
| Grammar |  | | | | | | | | | | | | | | | |
| t1 | **1.86 (0.18)** | **1.54 (0.18)** | 0.05  (0.18) | | 0.16  (0.18) | **1.95 (0.16)** | | **1.72 (0.15)** | **1.63 (0.15)** | | **1.70 (0.15)** | 0.28  (0.10) | | 0.18  (0.10) | **1.91 (0.11)** | **1.88 (0.11)** |
| t2 | **0.93  (0.20)** | 0.67  (0.19) | 0.70  (0.20) | | **0.33  (0.20)** | **1.75 (0.16)** | | **1.32 (0.16)** | 0.23  (0.17) | | 0.34  (0.16) | **0.81  (0.11)** | | **0.65  (0.11)** | **1.04 (0.13)** | **0.99  (0.12)** |

Notes. Significant differences (p < .05) between group values of the individual competence measurements are in bold. MD/LD = children with combined learning difficulties in mathematics and linguistics (n = 18); MD = children with mathematical learning difficulties (n = 26); LD = children with linguistic learning difficulties (n = 23); TA = typical achieving children (n = 234).

# Repeated measures ANCOVA of mathematical development with gradual addition of the covariates

Supplementary Table . *Repeated measures ANCOVA of mathematical development with gradual addition of the covariates*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* |
| Mathematic | **.88 (2111.41\*\*\*)** | **.76 (871.53\*\*\*)** | **40. (169.58\*\*\*)** | **.23 (77.06\*\*\*)** | **.13 (37.74\*\*\*)** | **.12 (34.86\*\*\*)** | **.11 (31.00\*\*\*)** |
| Mathematic\*Group | − | **.01 (2.46\*\*)** | **.04 (3.22\*\*\*)** | **.04 (3.12\*\*\*)** | **.03 (2.63\*\*)** | **.03 (2.66\*\*)** | **.03 (2.91\*\*)** |
| Mathematic\*SES | − | − | **.03 (6.96\*\*\*)** | **.03 (6.61\*\*\*)** | **.03 (7.47\*\*\*)** | **.03 (7.40\*\*\*)** | **.03 (6.71\*\*\*)** |
| Mathematic\*Sex | − | − | − | .01 (1.85) | .01 (1.83) | .01 (1.67) | .01 (1.58) |
| Mathematic\*GMDL | − | − | − | − | .01 (1.78) | .01 (2.03) | .01 (2.87) |
| Mathematic\*CE |  |  |  |  |  | **.01 (3.11\*)** | **.01(3.24\*)** |
| Mathematic\*PL |  |  |  |  |  |  | .01 (2.13) |

*Notes.* Repeated measures ANCOVA. Significant effects are highlighted in bold. SES = socioeconomic status; GMDL = German as main domestic language; CE = central executive; PL = phonological loop. *n* = 303; \*= *p* ≤ .05, \*\* = *p* ≤ .01, \*\*\* = *p* ≤ .001; *n* = 303.

# Check of the explanatory value of sex for group differences in mathematics

Supplementary Table . *Pearson correlations between working memory components and sex*

|  |  |  |
| --- | --- | --- |
|  | 1 | 2 |
| 1 Phonological loop |  |  |
| 2 Central executive | **.27\*\*** |  |
| 3 Sex | .09 | .17\*\* |

*Notes.* Values printed in bold represent significant relationships, \*= *p* ≤ .05, \*\* = *p* ≤ .01; *n* = 303.

Supplementary Table . *Univariate ANCOVA of central executive with sex as group variable*

|  |  |
| --- | --- |
|  |  |
| Central executive | **(*F*(4, 285) = 6.94, *p* < .001, = .09)** |
| Sex | **(*F*(4, 285) = 3.16, *p* = .044, = .02)** |
| Phonological loop | **(*F*(4, 285) = 18.75, *p* < .001, = .06)** |
| SES | (*F*(4, 285) = .89, *p* = .346, = .01) |

*Notes.* *n* = 303 ; SES = socioeconomic status.

Supplementary Table . *Descriptive overview of mathematical competencies between male and female children*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | male (*n* = 156) | | female (*n* = 146) | |
|  | *M* | *SD* | *M* | *SD* |
| Mathematics t1 | 0.58 | 1.05 | 0.36 | 0.95 |
| Mathematics t2 | 1.85 | 1.15 | 1.64 | 1.10 |
| Mathematics t2 | 2.54 | 1.20 | 2.39 | 1.11 |
| Mathematics t3 | 4.67 | 1.13 | 4.71 | 1.14 |

*Notes.* Descriptive statistics of mathematical skills in female and male children of the whole sample (*n* = 303).

# Comparison of analyses with the initial central executive measurement vs. the utilized central executive measurement

Supplementary Table . *Univariate ANCOVAs of mathematical competencies with direct vs. indirect measurement of central executive*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | central executive (direct) | central executive (indirect) | central executive (direct) | central executive (indirect) | central executive (direct) | central executive (indirect) | central executive (direct) | central executive (indirect) |
| Mathematics | t1 | | t2 | | t3 | | t4 | |
|  | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* | *(F)* |
| Model | **.50 (33.87\*\*\*)** | **.55 (42.03\*\*\*)** | **.38 (20.52\*\*\*)** | **.42 (23.96\*\*\*)** | **.32 (15.83\*\*\*)** | **.40 (22.12\*\*\*)** | **.31 (14.59\*\*\*)** | **.34 (17.27\*\*\*)** |
| Group | **.30 (38.21\*\*\*)** | **.35 (48.32\*\*\*)** | **.12 (12.69\*\*\*)** | **.15 (15.63\*\*\*)** | **.07 (7.02\*\*\*)** | **.10 (9.64\*\*\*)** | **.10 (9.42\*\*\*)** | **.11 (10.88\*\*\*)** |
| GERM | .00 (.78) | .00 (1.19) | .01 (2.14) | .01 (2.54) | .00 (.08) | .00 (.25) | .01 (2.61) | .01 (1.47) |
| SES | .00 (.01) | .01 (1.39) | **.05 (15.26\*\*\*)** | **.08 (21.96\*\*\*)** | **.03 (6.83\*\*)** | **.05 (13.51\*\*\*)** | **.07 (20.94\*\*\*)** | **.09 (25.76\*\*\*)** |
| Sex | **.02 (5.14\*)** | **.04 (11.28\*\*\*)** | **.03 (6.76\*\*)** | **.04 (11.47\*\*\*)** | **.02 (5.33\*)** | **.04 (11.91\*\*\*)** | .00 (.41) | .00 (.97) |
| PL | **.03 (7.84\*\*)** | **.03 (7.91\*\*)** | **.07 (18.71\*\*\*)** | **.07 (18.69\*\*\*)** | **.05 (15.38\*\*\*)** | **.05 (13.76\*\*\*)** | **.06 (15,76\*\*\*)** | **.05 (14.73\*\*\*)** |
| CE | **.08 (.30\*\*\*)** | **.17 (55.56\*\*\*)** | **.04 (10.91\*\*\*)** | **.09 (27.21\*\*\*)** | **.06 (18.03\*\*\*)** | **.17 (54.43\*\*\*)** | **.01 (3.72\*)** | **.06 (15.20\*\*\*)** |

*Notes.* Significant effects are highlighted in bold. GERM = German as main-domestic language; SES = socioeconomic status; PL = phonological loop; CE = central executive; *n* = 303; \*= *p* ≤ .05, \*\* = *p* ≤ .01 \*\*\* = *p* ≤ .001; *n* = 303.

Supplementary Table . *Univariate ANCOVAs of linguistic competencies with direct vs. indirect measurement of central executive*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | central executive (direct) | central executive (indirect) | central executive (direct) | central executive (indirect) | central executive (direct) | central executive (indirect) |
| Vocabulary | t1 | | t2 | | t3 | |
|  | (F) | (F) | (F) | (F) | (F) | (F) |
| Model | **.60 (50.93\*\*\*)** | **.62 (56.03\*\*\*)** | **.42 (24.85\*\*\*)** | **.43 (25.91\*\*\*)** | **.30 (14.32\*\*\*)** | **.30 (14.19\*\*\*)** |
| Group | **.41 (63.05\*\*\*)** | **.43 (68.88\*\*\*)** | **.25 (30.78\*\*\*)** | **.28 (35.98\*\*\*)** | **.11 (10.81\*\*\*)** | **.14 (13.82\*\*\*)** |
| GERM | **.08 (24.60\*\*\*)** | **.10 (29.27\*\*\*)** | .00 (.45) | .00 (.50) | **.02 (6.32\*)** | **.02 (6.18\*)** |
| SES | .00 (1.07) | .01 (1.60) | **.04 (11.55\*\*\*)** | **.04 (12.03\*\*\*)** | **.01 (2.75+)** | **.02 (3.98\*)** |
| Sex | **.04 (10.35\*\*)** | **.04 (11.02\*\*\*)** | .01 (2.62) | .01 (3.47) | .01 (2.73) | .01 (3.11) |
| PL | .01 (2.56) | .01 (2.41) | .01 (1.81) | .01 (2.42) | **.01 (3.0+)** | **.02 (4.71\*)** |
| CE | .00 (.79) | .01 (2.41) | **.03 (7.34\*\*)** | **.02 (6.51\*)** | **.03 (7.93\*)** | .01 (2.73) |
| Grammar | t1 | | t2 | |  | |
|  | (F) | (F) | (F) | (F) |  |  |
| Model | **.55 (42.12\*\*\*)** | **.54 (40.88\*\*\*)** | **.44 (26.33\*\*\*)** | **.43 (26.11\*\*\*)** |  |  |
| Group | **.40 (61.48\*\*\*)** | **.42 (67.43\*\*\*)** | **.15 (16.50\*\*\*)** | **.20 (21.45\*\*\*)** |  |  |
| GERM | .00 (.32) | .00 (.63) | .00 (.02) | .00 (.00) |  |  |
| SES | **.01 (3.74+)** | **.02 (6.14\*)** | **.04 (12.62\*\*\*)** | **.05 (15.22\*\*\*)** |  |  |
| Sex | .00 (.90) | .00 (1.14) | .01 (2.17) | .01 (2.16) |  |  |
| PL | **.03 (7.20\*\*)** | **.04 (10.77\*\*\*)** | **.10 (30.24\*\*\*)** | **.12 (36.73\*\*\*)** |  |  |
| CE | **.06 (16.05\*\*\*)** | **.02 (4.41\*)** | **.04 (11.30\*\*\*)** | .01 (2.50) |  |  |

Notes. Significant effects are highlighted in bold. Cursive effects are divergent effects of the initial central executive measurement, which was not used in our analyses due to the unacceptable reliability (α < .50). The initial central executive measurement was collected verbally (digit backward), the utilized central executive measurement was collected nonverbally. GERM = German as main domestic language; SES = socioeconomic status; PL = phonological loop; CE = central executive; n = 303; \*= p ≤ .05, \*\* = p ≤ .01, \*\*\* = p ≤ .001.