

Supplementary Table S2. Reasons for Risk of Bias Rating.

| Lead author | design | Exposure assessment | Outcome assessment | Confounding | Completeness of outcome data | Selective outcome reporting | Conflict of interest | Other |
|--------------------------------------|----------------|---|--|--|---|--|--|-------|
| Wargocki, P. (2007a) ^[28] | Case-crossover | Single quality controlled monitor, assumed <25% missing | The test was accurately scored based on objective criteria | Adjusting the results for these effects of increased familiarity with the exercise, fatigue, or differences between test versions | Missing data not expected to introduce substantial bias | All pre-specified outcomes outlined in the methods reported completely in a pre-specified way and no outcomes reported that were not pre-specified | Indirect evidence suggests study was free of conflict | None |
| Wargoki, P. (2007b) ^[29] | Case-crossover | Single quality controlled monitor, assumed <25% missing | The test was accurately scored based on objective criteria | Adjusting the results for these effects of increased familiarity with the exercise, fatigue, or differences between test versions | Missing data not expected to introduce substantial bias | All pre-specified outcomes outlined in the methods reported completely in a pre-specified way and no outcomes reported that were not pre-specified | Indirect evidence suggests study was free of conflict | None |
| Coley, D. (2007) ^[30] | Case-crossover | Single quality controlled monitor, assumed <25% missing | The test was accurately scored based on objective criteria | Lacking the effort to minimize confounding, e.g., the effect of increased familiarity with the exercise | Missing data not expected to introduce substantial bias | All pre-specified outcomes outlined in the methods reported completely in a pre-specified way and no outcomes reported that were not pre-specified | Indirect evidence suggests study was free of conflict | None |
| Petersen, S. (2016) ^[31] | Case-crossover | Single quality controlled monitor, assumed <25% missing | The test was accurately scored based on objective criteria | To minimize the effect of increased familiarity with the exercise, a rehearsal period was added prior to the baseline and crossover experiment | Missing data not expected to introduce substantial bias | All pre-specified outcomes outlined in the methods reported completely in a pre-specified way and no outcomes reported that were not pre-specified | Indirect evidence suggests study was free of conflict | None |
| Hviid, C. (2020) ^[32] | Case-crossover | Single quality controlled monitor, assumed <25% missing | The test was accurately scored based on objective criteria | Taking special precautions to minimize the effect of the external factors, such as solar radiation and positive learning curve, etc. | Missing data not expected to introduce substantial bias | All pre-specified outcomes outlined in the methods reported completely in a pre-specified way and no outcomes reported that were not pre-specified | Study authors make a claim denying conflicts of interest | None |

Supplementary Table S3. The tasks and the type of each task in the studies included in the meta-analysis.

| Lead author | Task | Type of task | Description | Outcome |
|--------------------------|---------------------------|----------------------|---|--|
| Wargoeki, P. (2007a)[28] | subtraction | arithmetic | the pupils subtracted two four-digit numbers. | Attempted units per min Percentage errors |
| | multiplication | arithmetic | the pupils multiplied two-digit numbers by three-digit numbers. | Attempted units per min Percentage errors |
| | addition | arithmetic | the pupils added two four-digit numbers. | Attempted units per min Percentage errors |
| | logical thinking | verbal comprehension | the pupils categorized statements describing the order of the letter pairs AB and BA as True or False. | Attempted units per min Percentage errors |
| | acoustic proof reading | verbal comprehension | the pupils read a text, marking the inserted errors, while listening to a recorded voice reading it aloud (10 errors were inserted per page of an otherwise correct transcript in such a way that they could not be found without listening and reading simultaneously). | Attempted units per min Percentage errors |
| | reading and comprehension | verbal comprehension | the pupils read text with choice points inserted (to determine whether the children understood the text, they had to mark one of three different words at each choice-point; all three words were correct in the immediate context of the phrase into which they had been inserted, but only one was correct in the context of the whole text). | Attempted units per min Percentage errors |
| | proofreading | verbal comprehension | the pupils read a prepared text in which four different kinds of errors had been inserted: spelling errors, two kinds of grammatical errors (one obvious in the context of the phrase in which it occurs and one correct in this context but incorrect in the wider context of the preceding text), and logical errors. | Attempted units per min Percentage errors |
| | number comparison | cognitive ability | the pupils checked columns of two seven-digit numbers against each other, the numbers being made similar or different by rotating three of the digits in the middle. | Attempted units per min Percentage errors |
| | | | | |
| Wargoki, P. (2007b)[29] | subtraction | arithmetic | the pupils subtracted two four-digit numbers. | Attempted units per min Percentage errors |
| | multiplication | arithmetic | the pupils multiplied two-digit numbers by three-digit numbers. | Attempted units per min Percentage errors |
| | addition | arithmetic | the pupils added two four-digit numbers. | Attempted units per min Percentage errors |
| | logical thinking | verbal comprehension | the pupils categorized statements describing the order of the letter pairs AB and BA as True or False. | Attempted units per min Percentage errors |
| | acoustic proof reading | verbal comprehension | the pupils read a text, marking the inserted errors, while listening to a recorded voice reading it aloud (10 errors were inserted per page of an otherwise correct transcript in such a way that they could not be found without listening and reading simultaneously). | Attempted units per min Percentage errors |
| | reading and comprehension | verbal comprehension | the pupils read text with choice points inserted (to determine whether the children understood the text, they had to mark one of three different words at each choice-point; all three words were correct in the immediate context of the phrase into which they had been inserted, but only one was correct in the context of the whole text). | Attempted units per min Percentage errors |
| | number comparison | cognitive ability | the pupils checked columns of two seven-digit numbers against each other, the numbers being made similar or different by rotating three of the digits in the middle. | Attempted units per min Percentage errors |
| | | | | |
| | simple reaction time | cognitive ability | | Reaction time |

| | | | | |
|----------------------------|---------------------------|----------------------|---|-----------------|
| Coley, D. (2007)[30] | | | The participant was instructed to press the 'YES' response button as quickly as possible every time the word 'YES' was presented on the screen. Thirty stimuli were presented with a varying inter-stimulus interval. | Accuracy |
| | choice reaction time | cognitive ability | Either the word 'NO' or the word 'YES' was presented on the screen and the participant was instructed to press the corresponding button as quickly as possible. There were 30 trials for which each stimulus word was chosen randomly with equal probability, with a varying inter-stimulus interval. Either the word 'NO' or the word 'YES' was presented on the screen and the participant was instructed to press the corresponding button as quickly as possible. There were 30 trials for which each stimulus word was chosen randomly with equal probability, with a varying inter-stimulus interval. | Reaction time |
| | | | | Accuracy |
| | digit vigilance | cognitive ability | A target digit was randomly selected and constantly displayed to the right of the screen. A series of digits was then presented in the center of the screen at the rate of 150 per min. The participant was required to press the 'YES' button as quickly as possible every time the digit in the series matched the target digit. There were 45 targets in the series and the task lasted for 3 min. | Reaction time |
| | | | | Accuracy |
| | picture presentation | cognitive ability | A series of 20 pictures was presented on the screen at the rate of 1 every 3 s for the participant to remember. | Reaction time |
| Petersen, S. (2016)[31] | addition | arithmetic | The pupils added two four-digit numbers. | Accuracy |
| | | | | Errors |
| | number comparison | cognitive ability | The pupils checked columns of two seven-digit numbers against each other, the numbers being made similar or different by rotating three of the digits in the middle. | Correct answers |
| | | | | Errors |
| | logical thinking | verbal comprehension | The pupils categorized statements describing the order of the letter pairs AB and BA as True or False. | Correct answers |
| | | | | Errors |
| Hviid, C. (2020)[32] | reading and comprehension | verbal comprehension | The pupils read text with choice points inserted (to determine whether the children understood the text, they had to mark one of three different words at each choice-point; all three words were correct in the immediate context of the phrase into which they had been inserted, but only one was correct in the context of the whole text). | Correct answers |
| | | | | Errors |
| | d2-test | cognitive ability | The test consists of 14 lines each containing 57 symbols. Each symbol is either the letter d or p with either one or two dots (· or ··) above or below the letter. The respondents mark only the symbol d with two dots (targets) while avoiding the other symbols (distracters). | TOT CORR |
| | | | | CONC |
| | baddeley test | verbal comprehension | the test combines a statement with a geometric figure and requires the pupils to categorize the statement as True or False. | Correct answers |
| | | | | Errors |
| | math | arithmetic | The pupils were asked to solve equations of multiplication and subtraction. The multiplication calculations were made as numbers between 2 and 5 multiplied by numbers between 10 and 50. The subtraction problems were made as numbers between 10 and 40 subtracted from numbers between 50 and 80. | Correct answers |
| | | | | Errors |