**Table 1 Definition of spatial ability factors.**

|  |  |  |
| --- | --- | --- |
| **Spatial ability Factors** | **Definition** | **Tasks** |
| **Flexibility of closure**  | The ability to find, apprehend, and identify a visual pattern fast, knowing in advance what is to be apprehended, when the pattern is disguised or obscured in some way (Carroll, 1993). |  |
| **Closure speed**  | The ability to apprehend and identify a visual pattern fast, without knowing in advance what the pattern is, when the pattern is disguised or obscured in some way (Carroll, 1993). |  |
| **Perceptual speed**  | The ability to find a known visual pattern or accurately comparing one or more patterns in a visual field fast in which the patterns are not disguised or obscured (Carroll, 1993). |  |
| **Visualization**  | The ability to manipulate or transform the image of spatial patterns into other arrangements (Ekstrom, French, Harman, & Dermen, n.d.) . |  |
| **Spatial relation**  | The ability to manipulate relatively simple visual patterns fast by whatever means (mental rotation, transformation, or otherwise) (Carroll, 1993).  |  |
| **Spatial orientation**  | The ability to the comprehension of the agreement of elements within a visual stimulus pattern and the aptitude to remain unconfused by the changing orientation in which a spatial configuration may be presented (McGee, 1979). In short, spatial orientation is perceived as one’s ability to imagine the appearance of an object from different perspectives (Yilmaz, 2009) |  |
| **Spatial temporal**  | The ability to judge regarding a moving stimulus (Halpern, 2013) |  |
| **wayfinding**  | It requires integrating the spatial information about natural and artificial objects and surfaces in an individual’s surroundings. These abilities are considered essential for way finding (WF) and navigation (Allen, 1999; Bell & Saucier, 2004) |  |

**Note: In the Spatial Temporal task a red circular target moves horizontally across the top of the screen. This moving circular target should be hit a ‘blue missile’ by participants with pressing the spacebar. The missile launches from the lower right corner of the screen.**

**Table 2 Basic information**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **ADHD (f=14, m=50)** | **TD (f=29, m=35)** | z |
| **Mean (SD)** | **Median** | **Mean (SD)** | **Median** |
| **Age** | 10.02 (0.98) | 10.02 | 9.97 (0.99) | 10.01 | -0.21 |
| **Education grade** | 4.09 (1.16) | 4 | 3.95 (0.99) | 4 | -0.48 |
| **Conner’s scale** | 67.73 (4.30) | 67 | 26 (14.23) | 24 | -9.64\* |

***\*p< .001***

***Abbreviation. f= female, m=male, SD= standard deviation***

**Table 3 Comparison of spatial ability variables between ADHD and TD groups.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tasks** | **Variables** | **ADHD** | **TD** | **z** |
| **Mean (SD)** | **Median** | **Mean (SD)** | **Median** |
| Flexibility of closure task  | ACC (%) | 67.48 (15.99) | 68.75 | 73.63 (14.50) | 75.00 | -2.09**\*** |
| RT  | 64.73 (12.99) | 66.09 | 63.06 (18.40) | 60.53 | -1.70 |
| Closure speed task | ACC (%) | 68.84 (15.71) | 70.59 | 81.84 (12.13) | 81.25 | -3.85**\*\*** |
| RT | 84.81 (28.05) | 78.9 | 75.57 (17.42) | 75.98 | -1.58 |
| Perceptual speed task | ACC (%) | 61.95 (19.32) | 64.71 | 80.47 (11.27) | 81.25 | -5.17**\*\*** |
| RT | 71.48 (30.54) | 67.29 | 65.80 (18.64) | 60.29 | -0.82 |
| Visualization Task | ACC (%) | 44.44 (17.43) | 44.44 | 61.81 (15.41) | 61.67 | -5.22**\*\*** |
| RT | 59.94 (27.08) | 63.84 | 80.53 (28.65) | 79.04 | -3.62**\*\*** |
| Spatial relation Task | ACC (%) | 61.52 (17.21) | 58.33 | 72.56 (20.56) | 75.00 | -3.40**\*\*** |
| RT | 89.65 (33.77) | 86.40 | 60.15 (24.72) | 57.25 | -5.20**\*\*** |
| Spatial orientation Task | ACC (%) | 43.75(20.27) | 38.89 | 56.51(19.61) | 61.11 | -3.75**\*\*** |
| RT | 61.92(38.31) | 52.51 | 77.48(35.15) | 81.64 | -2.84**\*\*** |
| Spatial temporal task | ACC (%) | 60.54 (19.1) | 62.00 | 73.63 (14.50) | 75.00 | -1.28 |
| Way finding Task | ML | ACC (%) | 71.44 (9.19) | 73.00 | 79.59 (13.19) | 81.25 | -3.39**\*\*** |
| LP | NT (%) | 52.50 (12.97) | 50.00 | 46.87 (7.75) | 50.00 | -2.69**\*\*** |
| SD | Meters | 36.20 (7.02) | 35.37 | 32.21 (7.91) | 32.03 | -2.90**\*\*** |

**\*p < .05, \*\* p < .001**

**Abbreviation. ACC= accuracy score, SD= standard deviation, RT= Reaction times of corrected responses.**

**Table 4 Comparison of executive function variables between ADHD and TD groups.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tasks** | **Variables** | **ADHD** | **TD** | **z** |
| **Mean (SD)** | **Median** | **Mean (SD)** | **Median** |
| **N-Back** | **ACC (%)** | 79.27 (17.54) | 87.50 | 87.58 (13.92) | 95 | -3.34\*\* |
| **WCST** | **Perseveration error (%)** | 29.39 (11.31) | 27.34 | 16.63 (8.46) | 14.48 | -6.59\*\* |
| **Clusters (%)** | 48.96 (18.27) | 50 | 71.61 (14.14) | 66.67 | -6.80\*\* |
| **Go/No- Go** | **No-Go (%)** | 81.14 (17.63) | 80.77 | 94.73 (7.21) | 96.15 | -5.46\*\* |
| **Go (%)** | 84.83 (15.98) | 87.50 | 92.12 (7.86) | 95.83 | -3.00\*\* |
| **Go Speed (S)** | 1.21 (0.31) | 1.26 | 1.33 (0.19) | 1.31 | -0.84\* |

**\*p < .05, \*\* p < .001**

**Table 5 Correlation between spatial ability factors and executive function in ADHD group.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Tasks** | **Dependent Variables** | **FC** | **CS** | **PS** | **VIS** | **SR** | **SO** | **ST** | **ML** | **LP (NT)** | **SD (Meters)** |
| **N-Back** | **ACC** | 0.33\*\* | 0.55\*\* | 0.27\* | 0.45\*\* | 0.20 | 0.53\*\* | 0.31**\*** | 0.21 | 0.06 | -0.10 |
| **WCST** | **Clusters** | 0.35\*\* | 0.39\*\* | 0.17 | 0.28\* | 0.37\*\* | -0.08 | 0.09 | -0.06 | 0.21 | 0.05 |
| **Perseveration Error** | -0.21 | -0.28\* | -0.08 | -0.24 | -0.09 | -0.11 | -0.04 | 0.15 | -0.12 | 0.04 |
| **Go/No- Go** | **No-Go** | -0.04 | 0.30\* | 0.13 | 0.16 | 0.16 | 0.13 | 0.10 | -0.08 | -0.01 | 0.10 |
| **Go** | 0.04 | 0.12 | 0.10 | -0.07 | -0.12 | -0.01 | 0.10 | 0.12 | -0.14 | -0.05 |

**\*p < .05, \*\* p < .001**

**Table 6 Correlation between spatial ability factors and executive function in TD group.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Tasks** | **Dependent Variables** | **FC** | **CS** | **PS** | **VIS** | **SR** | **SO** | **ST** | **ML** | **LP (NT)** | **SD (Meters)** |
| **N-Back** | **ACC** | 0.07 | 0.12 | 0.43\*\* | 0.06 | 0.30\* | 0.19 | 0.20 | 0.32\*\* | -0.32\* | -0.18 |
| **WCST** | **Clusters** | 0.17 | 0.15 | 0.10 | 0.41\*\* | 0.13 | 0.10 | -0.08 | O.35\*\* | -0.46\*\* | -0.05 |
| **Perseveration Error** | -0.22 | 0.01 | -0.09 | -0.36\*\* | -0.17 | -0.20 | 0.10 | -0.29\* | 0.32\*\* | -0.01 |
| **Go/No- Go** | **No-Go** | -0.32\* | -0.06 | -0.12 | 0.07 | 0.07 | -0.24 | -0.22 | -0.03 | -0.13 | 0.21 |
| **Go** | 0.24\* | 0.14 | 0.26\* | 0.16 | 0.05 | 0.14 | 0.29\*\* | 0.36\*\* | -0.10 | -0.02 |

**\*p < .05, \*\* p < .001**

**Table 7 Comparison of predictability of spatial ability factors on working memory (N-Back task) in two groups.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Group** | **Predictive Variables (ꞵ)** |  | **R2** | **R2adj** | F |
| **FC** | **CS** | **PS** | **VIS** | **SR** | **SO** | **ST** | **ML** | **LP** | **SD (Meters)** |
| **ADHD** | 0.07 | 0.65\*\* | -0.33\* | -0.08 | 0.06 | 0.33\* | 0.11 | 0.08 | 0.03 | -0.31\*\* | 0.529 | 0.440 | 5.95\*\* |
| **TD** | -0.12 | -0.07 | 0.35\* | -0.07 | 0.26 | -0.10 | 0.14 | 0.14 | -0.24\* | -0.09 | 0.353 | 0.231 | 2.891\*\* |

**\*p < .05, \*\* p < .001**

**Table 8 Comparison of predictability of spatial ability factors on cognitive flexibility (WCST) in two groups.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Dependent Variables** | **Group** | **Predictive Variables (ꞵ)** |  | **R2** | **R2adj** | **F** |
| **FC** | **CS** | **PS** | **VIS** | **SR** | **SO** | **ST** | **ML** | **LP** | **SD (Meters)** |
| **Clusters** | **ADHD** | 0.28\* | 0.68\*\* | -0.13 | -0.10 | 0.35\*\* | -0.43\*\* | -0.09 | -0.16 | 0.03 | -0.23 | 0.475 | 0.375 | 4.79\*\* |
| **TD** | 0.05 | -0.07 | -0.12 | 0.44\*\* | -0.09 | -0.08 | -0.03 | 0.26\* | -0.40\*\* | -0.09 | 0.433 | 0.326 | 4.05\*\* |
| **Perseveration Error** | **ADHD** | -0.12 | -0.53\* | 0.22 | 0.06 | -0.09 | 0.02 | 0.07 | 0.24 | -0.02 | 0.17 | 0.194 | 0.041 | 1.27 |
| **TD** | -0.22 | 0.31\* | 0.17 | -0.31\* | -0.05 | -0.08 | 0.08 | -0.22 | 0.29\* | 0.01 | 0.335 | 0.209 | 2.67\* |

**\*p < .05, \*\* p < .001**

**Table 9 Comparison of predictability of spatial ability factors on inhibition (Go/No- Go Task) in two groups.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Dependent Variables** | **Group** | **Predictive Variables (ꞵ)** | **R2** | **R2adj** | **F** |
| **FC** | **CS** | **PS** | **VIS** | **SR** | **SO** | **ST** | **ML** | **LP** | **SD**  |
| **No/Go** | **ADHD** | -0.23 | 0.53\* | -0.15 | -0.05 | 0.16 | 0.04 | 0.01 | -0.21 | -0.04 | -0.06 | 0.184 | 0.030 | 1.20 |
| **TD** | -0.36\* | 0.05 | 0.07 | 0.16 | 0.16 | -0.22 | -0.09 | 0.01 | -0.13 | 0.17 | 0.253 | 0.112 | 1.795 |
| **Go** | **ADHD** | 0.11 | 0.37 | -0.02 | -0.22 | -0.19 | -0.20 | 0.14 | 0.17 | -0.18 | -0.11 | 0.154 | -0.006 | 0.965 |
| **TD** | 0.16 | -0.04 | 0.05 | 0.11 | -0.03 | -0.13 | 0.24 | 0.28 | -0.04 | -0.02 | 0.22 | 0.07 | 1.509 |

**\*p < .05, \*\* p < .001**