Supplementary Material – ALS

Box 1 – Verbal Fluency Index Calculation

15 males and 13 females, age 57.07 years old (11.28), education 12.6 years (2.87), were tested in the spoken task of both letters (Π and Σ) to produce two discrete tables of the spoken Σ and Π. 28 healthy participants, 12 males and 16 females, age 56.97(9.15), education 13.73(2.84), were examined in the written task of both letters to develop the distinct tables of written Σ and Π.

Box 2 – Inter-Rater Reliability

The 4 assessors and the independent reviewer were equally trained in the administration and scoring of ECAS based on the relevant guidelines (<https://ecas.psy.ed.ac.uk/>). The 4 assessors administered the screens to healthy participants (N=52), ALS patients (N=28), and AD patients (N=26). The responses of the examinees were also recorded (typed) in a distinct sheet, which were solely accompanied with an id-number to maintain traceability and anonymity. The independent reviewer hence was blinded to the identity of both the examiner and the examinee. The independent reviewer evaluated the responses of the participants from all populations (N = 106). We thus formed two groups of scores i.e. (1) by the 4 assessors; (2) by the independent reviewer. The inter-rater reliability was calculated between the scores (ECAS Total Score, ECAS ALS-Specific, ECA ALS-Non-Specific) provided by the 4 assessors (1), and the independent reviewer (2). The inter-rater reliability analysis indicated an excellent ICC for all the scores i.e. ECAS Total Score (ICC = .88), ECAS ALS-Specific (ICC = .86), and ECA ALS-Non-Specific (ICC = .92). However, regarding the suitability of the ECAS for clinical implementation, solely the ICC of ECAS-Total Score (ICC = .88) should be considered.

Table 1 – Normative Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | N | Range | Minimum | Maximum | Mean (SD) | Cut-off |
| Age | 52 | 38 | 48 | 86 | 67.25 (9.69) |  |
| Education | 52 | 14 | 6 | 20 | 12.63 (3.22) |  |
| Sex | 26F/26M |  |  |  |  |  |
| ALS-CBS | 52 | 5 | 14 | 19 | 16.37 (1.22) | ≤ 13/30 |
| ECAS Total Score | 52 | 36 | 93 | 129 | 109.73 (8.35) | ≤ 93/136 |
| ECAS-ALS Specific | 52 | 25 | 68 | 93 | 80.81(6.33) | ≤ 68/100 |
| ECAS-ALS Non-Specific | 52 | 12 | 24 | 36 | 28.92 (2.88) | ≤ 23/36 |
| ACE-R | 52 | 14 | 85 | 99 | 91.94 (3.61) | ≤ 82/100 |
| MMSE | 52 | 8 | 22 | 30 | 27.65 (1.91) | ≤ 22/30 |
| ACE-III | 52 | 15 | 84 | 99 | 92.04 (3.81) | ≤ 83/100 |
| M-ACE | 52 | 8 | 22 | 30 | 26.96 (2.12) | ≤ 23/30 |

SD = Standard Deviation; Cut-offs indicate 2 SDs distance below the mean, they are presented out of the maximum score.

| Correlational Pairs | Pearson’s r | p-value | BF₁₀ |
| --- | --- | --- | --- |
| Education & ECAS Total Score | 0.401 \* | p<.01 | 11.647 |  |
| Education & ECAS ALS-Specific | 0.356 | p<.01 | 4.517 |  |
| Education & ECAS ALS Non-Specific | 0.379 | p<.01 | 7.213 |  |
| Education & ALS-CBS | 0.204 | 0.15 | 0.481 |  |
| Education & ACE-III | 0.284 | p<.05 | 1.307 |  |
| Education & M-ACE | 0.207 | 0.14 | 0.497 |  |
| Education & ACE-R | 0.202 | 0.15 | 0.472 |  |
| Education & MMSE | 0.126 | 0.38 | 0.254 |  |
| Age & ECAS Total Score | -0.163 | 0.25 | 0.331 |  |
| Age & ECAS ALS-Specific | -0.213 | 0.13 | 0.528 |  |
| Age & ECAS ALS Non-Specific | -0.005 | 0.97 | 0.173 |  |
| Age & ALS-CBS | -0.035 | 0.80 | 0.178 |  |
| Age & ACE-III | 0.104 | 0.46 | 0.225 |  |
| Age & M-ACE | 0.077 | 0.59 | 0.199 |  |
| Age & ACE-R | 0.003 | 0.98 | 0.173 |  |
| Age & MMSE | -0.198 | 0.16 | 0.452 |  |

Table 2 – Bayesian Pearson’s Correlations with Education & Age

BF= Bayes Factor; \* BF₁₀ > 10, \*\* BF₁₀ > 30, \*\*\* BF₁₀ > 100

| Correlational Pairs | Pearson’s r | p-value | BF₁₀ |
| --- | --- | --- | --- |
| ALS-CBS & ECAS Total Score | 0.818 \*\*\* | p<.001 | 2.271e +22 |  |
| ALS-CBS & ECAS ALS-Specific | 0.821 \*\*\* | p<.001 | 8.078e +22 |  |
| ALS-CBS & ECAS ALS Non-Specific | 0.490 \*\*\* | p<.001 | 186.2 |  |
| ALS-CBS & ACE-III | 0.775 \*\*\* | p<.001 | 2.615e +9 |  |
| ALS-CBS & M-ACE | 0.725 \*\*\* | p<.001 | 3.118e +7 |  |
| ALS-CBS Behavioural & ECAS Behavioural | -0.750 \*\*\* | p<.001 | 2356 |  |

Table 3 – Convergent Validity in ALS: Bayesian Pearson’s Correlations

BF= Bayes Factor; \* BF₁₀ > 10, \*\* BF₁₀ > 30, \*\*\* BF₁₀ > 100