**Supplementary material for: Characterisation of deficits and sex differences in verbal and visual memory/learning in bipolar disorder**

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**Supplementary Table 1.** *Demographic and clinical characteristics of all participants*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD*** | | | ***HC*** | | | ***Comparisons*** | |
|  | M | SD | N | M | SD | N | F/χ2 | *P* |
| *Sex (male/female)* |  |  | 50/64 |  |  | 42/63 | 0.36 | 0.55 |
| *Age (years)* | 38.1 | 12.2 |  | 33.3 | 13.1 |  | 7.73 | **0.006** |
| *Education (years)* | 16.7 | 4.6 |  | 16.3 | 4.0 |  | 0.55 | 0.46 |
| *MADRS* | 9.4 | 8.6 |  |  |  |  |  |  |
| *YMRS* | 4.8 | 4.6 |  |  |  |  |  |  |
| *Age of diagnosis* | 28.4 | 10.6 |  |  |  |  |  |  |
| *Symptom status (euthymic/symptomatic)* |  |  | 64/50 |  |  |  |  |  |
| *Subtype (BD I/II)* |  |  | 101/13 |  |  |  |  |  |
| *Psychosis history (yes/no)a* |  |  | 68/42 |  |  |  |  |  |
| *Comorbid anxiety disorder (yes/no)* |  |  | 60/54 |  |  |  |  |  |
| *Comorbid substance/alcohol abuse (yes/no)* |  |  | 15/99 |  |  |  |  |  |
| *Family history of BD/mood stabiliser(yes/no)b* |  |  | 34/76 |  |  |  |  |  |
| *Rapid cycling (yes/no)c* |  |  | 30/82 |  |  |  |  |  |
| *Mood stabilisers (yes/no)* |  |  | 77/37 |  |  |  |  |  |
| *Antipsychotics (yes/no)* |  |  | 56/58 |  |  |  |  |  |
| *Antidepressants (yes/no)* |  |  | 36/78 |  |  |  |  |  |
| *Other psychiatric meds (yes/no)* |  |  | 13/101 |  |  |  |  |  |
| *No meds (yes/no)* |  |  | 18/96 |  |  |  |  |  |

Note: BD = bipolar disorder; HC = healthy control; MADRS = Montgomery-Asberg Depression Rating Scale; M = mean; meds = medications; SD = standard deviation; YMRS = Young Mania Rating Scale; a data missing for n=4 participants; b data missing for 4 participants; c data missing for 2 participants; bolded values are significant at *p*<0.05.

**Supplementary Table 2.** *Ethnicity of all participants*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group | | | Frequency | % |
| **BD** |  | Caucasian/European | 98 | 86.0 |
| Black African descent | 4 | 3.5 |
| Hispanic/Latin American | 2 | 1.8 |
| Middle Eastern | 2 | 1.8 |
| Other | 3 | 2.6 |
| Missing | 5 | 4.4 |
| Total | 114 |  |
| **HC** |  | Caucasian/European | 62 | 59.0 |
| Black African descent | 7 | 6.7 |
| Asian | 9 | 8.6 |
| Middle Eastern | 1 | 1.0 |
| Other | 5 | 4.8 |
| Missing | 21 | 20.0 |
| Total | 105 |  |

Note: BD = bipolar disorder; HC = healthy control.

**Supplementary Table 3.** *Ethnicity of all participants separated by sex*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Group | Sex | | | | Frequency | | % | |
| **BD** | Male |  | Caucasian/European | 43 | | 86.0 | |
| Black African descent | 2 | | 4.0 | |
| Hispanic/Latin American | 2 | | 4.0 | |
| Middle Eastern | 1 | | 2.0 | |
| Other | 1 | | 2.0 | |
| Missing | 1 | | 2.0 | |
| Total | 50 | |  | |
| Female |  | Caucasian/European | 55 | | 85.9 | |
| Black African descent | 2 | | 3.1 | |
| Middle Eastern | 1 | | 1.6 | |
| Other | 2 | | 3.1 | |
| Missing | 4 | | 6.2 | |
| Total | 64 | |  | |
| **HC** | Male |  | Caucasian/European | 24 | | 57.1 | |
| Black African descent | 2 | | 4.8 | |
| Asian | 3 | | 7.1 | |
| Middle Eastern | 1 | | 2.4 | |
| Other | 4 | | 9.5 | |
| Missing | 8 | | 19.0 | |
| Total | 42 | |  | |
| Female |  | Caucasian/European | 38 | | 60.3 | |
| Black African descent | 5 | | 7.9 | |
| Asian | 6 | | 9.5 | |
| Other | 1 | | 1.6 | |
| Missing | 13 | | 20.6 | |
| Total | 63 | |  | |

Note: BD = bipolar disorder; HC = healthy control.

**Supplementary Table 4.** *Cohen’s d effect sizes for BD - HC (male – female) comparisons in all participants*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD Male***  ***(n = 50)*** | | ***BD Female***  ***(n = 64)*** | | ***HC Male***  ***(n = 42)*** | | ***HC Female***  ***(n = 63)*** | | ***Cohen’s d*** | | | |
|  | M | SD | M | SD | M | SD | M | SD | BD M -   BD F | HC M - HC F | BD M - HC M | BD F - HC F | |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  | |
| *Free recall T1* | 6.42 | 2.01 | 6.89 | 1.54 | 7.55 | 1.77 | 8.13 | 1.80 | 0.27 | 0.32 | 0.59 | 0.74 | |
| *Free recall T2* | 8.68 | 1.93 | 8.97 | 1.98 | 10.17 | 1.75 | 10.16 | 1.54 | 0.15 | 0.01 | 0.80 | 0.67 | |
| *Free recall T3* | 9.58 | 1.96 | 9.77 | 1.61 | 10.93 | 1.40 | 10.9 | 1.31 | 0.11 | 0.02 | 0.78 | 0.77 | |
| *Total recall (T1-T3 sum)* | 24.68 | 5.15 | 25.63 | 4.17 | 28.69 | 4.18 | 28.95 | 4.44 | 0.21 | 0.06 | 0.85 | 0.77 | |
| *Delayed recall (T4)* | 8.22 | 2.53 | 8.64 | 2.03 | 10.12 | 1.87 | 10.37 | 1.72 | 0.19 | 0.14 | 0.84 | 0.92 | |
| *Learning slope* | 3.34 | 1.66 | 3.16 | 1.52 | 3.50 | 1.64 | 2.87 | 1.54 | 0.11 | 0.40 | 0.10 | 0.19 | |
| *CWL* | 80.47 | 45.05 | 79.91 | 43.64 | 99.19 | 45.56 | 80.19 | 42.65 | 0.01 | 0.43 | 0.41 | 0.01 | |
| *Retention (%)* | 83.22 | 17.91 | 85.63 | 15.10 | 91.94 | 12.27 | 94.40 | 12.09 | 0.15 | 0.20 | 0.55 | 0.63 | |
| *Recognition DI* | 10.16 | 1.75 | 10.48 | 1.65 | 11.09 | 1.17 | 11.35 | 0.91 | 0.19 | 0.25 | 0.61 | 0.63 | |
| ***Visual memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  | |
| *Free recall T1* | 5.24 | 2.62 | 6.38 | 2.92 | 7.21 | 2.70 | 8.02 | 2.55 | 0.41 | 0.31 | 0.74 | 0.60 | |
| *Free recall T2* | 8.00 | 2.93 | 9.14 | 2.68 | 10.40 | 1.58 | 10.54 | 1.85 | 0.41 | 0.08 | 0.99 | 0.61 | |
| *Free recall T3* | 9.50 | 2.57 | 10.53 | 2.11 | 11.40 | 1.27 | 11.25 | 1.14 | 0.44 | 0.13 | 0.91 | 0.42 | |
| *Total recall (T1-T3 sum)* | 22.74 | 7.46 | 26.05 | 6.92 | 29.02 | 4.71 | 29.8 | 5.02 | 0.46 | 0.16 | 0.99 | 0.62 | |
| *Delayed recall (T4)* | 9.32 | 2.34 | 10.29 | 2.21 | 10.92 | 1.61 | 11.31 | 1.01 | 0.43 | 0.30 | 0.74 | 0.54 | |
| *Learning slope* | 4.34 | 1.90 | 4.23 | 2.34 | 4.29 | 2.53 | 3.30 | 2.04 | 0.05 | 0.44 | 0.02 | 0.42 | |
| *CSL* | 98.10 | 49.01 | 104.41 | 57.85 | 116.93 | 61.41 | 91.15 | 51.6 | 0.12 | 0.46 | 0.34 | 0.24 | |
| *Retention (%)* | 96.23 | 14.49 | 99.18 | 14.09 | 95.98 | 12.31 | 98.45 | 5.95 | 0.21 | 0.26 | 0.02 | 0.06 | |

Note: BD = bipolar disorder; HC = healthy control; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; F = female; M = male; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Data are mean (M) and standard deviation (SD); higher scores indicate better performance. Cohen’s *d* effect sizes are considered small (0.2), medium (0.5), large (0.8).

**Supplementary Table 5.** *Cohen’s d effect sizes for BD - HC comparisons in all participants*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***BD (n = 114)*** | | ***HC (n = 105)*** | |  |
|  | M | SD | M | SD | Cohen’s *d* |
| ***Verbal memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 6.68 | 1.77 | 7.89 | 1.80 | 0.68 |
| *Free recall T2* | 8.84 | 1.95 | 10.16 | 1.62 | 0.73 |
| *Free recall T3* | 9.68 | 1.77 | 10.91 | 1.34 | 0.78 |
| *Total recall (T1-T3 sum)* | 25.21 | 4.63 | 28.85 | 4.32 | 0.81 |
| *Delayed recall (T4)* | 8.46 | 2.26 | 10.27 | 1.78 | 0.87 |
| *Learning slope* | 3.24 | 1.58 | 3.13 | 1.61 | 0.07 |
| *CWL* | 80.16 | 44.07 | 87.79 | 44.61 | 0.17 |
| *Retention (%)* | 84.57 | 16.36 | 93.42 | 12.15 | 0.60 |
| *Recognition DI* | 10.35 | 1.69 | 11.24 | 1.03 | 0.62 |
| ***Visual memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 5.88 | 2.84 | 7.69 | 2.63 | 0.66 |
| *Free recall T2* | 8.64 | 2.84 | 10.49 | 1.74 | 0.78 |
| *Free recall T3* | 10.08 | 2.37 | 11.31 | 1.19 | 0.65 |
| *Total recall (T1-T3 sum)* | 24.60 | 7.32 | 29.49 | 4.89 | 0.78 |
| *Delayed recall (T4)* | 9.78 | 2.31 | 11.14 | 1.30 | 0.66 |
| *Learning slope* | 4.28 | 2.15 | 3.70 | 2.29 | 0.26 |
| *CSL* | 101.64 | 54.01 | 101.51 | 56.89 | 0.00 |
| *Retention (%)* | 97.64 | 14.27 | 97.34 | 9.25 | 0.02 |

Note: BD = bipolar disorder; HC = healthy control; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Higher scores indicate better performance. Cohen’s *d* effect sizes are considered small (0.2), medium (0.5), large (0.8).

**Supplementary Table 6.** *Cohen’s d effect sizes for male – female comparisons in all participants*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***Males (n = 92)*** | | ***Females (n = 127)*** | |  |
|  | M | SD | M | SD | Cohen’s *d* |
| ***Verbal memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 6.93 | 1.98 | 7.50 | 1.78 | 0.31 |
| *Free recall T2* | 9.36 | 1.99 | 9.56 | 1.87 | 0.10 |
| *Free recall T3* | 10.20 | 1.85 | 10.33 | 1.57 | 0.08 |
| *Total recall (T1-T3 sum)* | 26.51 | 5.12 | 27.28 | 4.60 | 0.16 |
| *Delayed recall (T4)* | 8.99 | 2.46 | 9.41 | 2.08 | 0.19 |
| *Learning slope* | 3.41 | 1.65 | 3.02 | 1.53 | 0.25 |
| *CWL* | 89.99 | 45.08 | 81.46 | 41.81 | 0.20 |
| *Retention (%)* | 86.75 | 16.37 | 89.52 | 14.47 | 0.18 |
| *Recognition DI* | 10.55 | 1.59 | 10.87 | 1.44 | 0.21 |
| ***Visual memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 6.14 | 2.82 | 7.18 | 2.85 | 0.37 |
| *Free recall T2* | 9.10 | 2.69 | 9.82 | 2.41 | 0.28 |
| *Free recall T3* | 10.37 | 2.28 | 10.88 | 1.73 | 0.26 |
| *Total recall (T1-T3 sum)* | 25.61 | 7.06 | 27.88 | 6.33 | 0.34 |
| *Delayed recall (T4)* | 9.77 | 2.27 | 10.64 | 1.94 | 0.41 |
| *Learning slope* | 4.32 | 2.20 | 3.78 | 2.24 | 0.24 |
| *CSL* | 106.58 | 55.43 | 97.94 | 55.07 | 0.16 |
| *Retention (%)* | 96.16 | 13.79 | 98.93 | 11.88 | 0.22 |

Note: CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Higher scores indicate better performance. Cohen’s *d* effect sizes are considered small (0.2), medium (0.5), large (0.8).

**Supplementary Table 7.** *Descriptives, main effects and interactions for the variables of interest in the euthymic BD patients and controls*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD (n = 64)*** | | | | | | ***HC (n = 105)*** | | | | | | ***Effect*** | | | | | |
|  | **Male** | | | **Female** | | | **Male** | | | **Female** | | | **Dx** | | **Sex** | | **Dx\*Sex** | |
|  | M | SD | *n* | M | SD | *n* | M | SD | *n* | M | SD | *n* | F | *p* | F | *p* | F | *p* |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 5.181 | 0.000 | 0.40 | 0.935 | 0.73 | 0.680 |
| *Free recall T1* | 6.71 | 2.00 | 28 | 6.75 | 1.46 | 36 | 7.55 | 1.77 | 42 | 8.08 | 1.83 | 62 | 14.46 | **<0.001** | 0.99 | 0.320 | 0.76 | 0.384 |
| *Free recall T2* | 8.64 | 1.81 | 28 | 8.78 | 1.99 | 36 | 10.17 | 1.75 | 42 | 10.14 | 1.53 | 62 | 26.79 | **<0.001** | 0.04 | 0.842 | 0.08 | 0.776 |
| *Free recall T3* | 9.68 | 1.96 | 28 | 9.61 | 1.57 | 36 | 10.93 | 1.40 | 42 | 10.87 | 1.33 | 62 | 26.52 | **<0.001** | 0.06 | 0.801 | 0.00 | 0.981 |
| *Total recall (T1-T3 sum)* | 25.04 | 4.93 | 28 | 25.14 | 4.40 | 36 | 28.69 | 4.18 | 42 | 28.86 | 4.47 | 62 | 26.52 | **<0.001** | 0.04 | 0.850 | 0.00 | 0.963 |
| *Delayed recall (T4)* | 8.18 | 2.61 | 28 | 8.14 | 2.19 | 36 | 10.12 | 1.87 | 34 | 10.35 | 1.71 | 63 | 36.24 | **<0.001** | 0.08 | 0.784 | 0.15 | 0.698 |
| *Learning slope* | 3.25 | 1.51 | 28 | 3.08 | 1.34 | 36 | 3.50 | 1.64 | 42 | 2.89 | 1.54 | 51 | 0.01 | 0.909 | 2.54 | 0.113 | 0.83 | 0.364 |
| *CWL* | 80.29 | 40.34 | 28 | 78.00 | 37.87 | 36 | 99.19 | 45.56 | 42 | 81.79 | 41.12 | 62 | 2.90 | 0.090 | 2.18 | 0.142 | 1.29 | 0.258 |
| *Retention (%)* | 81.13 | 20.13 | 28 | 82.16 | 16.24 | 36 | 91.94 | 12.27 | 34 | 94.51 | 12.00 | 51 | 25.52 | **<0.001** | 0.52 | 0.473 | 0.09 | 0.760 |
| *Recognition DI* | 10.04 | 1.99 | 28 | 10.25 | 1.95 | 36 | 11.09 | 1.17 | 35 | 11.35 | 0.90 | 51 | 18.54 | **<0.001** | 0.91 | 0.343 | 0.01 | 0.926 |
| ***Visual memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 2.404 | 0.083 | 0.54 | 0.926 | 0.17 | 0.985 |
| *Free recall T1* | 5.64 | 2.83 | 28 | 6.00 | 2.81 | 36 | 7.21 | 2.70 | 42 | 7.92 | 2.64 | 61 | 15.89 | **<0.001** | 1.47 | 0.227 | 0.16 | 0.692 |
| *Free recall T2* | 8.54 | 3.00 | 28 | 8.81 | 2.78 | 36 | 10.40 | 1.58 | 42 | 10.47 | 1.92 | 61 | 23.53 | **<0.001** | 0.21 | 0.648 | 0.08 | 0.777 |
| *Free recall T3* | 9.71 | 2.61 | 28 | 10.00 | 2.43 | 36 | 11.40 | 1.27 | 42 | 11.21 | 1.16 | 61 | 24.78 | **<0.001** | 0.02 | 0.877 | 0.68 | 0.410 |
| *Total recall (T1-T3 sum)* | 23.89 | 7.86 | 28 | 24.81 | 7.27 | 36 | 29.02 | 4.71 | 42 | 29.60 | 5.23 | 63 | 26.52 | **<0.001** | 0.04 | 0.850 | 0.00 | 0.963 |
| *Delayed recall (T4)* | 9.95 | 1.84 | 22 | 10.09 | 2.47 | 23 | 10.92 | 1.61 | 13 | 11.24 | 1.03 | 16 | 5.60 | **0.021** | 0.25 | 0.621 | 0.04 | 0.841 |
| *Learning slope* | 4.18 | 1.81 | 28 | 4.14 | 2.06 | 36 | 4.29 | 2.53 | 42 | 3.35 | 2.07 | 61 | 0.95 | 0.330 | 1.96 | 0.163 | 1.65 | 0.200 |
| *CSL* | 97.57 | 47.18 | 28 | 99.81 | 55.14 | 36 | 116.93 | 61.41 | 41 | 91.60 | 51.3 | 61 | 0.41 | 0.524 | 1.75 | 0.188 | 2.59 | 0.116 |
| *Retention (%)* | 100.59 | 13.03 | 22 | 99.06 | 15.65 | 23 | 95.98 | 12.31 | 13 | 99.19 | 6.53 | 16 | 0.55 | 0.460 | 0.08 | 0.780 | 0.62 | 0.434 |

Note: BD = bipolar disorder; HC = healthy control; CSL = cumulative shape learning; CWL = cumulative word learning; Dx = diagnosis; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Higher scores indicate better performance. Verbal memory/learning was assessed with the Hopkins Verbal Learning Test – Revised, and visual memory/learning was measured with the Brief Visuospatial Memory Test – Revised. All *p*-values represent uncorrected *p*-values. Bolded values survived FDR correction (*p*<0.05).

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**Supplementary Table 8.** *Cohen’s d effect sizes for BD – HC (male – female) comparisons in the euthymic BD patients and controls*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD Male***  ***(n = 28)*** | | ***BD Female***  ***(n = 36)*** | | ***HC Male***  ***(n = 42)*** | | ***HC Female***  ***(n = 63)*** | | ***Cohen’s d*** | | | |
|  | M | SD | M | SD | M | SD | M | SD | BD M - BD F | HC M -  HC F | BD M - HC M | BD F - HC F | |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  | |
| *Free recall T1* | 6.71 | 2.00 | 6.75 | 1.46 | 7.55 | 1.77 | 8.13 | 1.80 | 0.02 | 0.32 | 0.45 | 0.82 | |
| *Free recall T2* | 8.64 | 1.81 | 8.78 | 1.99 | 10.17 | 1.75 | 10.16 | 1.54 | 0.07 | 0.01 | 0.86 | 0.80 | |
| *Free recall T3* | 9.68 | 1.96 | 9.61 | 1.57 | 10.93 | 1.40 | 10.9 | 1.31 | 0.04 | 0.02 | 0.76 | 0.92 | |
| *Total recall (T1-T3 sum)* | 25.04 | 4.93 | 25.14 | 4.40 | 28.69 | 4.18 | 28.95 | 4.44 | 0.02 | 0.06 | 0.81 | 0.86 | |
| *Delayed recall (T4)* | 8.18 | 2.61 | 8.14 | 2.19 | 10.12 | 1.87 | 10.37 | 1.72 | 0.02 | 0.14 | 0.88 | 1.17 | |
| *Learning slope* | 3.25 | 1.51 | 3.08 | 1.34 | 3.50 | 1.64 | 2.87 | 1.54 | 0.12 | 0.40 | 0.16 | 0.14 | |
| *CWL* | 80.29 | 40.34 | 78.00 | 37.87 | 99.19 | 45.56 | 80.19 | 42.65 | 0.06 | 0.43 | 0.43 | 0.05 | |
| *Retention (%)* | 81.13 | 20.13 | 82.16 | 16.24 | 91.94 | 12.27 | 94.40 | 12.09 | 0.06 | 0.20 | 0.68 | 0.89 | |
| *Recognition DI* | 10.04 | 1.99 | 10.25 | 1.95 | 11.09 | 1.17 | 11.35 | 0.91 | 0.11 | 0.25 | 0.68 | 0.80 | |
| ***Visual memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  | |
| *Free recall T1* | 5.64 | 2.83 | 6.00 | 2.81 | 7.21 | 2.70 | 8.02 | 2.55 | 0.13 | 0.31 | 0.57 | 0.76 | |
| *Free recall T2* | 8.54 | 3.00 | 8.81 | 2.78 | 10.40 | 1.58 | 10.54 | 1.85 | 0.09 | 0.08 | 0.83 | 0.78 | |
| *Free recall T3* | 9.71 | 2.61 | 10.00 | 2.43 | 11.40 | 1.27 | 11.25 | 1.14 | 0.12 | 0.13 | 0.88 | 0.73 | |
| *Total recall (T1-T3 sum)* | 23.89 | 7.86 | 24.81 | 7.27 | 29.02 | 4.71 | 29.8 | 5.02 | 0.12 | 0.16 | 0.83 | 0.84 | |
| *Delayed recall (T4)* | 9.95 | 1.84 | 10.09 | 2.47 | 10.92 | 1.61 | 11.31 | 1.01 | 0.06 | 0.30 | 0.57 | 0.72 | |
| *Learning slope* | 4.18 | 1.81 | 4.14 | 2.06 | 4.29 | 2.53 | 3.30 | 2.04 | 0.02 | 0.44 | 0.05 | 0.41 | |
| *CSL* | 97.57 | 47.18 | 99.81 | 55.14 | 116.93 | 61.41 | 91.15 | 51.6 | 0.04 | 0.46 | 0.34 | 0.16 | |
| *Retention (%)* | 100.59 | 13.03 | 99.06 | 15.65 | 95.98 | 12.31 | 98.45 | 5.95 | 0.11 | 0.26 | 0.37 | 0.06 | |

Note: BD = bipolar disorder; HC = healthy control; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; F = female; M = male; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Data are mean (M) and standard deviation (SD); higher scores indicate better performance. Cohen’s *d* effect sizes are considered small (0.2), medium (0.5), large (0.8).

**Supplementary Table 9.** *Cohen’s d effect sizes for BD – HC comparisons in the euthymic BD patients and controls*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***BD (n = 64)*** | | ***HC (n = 105)*** | |  |
|  | M | SD | M | SD | Cohen’s *d* |
| ***Verbal memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 6.73 | 1.70 | 7.87 | 1.81 | 0.64 |
| *Free recall T2* | 8.72 | 1.90 | 10.15 | 1.62 | 0.83 |
| *Free recall T3* | 9.64 | 1.74 | 10.90 | 1.35 | 0.83 |
| *Total recall (T1-T3 sum)* | 25.09 | 4.60 | 28.79 | 4.34 | 0.83 |
| *Delayed recall (T4)* | 8.16 | 2.37 | 10.26 | 1.77 | 1.03 |
| *Learning slope* | 3.16 | 1.41 | 3.13 | 1.60 | 0.02 |
| *CWL* | 79.00 | 38.67 | 88.75 | 43.58 | 0.23 |
| *Retention (%)* | 81.71 | 17.90 | 93.49 | 12.10 | 0.79 |
| *Recognition DI* | 10.16 | 1.95 | 11.24 | 1.02 | 0.73 |
| ***Visual memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 5.84 | 2.80 | 7.63 | 2.67 | 0.66 |
| *Free recall T2* | 8.69 | 2.86 | 10.44 | 1.78 | 0.78 |
| *Free recall T3* | 9.88 | 2.49 | 11.29 | 1.20 | 0.78 |
| *Total recall (T1-T3 sum)* | 24.41 | 7.48 | 29.37 | 5.01 | 0.82 |
| *Delayed recall (T4)* | 10.02 | 2.16 | 11.10 | 1.30 | 0.58 |
| *Learning slope* | 4.16 | 1.94 | 3.73 | 2.30 | 0.20 |
| *CSL* | 98.83 | 51.42 | 101.68 | 56.64 | 0.05 |
| *Retention (%)* | 99.81 | 14.28 | 97.80 | 9.43 | 0.16 |

Note: BD = bipolar disorder; HC = healthy control; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Higher scores indicate better performance. Cohen’s *d* effect sizes are considered small (0.2), medium (0.5), large (0.8).

**Supplementary Table 10.** *Cohen’s d effect sizes for male – female comparisons in the euthymic BD patients and controls*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***Males (n = 70)*** | | ***Females (n = 99)*** | |  |
|  | M | SD | M | SD | Cohen’s *d* |
| ***Verbal memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 7.21 | 1.90 | 7.60 | 1.81 | 0.21 |
| *Free recall T2* | 9.56 | 1.92 | 9.65 | 1.83 | 0.05 |
| *Free recall T3* | 10.43 | 1.75 | 10.41 | 1.54 | 0.01 |
| *Total recall (T1-T3 sum)* | 27.23 | 4.81 | 27.52 | 4.77 | 0.06 |
| *Delayed recall (T4)* | 9.24 | 2.42 | 9.44 | 2.20 | 0.09 |
| *Learning slope* | 3.40 | 1.58 | 2.96 | 1.46 | 0.29 |
| *CWL* | 91.63 | 44.24 | 80.41 | 39.81 | 0.27 |
| *Retention (%)* | 87.06 | 17.04 | 89.46 | 15.09 | 0.15 |
| *Recognition DI* | 10.62 | 1.66 | 10.9 | 1.52 | 0.18 |
| ***Visual memory/learning*** |  |  |  |  |  |
| *Free recall T1* | 6.59 | 2.84 | 7.21 | 2.84 | 0.22 |
| *Free recall T2* | 9.66 | 2.42 | 9.86 | 2.40 | 0.08 |
| *Free recall T3* | 10.73 | 2.08 | 10.77 | 1.82 | 0.02 |
| *Total recall (T1-T3 sum)* | 26.97 | 6.62 | 27.84 | 6.45 | 0.13 |
| *Delayed recall (T4)* | 10.31 | 1.79 | 10.58 | 2.05 | 0.14 |
| *Learning slope* | 4.24 | 2.26 | 3.64 | 2.09 | 0.28 |
| *CSL* | 109.07 | 56.52 | 94.61 | 52.61 | 0.27 |
| *Retention (%)* | 98.87 | 12.78 | 99.12 | 12.48 | 0.02 |

Note: BD = bipolar disorder; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Higher scores indicate better performance. Cohen’s *d* effect sizes are considered small (0.2), medium (0.5), large (0.8).

**Supplementary Table 11.** *Mood stabiliser* *main effects and interactions for the variables of interest in BD patients*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD Males*** | | | | | | ***BD Females*** | | | | | | ***Effect*** | | | | | |
|  | **Off** | | | **On** | | | **Off** | | | **On** | | | **Sex** | | **Mood Stabiliser** | | **Sex\* Mood Stabiliser** | |
|  | M | SD | *n* | M | SD | *n* | M | SD | *n* | M | SD | *n* | F | *p* | F | *p* | F | *p* |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 0.525 | 0.835 | 0.135 | 0.997 | 0.578 | 0.794 |
| *Free recall T1* | 6.44 | 1.99 | 16 | 6.38 | 2.13 | 34 | 6.95 | 1.43 | 21 | 6.86 | 1.61 | 43 | 1.927 | 0.168 | 0.001 | 0.971 | 0.048 | 0.826 |
| *Free recall T2* | 8.74 | 1.76 | 16 | 8.56 | 2.31 | 34 | 9.05 | 1.94 | 21 | 8.93 | 2.02 | 43 | 0.730 | 0.395 | 0.005 | 0.945 | 0.133 | 0.716 |
| *Free recall T3* | 9.53 | 1.96 | 16 | 9.69 | 2.02 | 34 | 9.52 | 1.83 | 21 | 9.88 | 1.50 | 43 | 0.070 | 0.791 | 0.079 | 0.780 | 0.519 | 0.473 |
| *Total recall (T1-T3 sum)* | 24.71 | 4.92 | 16 | 24.63 | 5.78 | 34 | 25.52 | 4.12 | 21 | 25.67 | 4.24 | 43 | 0.984 | 0.323 | 0.015 | 0.902 | 0.001 | 0.071 |
| *Delayed recall (T4)* | 8.15 | 2.46 | 16 | 8.38 | 2.73 | 34 | 8.52 | 1.81 | 21 | 8.70 | 2.14 | 43 | 0.580 | 0.448 | 0.003 | 0.953 | 0.191 | 0.663 |
| *Learning slope* | 3.29 | 1.51 | 16 | 3.44 | 2.00 | 34 | 3.10 | 1.48 | 21 | 3.19 | 1.56 | 43 | 0.487 | 0.487 | 0.007 | 0.935 | 0.132 | 0.717 |
| *CWL* | 81.00 | 39.35 | 16 | 84.94 | 52.96 | 34 | 79.38 | 39.77 | 21 | 82.23 | 44.21 | 43 | 0.061 | 0.805 | 0.004 | 0.951 | 0.151 | 0.699 |
| *Retention (%)* | 82.69 | 18.37 | 16 | 84.34 | 17.44 | 34 | 84.45 | 12.00 | 21 | 86.20 | 16.51 | 43 | 0.295 | 0.588 | 0.000 | 0.988 | 0.260 | 0.611 |
| *Recognition DI* | 10.03 | 1.94 | 16 | 10.44 | 1.26 | 33 | 10.24 | 1.51 | 21 | 10.60 | 1.72 | 43 | 0.297 | 0.587 | 0.003 | 0.953 | 1.266 | 0.263 |
| ***Visual memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 0.683 | 0.686 | 0.981 | 0.455 | 0.903 | 0.511 |
| *Free recall T1* | 5.18 | 2.67 | 16 | 5.38 | 2.58 | 34 | 6.00 | 3.08 | 21 | 6.56 | 2.86 | 43 | 3.137 | 0.079 | 0.101 | 0.752 | 0.446 | 0.506 |
| *Free recall T2* | 7.88 | 3.11 | 16 | 8.25 | 2.59 | 34 | 8.67 | 3.02 | 21 | 9.37 | 2.50 | 43 | 2.838 | 0.095 | 0.089 | 0.766 | 0.899 | 0.345 |
| *Free recall T3* | 9.35 | 2.85 | 16 | 9.81 | 1.91 | 34 | 9.86 | 2.78 | 21 | 10.86 | 1.63 | 43 | 2.769 | 0.099 | 0.340 | 0.561 | 2.460 | 0.120 |
| *Total recall (T1-T3 sum)* | 22.41 | 7.95 | 16 | 23.44 | 6.48 | 34 | 24.52 | 8.09 | 21 | 26.79 | 6.24 | 43 | 3.566 | 0.062 | 0.184 | 0.669 | 1.294 | 0.258 |
| *Delayed recall (T4)* | 9.22 | 2.54 | 11 | 9.55 | 1.97 | 23 | 9.54 | 2.90 | 13 | 10.83 | 1.38 | 18 | 1.882 | 0.175 | 0.680 | 0.413 | 1.915 | 0.171 |
| *Learning slope* | 4.26 | 1.91 | 16 | 4.50 | 1.93 | 34 | 4.10 | 2.32 | 21 | 4.30 | 2.38 | 43 | 0.175 | 0.677 | 0.001 | 0.974 | 0.254 | 0.616 |
| *CSL* | 96.32 | 49.85 | 16 | 101.88 | 48.55 | 34 | 96.52 | 59.11 | 21 | 108.26 | 57.53 | 43 | 0.090 | 0.765 | 0.079 | 0.779 | 0.619 | 0.433 |
| *Retention (%)* | 94.74 | 13.03 | 11 | 99.34 | 17.43 | 23 | 97.24 | 11.11 | 13 | 100.58 | 16.07 | 18 | 0.252 | 0.617 | 0.029 | 0.865 | 1.138 | 0.290 |

Note: BD = bipolar disorder; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Verbal memory/learning was assessed with the Hopkins Verbal Learning Test – Revised, and visual memory/learning was measured with the Brief Visuospatial Memory Test – Revised. Higher scores indicate better performance. All *p*-values represent uncorrected *p*-values.

**Supplementary Table 12.** *Antipsychotic* *main effects and interactions for the variables of interest in BD patients*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD Males*** | | | | | | ***BD Females*** | | | | | | ***Effect*** | | | | | |
|  | **Off** | | | **On** | | | **Off** | | | **On** | | | **Sex** | | **Antipsychotic** | | **Sex\* Antipsychotic** | |
|  | M | SD | *n* | M | SD | *n* | M | SD | *n* | M | SD | *n* | F | *p* | F | *p* | F | *p* |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 0.491 | 0.860 | 1.307 | 0.249 | 2.109 | 0.041b |
| *Free recall T1* | 6.96 | 2.16 | 27 | 5.78 | 1.65 | 23 | 6.97 | 1.56 | 31 | 6.82 | 1.55 | 33 | 2.516 | 0.116 | 4.111 | 0.045a | 2.470 | 0.119 |
| *Free recall T2* | 9.07 | 1.80 | 27 | 8.22 | 2.02 | 23 | 9.32 | 1.72 | 31 | 8.64 | 2.16 | 33 | 0.831 | 0.364 | 4.440 | 0.037a | 0.054 | 0.816 |
| *Free recall T3* | 10.22 | 1.74 | 27 | 8.83 | 1.97 | 23 | 9.81 | 1.51 | 31 | 9.73 | 1.72 | 33 | 0.553 | 0.459 | 5.112 | 0.026a | 4.073 | 0.046a |
| *Total recall (T1-T3 sum)* | 26.26 | 4.94 | 27 | 22.83 | 4.86 | 23 | 26.10 | 4.04 | 31 | 25.18 | 4.30 | 33 | 1.654 | 0.201 | 6.500 | 0.012a | 2.180 | 0.143 |
| *Delayed recall (T4)* | 8.74 | 2.57 | 27 | 7.61 | 2.39 | 23 | 8.81 | 1.90 | 31 | 8.48 | 2.15 | 33 | 1.232 | 0.270 | 2.934 | 0.090 | 0.912 | 0.342 |
| *Learning slope* | 3.37 | 1.90 | 27 | 3.30 | 1.36 | 23 | 3.06 | 1.48 | 31 | 3.24 | 1.58 | 33 | 0.370 | 0.544 | 0.034 | 0.854 | 0.163 | 0.687 |
| *CWL* | 86.81 | 49.27 | 27 | 76.91 | 36.30 | 23 | 80.06 | 42.20 | 31 | 82.45 | 43.41 | 33 | 0.005 | 0.941 | 0.211 | 0.647 | 0.564 | 0.454 |
| *Retention (%)* | 82.95 | 16.52 | 27 | 83.53 | 19.80 | 23 | 87.54 | 15.35 | 31 | 83.83 | 14.87 | 33 | 0.614 | 0.435 | 0.252 | 0.616 | 0.475 | 0.492 |
| *Recognition DI* | 10.42 | 1.10 | 26 | 9.87 | 2.26 | 23 | 10.81 | 1.28 | 31 | 10.18 | 1.91 | 33 | 1.182 | 0.279 | 3.392 | 0.068 | 0.012 | 0.912 |
| ***Visual memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 1.093 | 0.381 | 1.339 | 0.250 | 0.752 | 0.630 |
| *Free recall T1* | 5.19 | 2.63 | 27 | 5.30 | 2.65 | 23 | 6.71 | 2.82 | 31 | 6.06 | 3.02 | 33 | 4.622 | 0.034a | 0.250 | 0.618 | 0.524 | 0.470 |
| *Free recall T2* | 8.07 | 3.01 | 27 | 7.91 | 2.91 | 23 | 9.65 | 2.39 | 31 | 8.67 | 2.88 | 33 | 4.842 | 0.030a | 1.163 | 0.283 | 0.599 | 0.441 |
| *Free recall T3* | 9.63 | 2.45 | 27 | 9.35 | 2.76 | 23 | 10.71 | 2.08 | 31 | 10.36 | 2.15 | 33 | 5.614 | 0.020a | 0.504 | 0.479 | 0.005 | 0.942 |
| *Total recall (T1-T3 sum)* | 22.89 | 7.39 | 27 | 22.57 | 7.71 | 23 | 27.06 | 6.54 | 31 | 25.09 | 7.23 | 33 | 6.078 | 0.015a | 0.714 | 0.400 | 0.368 | 0.545 |
| *Delayed recall (T4)* | 9.50 | 2.36 | 18 | 9.13 | 2.39 | 16 | 11.17 | 1.03 | 12 | 9.74 | 2.58 | 19 | 4.001 | 0.050a | 2.510 | 0.118 | 0.857 | 0.358 |
| *Learning slope* | 4.52 | 1.99 | 27 | 4.13 | 1.82 | 23 | 4.16 | 2.16 | 31 | 4.30 | 2.53 | 33 | 0.050 | 0.823 | 0.090 | 0.765 | 0.415 | 0.521 |
| *CSL* | 102.44 | 51.75 | 27 | 93.00 | 46.20 | 23 | 106.23 | 54.77 | 31 | 102.7 | 61.4 | 33 | 0.427 | 0.515 | 0.395 | 0.531 | 0.082 | 0.775 |
| *Retention (%)* | 95.16 | 16.23 | 18 | 97.44 | 12.67 | 16 | 103.7 | 12.29 | 12 | 96.32 | 14.71 | 19 | 1.065 | 0.306 | 0.503 | 0.481 | 1.801 | 0.185 |

Note: BD = bipolar disorder; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Verbal memory/learning was assessed with the Hopkins Verbal Learning Test – Revised, and visual memory/learning was measured with the Brief Visuospatial Memory Test – Revised. Higher scores indicate better performance. All *p*-values represent uncorrected *p*-values. Bolded values survived FDR correction (*p*<0.05); a are significant at *p*<0.05 uncorrected but did not survive FDR correction; b omnibus test is significant at *p*<0.05 uncorrected (no correction applied).

**Supplementary Table 13.** *Antidepressant* *main effects and interactions for the variables of interest in BD patients*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD Males*** | | | | | | ***BD Females*** | | | | | | ***Effect*** | | | | | | |
|  | **Off** | | | **On** | | | **Off** | | | **On** | | | **Sex** | | **Antidepressant** | | **Sex\* Antidepressant** | | |
|  | M | SD | *n* | M | SD | *n* | M | SD | *n* | M | SD | *n* | F | *p* | F | *p* | F | *p* |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 0.967 | 0.466 | 1.615 | 0.129 | 1.430 | 0.193 |
| *Free recall T1* | 6.65 | 1.84 | 37 | 5.77 | 2.39 | 13 | 6.61 | 1.41 | 41 | 7.39 | 1.67 | 23 | 4.834 | 0.030a | 0.018 | 0.892 | 5.320 | 0.023a |
| *Free recall T2* | 9.00 | 1.68 | 37 | 7.77 | 2.35 | 13 | 8.61 | 1.97 | 41 | 9.61 | 1.85 | 23 | 3.365 | 0.069 | 0.086 | 0.770 | 7.966 | **0.006** |
| *Free recall T3* | 9.84 | 1.66 | 37 | 8.85 | 2.58 | 13 | 9.39 | 1.64 | 41 | 10.43 | 1.34 | 23 | 2.556 | 0.113 | 0.005 | 0.941 | 8.139 | **0.005** |
| *Total recall (T1-T3 sum)* | 25.49 | 4.27 | 37 | 22.38 | 6.79 | 13 | 24.61 | 4.12 | 41 | 27.43 | 3.69 | 23 | 5.102 | 0.026a | 0.022 | 0.881 | 10.289 | **0.002** |
| *Delayed recall (T4)* | 8.43 | 2.24 | 37 | 7.62 | 3.23 | 13 | 8.10 | 1.91 | 41 | 9.61 | 1.90 | 23 | 3.315 | 0.071 | 0.581 | 0.448 | 6.532 | 0.012a |
| *Learning slope* | 3.41 | 1.64 | 37 | 3.15 | 1.77 | 13 | 3.12 | 1.31 | 41 | 3.22 | 1.88 | 23 | 0.110 | 0.741 | 0.056 | 0.814 | 0.274 | 0.601 |
| *CWL* | 85.54 | 41.74 | 37 | 72.92 | 49.23 | 13 | 77.17 | 35.62 | 41 | 88.65 | 52.72 | 23 | 0.170 | 0.681 | 0.004 | 0.949 | 1.825 | 0.179 |
| *Retention (%)* | 83.17 | 16.67 | 37 | 83.35 | 21.82 | 13 | 82.62 | 13.83 | 41 | 90.98 | 16.09 | 23 | 1.104 | 0.296 | 1.608 | 0.207 | 1.475 | 0.227 |
| *Recognition DI* | 10.17 | 1.83 | 36 | 10.15 | 1.57 | 13 | 9.98 | 1.77 | 41 | 11.39 | 0.89 | 23 | 2.932 | 0.125 | 4.299 | 0.040a | 4.458 | 0.037a |
| ***Visual memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Omnibus* |  |  |  |  |  |  |  |  |  |  |  |  | 1.179 | 0.330 | 0.338 | 0.933 | 0.948 | 0.478 |
| *Free recall T1* | 5.43 | 2.63 | 37 | 4.69 | 2.59 | 13 | 6.02 | 2.85 | 41 | 7.00 | 3.00 | 23 | 6.312 | **0.013** | 0.042 | 0.839 | 2.210 | 0.140 |
| *Free recall T2* | 8.41 | 2.86 | 37 | 6.85 | 2.94 | 13 | 8.76 | 2.90 | 41 | 9.83 | 2.10 | 23 | 8.521 | **0.004** | 0.184 | 0.669 | 5.310 | 0.023a |
| *Free recall T3* | 9.73 | 2.60 | 37 | 8.85 | 2.48 | 13 | 10.27 | 2.36 | 41 | 11.00 | 1.51 | 23 | 7.879 | **0.006** | 0.025 | 0.874 | 2.836 | 0.095 |
| *Total recall (T1-T3 sum)* | 23.57 | 7.34 | 37 | 20.38 | 7.59 | 13 | 25.05 | 7.33 | 41 | 27.83 | 5.85 | 23 | 9.211 | **0.003** | 0.019 | 0.891 | 4.110 | 0.045a |
| *Delayed recall (T4)* | 9.83 | 2.06 | 23 | 8.27 | 2.65 | 11 | 10.00 | 2.41 | 24 | 11.29 | 0.76 | 7 | 6.456 | **0.014** | 0.046 | 0.832 | 5.124 | 0.027a |
| *Learning slope* | 4.41 | 2.05 | 37 | 4.15 | 1.46 | 13 | 4.37 | 2.21 | 41 | 4.00 | 2.59 | 23 | 0.046 | 0.831 | 0.469 | 0.495 | 0.016 | 0.899 |
| *CSL* | 103.41 | 52.56 | 37 | 83.00 | 34.48 | 13 | 105.17 | 55.93 | 41 | 103.04 | 62.39 | 23 | 0.938 | 0.335 | 1.002 | 0.319 | 0.659 | 0.419 |
| *Retention (%)* | 96.07 | 11.95 | 23 | 96.57 | 19.47 | 11 | 97.72 | 13.8 | 24 | 104.17 | 15.02 | 7 | 1.294 | 0.260 | 0.727 | 0.397 | 0.534 | 0.468 |

Note: BD = bipolar disorder; CSL = cumulative shape learning; CWL = cumulative word learning; DI = discrimination index; M = mean; SD = standard deviation; T1 = trial 1; T2 = trial 2; T3 = trial 3; T4 = trial 4. Verbal memory/learning was assessed with the Hopkins Verbal Learning Test – Revised, and visual memory/learning was measured with the Brief Visuospatial Memory Test – Revised. Higher scores indicate better performance. All *p*-values represent uncorrected *p*-values. Bolded values survived FDR correction (*p*<0.05); a are significant at *p*<0.05 uncorrected but did not survive FDR correction.

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**Supplementary Table 14.** *Follow up analyses for significant sex by antidepressant interactions in BD patients*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***BD Males*** | | | | ***Effect*** | | ***BD Females*** | | | | ***Effect*** | |
|  | **Off** | | **On** | |  |  | **Off** | | **On** | |  |  |
|  | M | SD | M | SD | F | *p* | M | SD | M | SD | F | *p* |
| ***Verbal memory/learning*** |  |  |  |  |  |  |  |  |  |  |  |  |
| *Free recall T2* | 9.00 | 1.68 | 7.77 | 2.35 | 4.16 | **0.047** | 8.61 | 1.97 | 9.61 | 1.85 | 3.94 | 0.052 |
| *Free recall T3* | 9.84 | 1.66 | 8.85 | 2.58 | 3.68 | 0.061 | 9.39 | 1.64 | 10.43 | 1.34 | 6.76 | **0.012** |
| *Total recall (T1-T3 sum)* | 25.49 | 4.27 | 22.38 | 6.79 | 2.54 | 0.117 | 24.61 | 4.12 | 27.43 | 3.69 | 7.46 | **0.008** |

Note: BD = bipolar disorder; M = mean; SD = standard deviation; T2 = trial 2; T3 = trial 3. Verbal memory/learning was assessed with the Hopkins Verbal Learning Test – Revised. Higher scores indicate better performance. All *p*-values represent uncorrected *p*-values. Bolded values are significant at *p*<0.05.