**The impact of the COVID-19 pandemic on mental and psychosocial functioning, quality of life, and recovery in adults with severe mental illness: findings from Dutch longitudinal cohorts.**

**Supplementary**

**Supplementary Table 1. Overview of linear mixed model variations.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Model 1 | Model 2 | Model 3 | Model 4a-h | Model 5a-h | Model 6a-e |
| Outcome | Change in HoNOS score over time | Change in MANSA score over time | Change in I.ROC score over time | Change in HoNOS score over time | Change in MANSA score over time | Change in I.ROC score over time |
| Aim | Effects of COVID-19 on changes in mental health and functioning | Effects of COVID-19 on changes in quality of life | Effects of COVID-19 on changes in recovery | Exploration of factors correlated with improvements or declines in mental health and functioning. | Exploration of factors correlated with improvements or declines in quality of life | Exploration of factors correlated with improvements or declines in recovery. |
| Fixed effects | Period | Period | Period | Period | Period | Period |
| Gender | Gender | Gender | Gender | Gender | Gender |
| Age | Age | Age | Age | Age | Age |
| Period between measurements (days) | Period between measurements (days) | Period between measurements (days) | Period between measurements (days) | Period between measurements (days) | Period between measurements (days) |
|  | Baseline score | Baseline score | Baseline score | Baseline score | Baseline score | Baseline score |
| Interactions |  |  |  | Period \* | Period \* | Period \* |
|  |  |  | a. Treatment duration | a. Treatment duration | a. Treatment duration |
|  |  |  | b. Psychosis | b. Psychosis | b. Psychosis |
|  |  |  |  |  | c. Substance use disorder |
|  |  |  |  |  | d. Number of comorbidities |
|  |  |  | e. Migration background | e. Migration background |  |
|  |  |  | f. Partner | f. Partner |  |
|  |  |  | g. Supported living | g. Supported living |  |
|  |  |  | h. (volunteer) work | h. (volunteer) work |  |
| Random intercept | Participant ID | Participant ID | Participant ID | Participant ID | Participant ID | Participant ID |
| Sample | Cohort 1 | Cohort 1 | Cohort 2 | Cohort 1 | Cohort 1 | Cohort 2 |
| N | 3681 | 892 | 1805 | 3681 | 892 | 1805 |
| Number of measurements | 9997 | 1697 | 4912 | 9997 | 1697 | 4912 |

**Note:** HoNOS = Health of the Nation Outcome Scales , MANSA = Manchester Short Assessment of Quality of Life, I.ROC = Individual Recovery Outcomes Counter, Cohort 1: Altrecht, Cohort 2: GGz Breburg

**Supplementary table 2 – Sample characteristics across time periods.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 1  Pre-pandemic | 2  Transit into pandemic | 3  During pandemic | 4  Transit out of pandemic | 5  Post-pandemic | Total |
| **Cohort 1** | |  |  |  |  |  |  |  |
| HoNOS | N |  | 2466 | 2452 | 2081 | 1859 | 319 | 3681 |
|  | Measurements |  | 2959 | 2452 | 2403 | 1859 | 324 | 9997 |
|  | Male (%) |  | 65.0 | 66.3 | 67.8 | 67.6 | 63.0 | 66.4 |
|  | Mean age (SD) |  | 45.4 (12.2) | 46.0 (12.2) | 45.9 (12.9) | 46.9 (12.8) | 44.5 (13.8) | 46.0 (12.5) |
|  | Mean days between measurements (SD) |  | 323 (86) | 443 (171) | 343 (100) | 525 (180) | 355 (115) | 396 (155) |
|  | Mean treatment duration (years) (SD) |  | 9.2 (7.2) | 10.4 (7.3) | 10.5 (7.7) | 11.9 (7.8) | 10.0 (7.5) | 10.3 (7.5) |
| Psychosis (%) |  | 63.6 | 65.6 | 63.6 | 67.2 | 66.0 | 64.9 |
| Substance use disorder (%) |  | NA | NA | NA | NA | NA | NA |
|  | Educational level (%) | *Low* | 33.8 | 35.0 | 36.2 | 36.5 | 35.5 | 35.2 |
|  |  | *Middle* | 30.1 | 31.4 | 32.1 | 32.8 | 35.2 | 31.5 |
|  |  | *High* | 13.9 | 13.5 | 12.8 | 13.7 | 13.6 | 13.5 |
|  | Mean number of comorbidities (SD) |  | NA | NA | NA | NA | NA | NA |
|  | Migration background (%) | *Western* | 69.9 | 69.7 | 70.2 | 70.2 | 71.3 | 70.0 |
|  | Partner (%) |  | 22.8 | 21.4 | 20.2 | 21.0 | 17.6 | 21.3 |
|  | Supported living (%) |  | 17.2 | 17.4 | 17.4 | 17.4 | 13.0 | 17.2 |
|  | (volunteer) Work (%) |  | 31.7 | 27.8 | 28.6 | 28.3 | 31.2 | 29.3 |
|  |  |  |  |  |  |  |  |  |
|  | Mean HoNOS total score (SD) |  | 9.0 (6.4) | 9.2 (6.2) | 9.6 (6.5) | 9.7 (6.5) | 8.7 (6.4) | 9.3 (6.4) |
|  | Mean HoNOS delta score (SD) |  | -0.6 (5.5) | 0.0 (5.7) | -0.2 (5.3) | 0.1 (5.6) | -0.6 (5.2) | -0.2 (5.5) |
|  |  |  |  |  |  |  |  |  |
| MANSA | N |  | 398 | 470 | 315 | 390 | 57 | 892 |
| Measurements |  | 438 | 470 | 342 | 390 | 57 | 1697 |
| Male (%) |  | 65.8 | 70.4 | 71.9 | 69.0 | 59.6 | 68.8 |
| Mean age (SD) |  | 47.4 (11.8) | 46.6 (12.4) | 46.2 (12.8) | 47.9 (12.8) | 46.1 (13.8) | 47.0 (12.5) |
|  | Mean days between measurements (SD) |  | 344 (93) | 560 (257) | 366 (91) | 579 (208) | 393 (102) | 464 (209) |
|  | Mean treatment duration (years) (SD) |  | 10.1 (7.4) | 10.4 (7.4) | 10.3 (7.6) | 11.4 (7.7) | 11.3 (9.3) | 10.6 (7.6) |
|  | Psychosis (%) |  | 59.8 | 58.9 | 54.1 | 60.5 | 61.4 | 58.8 |
|  | Substance use disorder(%) |  | NA | NA | NA | NA | NA | NA |
|  | Educational level (%) | *Low* | 27.6 | 31.3 | 31.0 | 32.6 | 36.8 | 30.8 |
|  |  | *Middle* | 40.0 | 37.0 | 39.2 | 37.7 | 40.4 | 38.5 |
|  |  | *High* | 21.0 | 22.8 | 22.5 | 21.8 | 14.0 | 21.7 |
|  | Mean number of comorbidities (SD) |  | NA | NA | NA | NA | NA | NA |
|  | Migration background (%) | *Western* | 82.4 | 81.7 | 84.2 | 81.0 | 86.0 | 82.3 |
|  | Partner (%) |  | 26.9 | 28.1 | 29.5 | 25.1 | 21.1 | 27.2 |
|  | Supported living (%) |  | 11.0 | 7.7 | 9.1 | 11.5 | 7.0 | 9.7 |
|  | (volunteer) Work (%) |  | 49.8 | 42.6 | 48.5 | 45.6 | 47.4 | 52.4 |
|  |  |  |  |  |  |  |  |  |
|  | M MANSA total score (SD) |  | 59.5 (11.1) | 59.7 (11.1) | 58.8 (12.2) | 59.6 (12.0) | 61.6 (12.8) | 59.5 (11.8) |
|  | M MANSA delta score (SD) |  | 0.8 (8.1) | 1.8 (9.1) | -0.1 (8.4) | 1.6 (9.1) | 0.6 (10.0) | 1.1 (8.8) |
|  |  |  |  |  |  |  |  |  |
| **Cohort 2** | |  |  |  |  |  |  |  |
| I.ROC | N |  | 521 | 654 | 934 | 983 | 604 | 1805 |
|  | Measurements |  | 793 | 654 | 1516 | 983 | 966 | 4912 |
|  | Male (%) |  | 63.1 | 64.8 | 41.4 | 46.6 | 42.0 | 49.1 |
|  | Mean age (SD) |  | 47.9 (11.8) | 48.1 (12.4) | 44.1 (13.2) | 47.9 (14.3) | 46.9 (14.1) | 46.6 (13.4) |
|  | Mean days between measurements (SD) |  | 340 (148) | 589 (321) | 201 (114) | 368 (229) | 187 (90) | 305 (226) |
|  | Mean treatment duration (years) (SD) |  | 9.9 (7.4) | 10.7 (7.6) | 5.4 (6.3) | 8.3 (7.7) | 6.7 (6.6) | 7.7 (5.0) |
|  | Psychosis (%) |  | 29.4 | 55.5 | 21.1 | 34.7 | 18.6 | 29.3 |
|  | Substance use disorder (%) |  | 29.8 | 32.0 | 20.6 | 23.6 | 19.6 | 24.0 |
|  | Educational level\* (%) | *Low* | 55.8 | 56.4 | 30.5 | 39.2 | 30.1 | 26.8 |
|  |  | *Middle* | 31.9 | 31.1 | 34.7 | 33.0 | 33.0 | 22.6 |
|  |  | *High* | 12.3 | 12.5 | 34.9 | 27.8 | 36.9 | 18.8 |
|  | Mean number of comorbidities (SD) |  | 2.0 (1.8) | 2.2 (1.8) | 2.6 (1.8) | 2.1 (1.7) | 2.1 (1.7) | 2.2 (1.8) |
|  | Migration background (%) | *Western* | NA | NA | NA | NA | NA | NA |
|  | Partner\* (%) |  | 29.6 | 27.7 | 51.0 | 43.9 | 48.0 | 43.5 |
|  | Supported living (%) |  | NA | NA | NA | NA | NA | NA |
|  | (volunteer) Work (%) |  | NA | NA | NA | NA | NA | NA |
|  |  |  |  |  |  |  |  |  |
|  | Mean I.ROC total score (SD) |  | 49.4 (10.8) | 48.5 (10.9) | 43.2 (11.7) | 45.5 (11.6) | 44.3 (11.8) | 45.6 (11.7) |
|  | Mean I.ROC delta score (SD) |  | 1.4 (8.8) | 0.1 (9.0) | 1.3 (8.7) | 0.81 (9.5) | 0.6 (8.3) | 0. (8.9) |

**Note:** *A positive delta score on the MANSA/I.ROC signifies improvement, while a negative delta score on the HoNOS assessment indicates improvement.*

N = number of participants; SD = standard deviation; NA = Not available; HoNOS = Health of the Nation Outcome Scales, MANSA = Manchester Short Assessment of Quality of Life, I.ROC =Individual Recovery Outcome Counter

\*Data was only available at the time of first treatment enrollment

**Supplementary table 3 – Primary outcomes LMM fixed effects**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Primary outcomes – Fixed effects – Part 1** | | | | | | | |  | |  |  |  | | | | |
|  | HoNOS | | | | | | |  | |  | MANSA | | | |  |  | |
|  | est | | 95% CI | | P | | Padj | | |  | est | | 95% CI | P | Padj |  | |
| Intercept | -0.015 | | [-0.55, 0.52] | | .958 | | .958 | | |  | 13.231 | | [10.48, 15.98] | .000\* | .000 |  | |
| Group 2 | 0.362 | | [0.05, 0.67] | | .023\* | | .059 | | |  | 0.765 | | [-0.44, 1.97] | .213 | .349 |  | |
| Group 3 | 0.350 | | [0.05, 0.65] | | .022\* | | .059 | | |  | -1.066 | | [-2.26, 0.13] | .082 | .164 |  | |
| Group 4 | 0.341 | | [-0.20, 0.70] | | .064 | | .145 | | |  | 0.510 | | [-0.76, 1.78] | .431 | .554 |  | |
| Group 5 | -0.10 | | [-0.75, 0.55] | | .769 | | .911 | | |  | 0.210 | | [-2.14, 2.56] | .861 | .911 |  | |
| Period\*\* | 0.002 | | [0.00, 0.00] | | .000\* | | .000 | | |  | 0.000 | | [0.00, 0.00] | .831 | .911 |  | |
| Age | 0.016 | | [0.00, 0.03] | | .000\* | | .001 | | |  | -0.014 | | [-0.05, 0.02] | .397 | .550 |  | |
| Gender | -0.155 | | [-0.39, 0.08 ] | | .188 | | .338 | | |  | -0.392 | | [-1.27, 0.48] | .381 | .550 |  | |
| Baseline | -0.196 | | [-0.21, -0.18] | | .000\* | | .000 | | |  | -0.197 | | [-0.23, -0.16] | .000\* | .000 |  | |
| **Primary outcomes – Fixed effects – Part 2** | | | | | | | |  | |  |  |  | | | | |
|  | I.ROC | | | | | | |  | |  |  | | | |  |  | |  |  |
|  | est | 95% CI | | P | | Padj | | |
| Intercept | 8.540 | [ 7.09, 9.99 ] | | .000\* | | - | | |
| Group 2 | -1.534 | [-2.49, -0.57] | | .002\* | | - | | |
| Group 3 | -0.851 | [-1.63, -0.07] | | .034\* | | - | | |
| Group 4 | -1.205 | [-2.03, -0.38] | | .004\* | | - | | |
| Group 5 | -1.634 | [-2.49, -0.78] | | .000\* | | - | | |
| Period\*\* | 0.000 | [0.00, 0.00] | | .223 | | - | | |
| Age | -0.010 | [-0.03, 0.01] | | .272 | | - | | |
| Gender | -0.038 | [-0.46, 0.54] | | .881 | | - | | |
| Baseline | -0.148 | [-0.17, -0.13] | | .000\* | | - | | |

\* Significance with P<0.05

\*\* Period between measurements in days

Note: CI = confidence interval, P = P-value; HoNOS = HoNOS = Health of the Nation Outcome Scales, MANSA = Manchester Short Assessment of Quality of Life, I.ROC =Individual Recovery Outcome Counter

**Supplementary table 4a. – Post-hoc analysis change in HoNOS subscale per period indexed as standardized estimated marginal mean change score (EMM) and standard errors.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Total |  | Subscale 1 |  | Subscale 2 |  | Subscale 3 |  | Subscale 4 |  |
| Period 1 | -0.460 (0.107) |  | -0.058 (0.028) |  | -0.065 (0.029) |  | -0.170 (0.047) |  | -0.142 (0.051) |  |
| Period 2 | -0.098 (0.116) |  | -0.058 (0.030) |  | 0.036 (0.030)\* |  | -0.102 (0.050) |  | 0.025 (0.054)\* |  |
| Period 3 | -0.110 (0.118) |  | -0.062 (0.030) |  | 0.079 (0.031)\* |  | -0.073 (0.051) |  | -0.021 (0.055) |  |
| Period 4 | -0.119 (0.142) |  | 0.041 (0.036)\* |  | 0.113 (0.037)\* |  | -0.129 (0.062) |  | -0.077 (0.067) |  |
| Period 5 | -0.557 (0.315) |  | -0.134 (0.080) |  | 0.014 (0.081) |  | -0.410 (0.136) |  | -0.078 (0.148) |  |

\* Significance with P<0.05

\*\* Period between measurements in days

**Note:** *A negative delta score on the HoNOS assessment indicates improvement.*

Period 1 = pre-pandemic, Period 2 = transition into pandemic, Period 3 = during pandemic, Period 4 = transition out of pandemic, Period 5 = post-pandemic, HoNOS = Health of the Nation Outcome Scales. Subscale 1: behavioral problems (item 1-3), subscale 2: impairments (items 4-5), subscale 3: symptomatology (items 6-8), subscale 4: social problems (items 9-12).

**Supplementary table 4b. – Post-hoc analysis change in I.ROC subscale per period indexed as standardized estimated marginal mean change score (EMM) and standard errors.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Total |  | Factor 1 |  | Factor 2 |
| Period 1 | 1.941 (0.314) |  | 1.509 (0.228) |  | 0.468 (0.122) |
| Period 2 | 0.407 (0.392)\* |  | 0.612 (0.285)\* |  | -0.175 (0.153)\* |
| Period 3 | 1.090 (0.236)\* |  | 0.783 (0.171)\* |  | 0.292 (0.091) |
| Period 4 | 0.735 (0.281)\* |  | 0.408 (0.204)\* |  | 0.339 (0.109) |
| Period 5 | 0.307 (0.293)\* |  | 0.275 (0.213)\* |  | -0.002 (0.114) |

\* Significance with P<0.05

\*\* Period between measurements in days

**Note:** *A positive delta score on the I.ROC signifies improvement.* Period 1 = pre-pandemic, Period 2 = transition into pandemic, Period 3 = during pandemic, Period 4 = transition out of pandemic, Period 5 = post-pandemic, I.ROC =Individual Recovery Outcome Counter. Factor 1: Empowerment (items 1, 3, 6, 7, 9-12), factor 2: Vitality and activity (items 2, 4, 5, 8).

**Supplementary table 5a – Post-hoc HoNOS LMM fixed effects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Primary outcomes – Fixed effects – Part 1** | | | |  |  | | |
|  | Subscale 1 | | |  | Subscale 2 | | |
|  | est | 95% CI | P |  | est | 95% CI | P |
| Intercept | 0.190 | [ 0.06, 0.32] | 0.005\* |  | -0.356 | [-0.49, -0.22] | 0.000\* |
| Group 2 | 0.000 | [-0.08, 0.08] | 0.985 |  | 0.101 | [ 0.02, 0.18] | 0.016\* |
| Group 3 | -0.003 | [-0.08, 0.07] | 0.931 |  | 0.144 | [ 0.07, 0.22] | 0.000\* |
| Group 4 | 0.100 | [ 0.01, 0.19] | 0.036\* |  | 0.178 | [ 0.08, 0.27] | 0.000\* |
| Group 5 | -0.075 | [-0.24, 0.09] | 0.370 |  | 0.079 | [-0.09, 0.25] | 0.355 |
| Period\*\* | 0.000 | [ 0.00, 0.00] | 0.069 |  | 0.000 | [ 0.00, 0.00] | 0.000\* |
| Age | -0.001 | [ 0.00, 0.00] | 0.233 |  | 0.101 | [ 0.01, 0.01] | 0.000\* |
| Gender | -0.048 | [-0.11, 0.01] | 0.111 |  | 0.262 | [-0.03, 0.09] | 0.398 |
| Baseline | -0.203 | [-0.22, -0.19] | 0.000\* |  | -0.208 | [-0.23, -0.19] | 0.000\* |
| **Primary outcomes – Fixed effects – Part 2** | | | |  |  | | |
|  | Subscale 3 | | |  | Subscale 4 | | |
|  | est | 95% CI | P |  | est | 95% CI | P |
| Intercept | 0.152 | [-0.08, 0.38] | 0.201 |  | 0.208 | [-0.04, 0.46] | 0.100 |
| Group 2 | 0.069 | [-0.07, 0.20] | 0.322 |  | 0.167 | [ 0.02, 0.31] | 0.026\* |
| Group 3 | 0.098 | [-0.03, 0.23] | 0.143 |  | 0.121 | [-0.02, 0.26] | 0.093 |
| Group 4 | 0.041 | [-0.12, 0.20] | 0.607 |  | 0.065 | [-0.11, 0.24] | 0.453 |
| Group 5 | -0.240 | [-0.52, 0.04] | 0.094 |  | 0.064 | [-0.24, 0.37] | 0.678 |
| Period\*\* | 0.000 | [0.00, 0.00] | 0.000\* |  | 0.000 | [ 0.00, 0.00] | 0.003\* |
| Age | 0.003 | [0.00, 0.01] | 0.092 |  | 0.004 | [ 0.00, 0.01] | 0.046\* |
| Gender | 0.011 | [-0.09, 0.11] | 0.830 |  | -0.108 | [-0.22, 0.00] | 0.053 |
| Baseline | -0.224 | [-0.24, -0.20] | 0.000\* |  | -0.211 | [-0.23, -019] | 0.000\* |

\* Significance with P<0.05

\*\* Period between measurements in days

**Note:** Period 1 = pre-pandemic, Period 2 = transition into pandemic, Period 3 = during pandemic, Period 4 = transition out of pandemic, Period 5 = post-pandemic, HoNOS = Health of the Nation Outcome Scales. Subscale 1: behavioral problems (item 1-3), subscale 2: impairments (items 4-5), subscale 3: symptomatology (items 6-8), subscale 4: social problems (items 9-12).

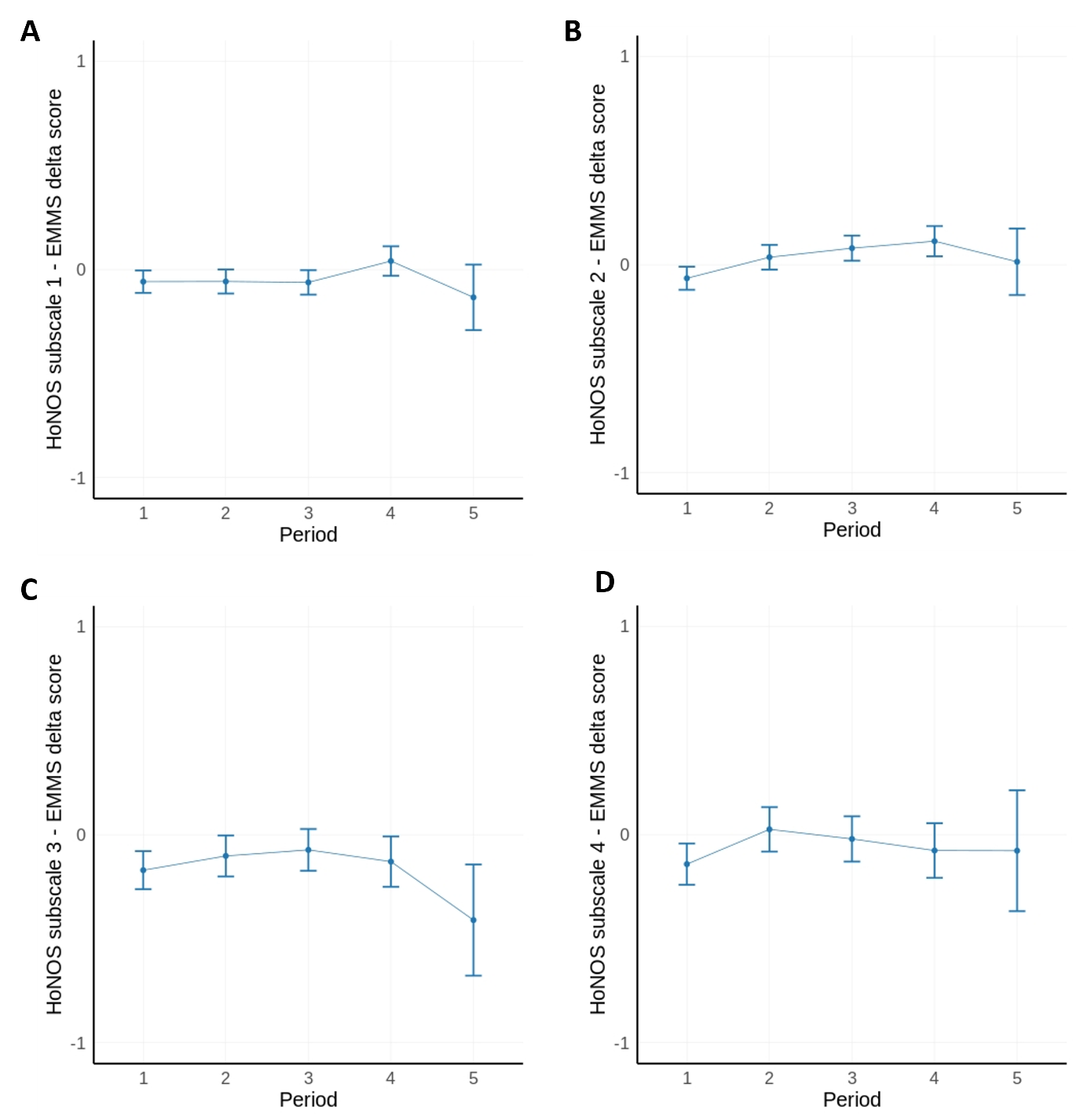
**Supplementary table 5b – Post-hoc I.ROC LMM fixed effects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Primary outcomes – Fixed effects – Part 1** | | | |  |  | | |
|  | Factor 1 | | |  | Factor 2 | | |
|  | est | 95% CI | P |  | est | 95% CI | P |
| Intercept | 6.078 | [5.05, 7.10] | 0.000 |  | 2.879 | [2.33, 3.43] | 0.000\* |
| Group 2 | -0.897 | [-1.59, -0.20] | 0.012\* |  | -0.644 | [-1.02, -0.27] | 0.007\* |
| Group 3 | -0.727 | [-1.30, -0.16] | 0.013\* |  | -0.176 | [-0.48, 0.13] | 0.256 |
| Group 4 | -1.101 | [-1.70, -0.50] | 0.000\* |  | -0.129 | [-0.49, 0.19] | 0.428 |
| Group 5 | -1.235 | [-1.86, -0.61] | 0.000\* |  | -0.470 | [-0.80, -0.14] | 0.054 |
| Period\*\* | 0.001 | [0.00, 0.00] | 0.129 |  | 0.000 | [0.00, 0.00] | 0.712 |
| Age | -0.006 | [-0.02, 0.01] | 0.420 |  | -0.004 | [-0.01, 0.00] | 0.326 |
| Gender | 0.032 | [-0.33, 0.39] | 0.863 |  | 0.029 | [-0.17, 0,22] | 0.773 |
| Baseline | -0.157 | [-0.18, -0.14] | 0.000 |  | -0.160 | [-0.18, -0.14] | 0.000\* |

\* Significance with P<0.05

\*\* Period between measurements in days

**Note:** Period 1 = pre-pandemic, Period 2 = transition into pandemic, Period 3 = during pandemic, Period 4 = transition out of pandemic, Period 5 = post-pandemic, I.ROC =Individual Recovery Outcome Counter. Factor 1: Empowerment (items 1, 3, 6, 7, 9-12), factor 2: Vitality and activity (items 2, 4, 5, 8).

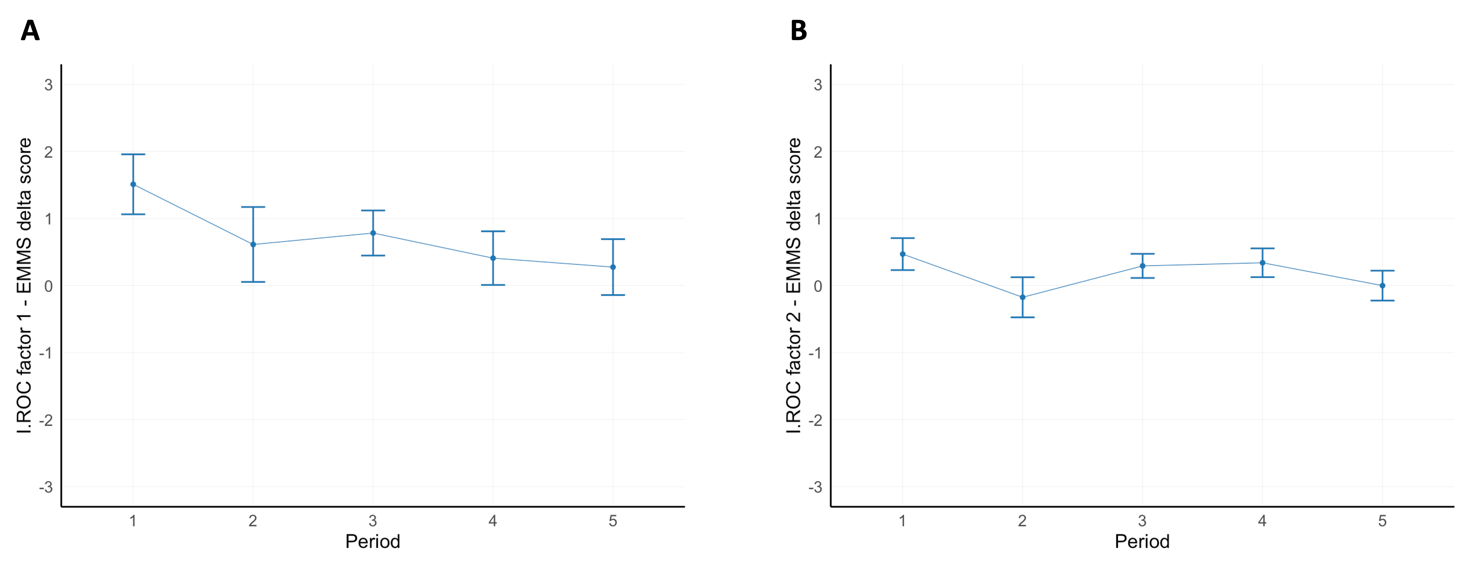
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**Supplementary figure 2 - Overview graph of changes in subscales of HoNOS per period indexed as standardized estimated marginal mean (EMM) change score.**

**A**. HoNOS subscale 1 EMMs delta score across pandemic period. **B**. HoNOS subscale 2 EMMs delta score across pandemic period. **C.** HoNOS subscale 3 EMMs delta score across pandemic period. **D**. HoNOS subscale 4 EMMs delta score across pandemic period.

**Note:** *A negative delta score on the HoNOS assessment indicates improvement.*

Period 1 = pre-pandemic, Period 2 = transition into pandemic, Period 3 = during pandemic, Period 4 = transition out of pandemic, Period 5 = post-pandemic, HoNOS = Health of the Nation Outcome Scales. Subscale 1: behavioral problems (item 1-3), subscale 2: impairments (items 4-5), subscale 3: symptomatology (items 6-8), subscale 4: social problems (items 9-12).

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**Supplementary figure 3 - Overview graph of changes in subscales of I.ROC per period indexed as standardized estimated marginal mean (EMM) change score.**

**A**. I.ROC factor 1 EMMs delta score across pandemic period. **B**. I.ROC factor 2 EMMs delta score across pandemic period.

**Note:** *A positive delta score on the I.ROC signifies improvement.*

Period 1 = pre-pandemic, Period 2 = transition into pandemic, Period 3 = during pandemic, Period 4 = transition out of pandemic, Period 5 = post-pandemic, I.ROC =Individual Recovery Outcome Counter. Factor 1: Empowerment (items 1, 3, 6, 7, 9-12), factor 2: Vitality and activity (items 2, 4, 5, 8).

**Supplementary table 6. Interaction effects in standardized estimated marginal means (EMM) and standard errors.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Interaction |  | 1  Pre- pandemic | 2  Transit into pandemic | 3  During pandemic | 4  Transit out of pandemic | 5  Post-pandemic |
| HoNOS | Treatment duration |  | -0.446 (0.11) | -0.086 (0.12) | -0.128 (0.12) | -0.161 (0.15) | -0.564 (0.32) |
| Psychosis | *Yes* | -0.436 (0.13) | 0.074 (0.14) | -0.112 (0.15) | -0.232 (0.17) | -0.861 (0.39) |
|  | *No* | -0.505 (0.18) | -0.457 (0.19) | -0.113 (0.19) | 0.138 (0.23) | 0.041 (0.58) |
| Substance use disorder | *Yes* | NA | NA | NA | NA | NA |
|  |  | *No* | NA | NA | NA | NA | NA |
|  | Education level | *Low* | -0.315 (0.18) | 0.012 (0.19) | 0.198 (0.19) | -0.098 (0.22) | -0.907 (0.54) |
|  |  | *Middle* | -0.525 (0.19) | -0.047 (0.20) | -0.264 (0.20) | -0.129 (0.23) | -0.532 (0.53) |
|  |  | *High* | -1.045 (0.27) | -0.335 (0.30) | -0.684 (0.31) | -0.013 (0.35) | -1.245 (0.81) |
|  | Number of comorbidities |  | NA | NA | NA | NA | NA |
|  | Migration background | *Western* | -0.519 (0.13) | -0.178 (0.14) | -0.103 (0.14) | -0.013 (0.17) | -0.804 (0.37) |
|  |  | *Non-western* | -0.353 (0.19) | 0.115 (0.21) | -0.110 (0.22) | -0.371 (0.25) | -0.364 (0.63) |
|  | Partner | *Yes* | -0.786 (0.21) | -0.553 (0.24) | -0.310 (0.25) | -0.771 (0.29) | -0.418 (0.79) |
|  |  | *No* | -0.316 (0.12) | 0.078 (0.13) | 0.020 (0.13) | 0.126 (0.16) | -0.723 (0.35) |
|  | Supported living | *Yes* | NA | NA | NA | NA | NA |
|  |  | *No* | NA | NA | NA | NA | NA |
|  | (volunteer) work | *Yes* | -1.115 (0.18) | -0.496 (0.21) | -0.722 (0.21) | -0.804 (0.25) | -1.055 (0.55) |
|  |  | *No* | -0.120 (0.13) | 0.116 (0.14) | 0.205 (0.14) | 0.289 (0.17) | -0.536 (0.41) |
|  |  |  |  |  |  |  |  |
| MANSA | Treatment duration |  | 0.993 (0.43) | 1.782 (0.42) | -0.036 (0.48) | 1.538 (0.48)\* | 1.188 (1.13) |
| Psychosis | *Yes* | 0.310 (0.55) | 1.851 (0.54) | -0.132 (0.65) | 1.527 (0.58) | 2.880 (1.45)\* |
|  | *No* | 2.020 (0.66) | 1.681 (0.62) | 0.002 (0.69) | 1.637 (0.70) | -1.328 (1.80)\* |
| Substance use disorder | *Yes* | NA | NA | NA | NA | NA |
|  |  | *No* | NA | NA | NA | NA | NA |
|  | Education level | *Low* | 1.244 (0.79) | 2.748 (0.72) | -1.184 (0.83) | 2.180 (0.77) | 3.322 (1.83) |
|  |  | *Middle* | 1.356 (0.65) | 1.197 (0.65) | 0.556 (0.74) | 0.950 (0.71) | -1.365 (1.75) |
|  |  | *High* | 0.151 (0.90) | 2.838 (0.82) | 0.695 (0.97) | 1.275 (0.92) | 2.391 (3.17) |
|  | Number of comorbidities |  | NA | NA | NA | NA | NA |
|  | Migration background | *Western* | 1.216 (0.47) | 1.629 (0.45) | 0.122 (0.52) | 1.813 (0.50) | 0.029 (1.22) |
|  |  | *Non-western* | 0.082 (0.99) | 2.622 (0.93) | -0.895 (1.16) | 0.423 (1.02) | 8.546 (2.98) |
|  | Partner | *Yes* | 2.759 (0.79) | 2.835 (0.74) | 0.875 (0.85) | 2.366 (0.87) | 4.503 (2.54) |
|  |  | *No* | 0.370 (0.50) | 1.282 (0.49) | -0.455 (0.57) | 1.218 (0.53) | 0.458 (1.26) |
|  | Supported living | *Yes* | 0.596 (1.23) | -0.150 (1.44) | 0.067 (1.55) | 1.593 (1.29) | -5.242 (4.21) |
|  |  | *No* | 1.032 (0.46) | 1.932 (0.43) | 0.082 (0.50) | 1.493 (0.48) | 1.739 (1.17) |
|  | (volunteer) work | *Yes* | 2.048 (0.59) | 2.893 (0.61) | 0.318 (0.68) | 2.026 (0.65) | 4.256 (1.65) |
|  |  | *No* | -0.024 (0.60) | 0.818 (0.54) | -0.125 (0.65) | 0.954 (0.60) | -1.032 (1.56) |
|  |  |  |  |  |  |  |  |
| I.ROC | Treatment duration |  | 2.015 (0.33) | 0.517 (0.42) | 1.125 (0.25) | 0.742 (0.28) | 0.332 (0.30) |
|  | Psychosis | *Yes* | 3.082 (0.57) | 0.306 (0.51)\* | 2.101 (0.49) | 0.983 (0.49) | 0.812 (0.65) |
|  |  | *No* | 1.541 (0.37) | 0.837 (0.54)\* | 0.742 (0.28) | 0.631 (0.35) | 0.116 (0.33) |
|  | Substance use disorder | *Yes* | 1.372 (0.57) | 0.197 (0.63) | 1.444 (0.50) | -0.213 (0.58) | -0.106 (0.64) |
|  |  | *No* | 2.170 (0.37) | 0.461 (0.46) | 1.012 (0.27) | 1.026 (0.32) | 0.426 (0.33) |
|  | Education level | *Low* | NA | NA | NA | NA | NA |
|  |  | *Middle* | NA | NA | NA | NA | NA |
|  |  | *High* | NA | Na | NA | NA | NA |
|  | Number of comorbidities |  | 1.945 (0.32) | 0.443 (0.39) | 1.111 (0.24) | 0.722 (0.28) | 0.234 (0.29) |
|  | Migration background | *Western* | NA | NA | NA | NA | NA |
|  |  | *Non-western* | NA | NA | NA | NA | NA |
|  | Partner | *Yes* | NA | NA | NA | NA | NA |
|  |  | *No* | NA | NA | NA | NA | NA |
|  | Supported living | *Yes* | NA | NA | NA | NA | NA |
|  |  | *No* | NA | NA | NA | NA | NA |
|  | (volunteer) work | *Yes* | NA | NA | NA | NA | NA |
|  |  | *No* | NA | NA | NA | NA | NA |

**Note:** *A positive delta score on the MANSA/I.ROC signifies improvement, while a negative delta score on the HoNOS assessment indicates improvement.* NA = Not available; HoNOS = Health of the Nation Outcome Scales, MANSA = Manchester Short Assessment of Quality of Life, I.ROC =Individual Recovery Outcome Counter

**\***Significance with P< 0.05,

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Secondary outcomes HoNOS** | | | | | | | | | | | | | | |
|  | a. Treatment duration | | | |  | b. Psychosis | | | |  | c. Substance use disorder | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |
| Group 2 | -0.012 | [-0.05, 0.03] | .562 | .727 |  | 0.462 | [-0.16, 1.09] | .147 | .354 |  | NA | NA | NA | NA |
| Group 3 | 0.030 | [-0.01, 0.07] | .140 | .354 |  | -0.070 | [-0.69, 0.55] | .827 | .876 |  | NA | NA | NA | NA |
| Group 4 | 0.027 | [-0.02, 0.07] | .220 | .419 |  | -0.439 | [-1.12, 0.24] | .208 | .412 |  | NA | NA | NA | NA |
| Group 5 | 0.019 | [-0.06, 0.10] | .644 | .789 |  | -0.971 | [-2.33, 0.39] | .162 | .371 |  | NA | NA | NA | NA |
| **Secondary outcomes HoNOS – Part 2** | | | | | | | | | | | | | | |
|  | d. Education level | | | |  | e. Migration background | | | |  | f. Partner | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |
| Group 2 | 0.151 | [-0.57, 0.86] | .683 | .806 |  | 0.128 | [-0.53, 0.78] | .702 | .806 |  | -0.161 | [-0.87, 0.59] | .656 | .789 |
| Group 3 | -0.252 | [-0.98, 0.47] | .497 | .690 |  | -0.172 | [-0.83, 0.49] | .610 | .775 |  | 0.139 | [-0.58, 0.86] | .707 | .806 |
| Group 4 | 0.179 | [-0.60, 0.96] | .654 | .789 |  | -0.524 | [-1.24, 0.20] | .154 | .360 |  | -0.428 | [-1.21, 0.35] | .281 | .497 |
| Group 5 | 0.584 | [-0.96, 2.13] | .459 | .656 |  | 0.276 | [-1.22, 1.78] | .720 | .810 |  | 0.774 | [-0.97, 2.52] | .385 | .624 |
| Group 2\*\* | 0.384 | [-0.55, 1.31] | .420 | .644 |  | - | - | - | - |  | - | - | - | - |
| Group 3\*\* | -0.152 | [-1.10, 0.79] | .756 | .828 |  | - | - | - | - |  | - | - | - | - |
| Group 4\*\* | 0.815 | [-0.19, 1.82] | .113 | .305 |  | - | - | - | - |  | - | - | - | - |
| Group 5\*\* | 0.392 | [-1.61, 2.39] | .701 | .806 |  | - | - | - | - |  | - | - | - | - |
| **Secondary outcomes HoNOS – Part 3** | | | | | | | | | | | | | | |
|  | g. Supported living | | | |  | h. (volunteer) work | | | |  |  | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  |  |  |  |  |
| Group 2 | NA | NA | NA | NA |  | 0.382 | [-2.68, 1.03] | .249 | .462 |  |  |  |  |  |
| Group 3 | NA | NA | NA | NA |  | 0.068 | [-5.84, 0.72] | .839 | .879 |  |  |  |  |  |
| Group 4 | NA | NA | NA | NA |  | -0.098 | [-8.07, 0.61] | .786 | .845 |  |  |  |  |  |
| Group 5 | NA | NA | NA | NA |  | 0.476 | [-9.24, 1.88] | .505 | .692 |  |  |  |  |  |

**Supplementary table 7a – Secondary outcomes fixed effects – HoNOS**

\* Significance with P<0.05

\*\* Educational level high

Note: CI = confidence interval, P = P-value; HoNOS = HoNOS = Health of the Nation Outcome Scales, NA: Not applicable

**Supplementary table 7b – Secondary outcomes fixed effects – MANSA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Secondary outcomes MANSA – Part 1** | | | | | | | | | | | | | | |
|  | a. Treatment duration | | | |  | b. Psychosis | | | |  | c. Substance use disorder | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |
| Group 2 | 0.101 | [-0.05, 0.25] | .189 | .474 |  | 1.881 | [-0.36, 4.13] | .102 | .338 |  | NA | NA | NA | NA |
| Group 3 | 0.151 | [-0.01, 0.31] | .065 | .248 |  | 1.577 | [-0.84, 4.00] | .203 | .475 |  | NA | NA | NA | NA |
| Group 4 | 0.120 | [-0.03, 0.27] | .127 | .407 |  | 1.601 | [-0.76, 3.96] | .186 | .474 |  | NA | NA | NA | NA |
| Group 5 | 0.250 | [-0.01, 0.51] | .061 | .248 |  | 5.919 | [1.13, 10.71] | .016 | .078 |  | NA | NA | NA | NA |
| **Secondary outcomes MANSA – Part 2** | | | | | | | | | | | | | | |
|  | d. Education level | | | |  | e. Migration background | | | |  | f. Partner | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |
| Group 2 | -1.663 | [-4.33, 1.01] | .225 | .514 |  | -0.006 | [-0.01, 0.00] | .148 | .445 |  | -0.836 | [-3.29, 1.61] | .505 | .722 |
| Group 3 | 1.629 | [-1.26, 4.51] | .271 | .570 |  | -0.000 | [0.00, 0.00] | .944 | .976 |  | -1.059 | [-3.54, 1.95] | .433 | .703 |
| Group 4 | -1.342 | [-4.12, 1.43] | .346 | .654 |  | 0.00 | [0.00, 0.00] | .868 | .957 |  | -1.241 | [-3.87, 1.38] | .356 | .654 |
| Group 5 | -4.798 | [-10.10, 0.50] | .077 | .283 |  | -0.011 | [-0.02, 0.00] | .005 | .031 |  | 1.656 | [-4.15, 7.46] | .577 | .763 |
| Group 2\*\* | 1.184 | [-1.90, 4.27] | .456 | .703 |  | - | - | - | - |  | - | - | - | - |
| Group 3\*\* | 2.972 | [-0.38, 6.32] | .084 | .288 |  | - | - | - | - |  | - | - | - | - |
| Group 4\*\* | 0.189 | [-3.05, 3.42] | .910 | .957 |  | - | - | - | - |  | - | - | - | - |
| Group 5\*\* | 0.162 | [-7.32, 7.64] | .966 | .985 |  | - | - | - | - |  | - | - | - | - |
| **Secondary outcomes MANSA – Part 3** | | | | | | | | | | | | | | |
|  | g. Supported living | | | |  | h. (volunteer) work | | | |  |  | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  |  |  |  |  |
| Group 2 | -1.646 | [-5.49, 2.20] | .403 | .691 |  | 0.004 | [-2.20, 2.21] | .997 | .997 |  |  |  |  |  |
| Group 3 | 0.421 | [-3.61, 4.45] | .836 | .939 |  | -1.629 | [-3.31, 1.31] | .182 | .474 |  |  |  |  |  |
| Group 4 | 0.536 | [-3.12, 4.19] | .664 | .923 |  | -0.999 | [-3.31, 1.31] | .398 | .691 |  |  |  |  |  |
| Group 5 | -6.544 | [-15.45, 2.36] | .151 | .445 |  | 3.216 | [-1.48, 7.91] | .181 | .474 |  |  |  |  |  |

\* Significance with P<0.05

\*\* Educational level high

Note: CI = confidence interval, P = P-value; MANSA = Manchester Short Assessment of Quality of Life

**Supplementary table 7c – Secondary outcomes fixed effects – I.ROC**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Secondary outcomes I.ROC – Part 1** | | | | | | | | | | | | | | |
|  | Treatment duration | | | |  | Psychosis | | | |  | Substance use disorder | | | |
|  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |  | est | 95% CI | P | Padj |
| Group 2 | -0.007 | [-0.13, 0.11] | .911 | .935 |  | -2.072 | [-3.96, -0.18] | .032\* | .105 |  | 0.534 | [-1.41, 2.48] | .591 | .752 |
| Group 3 | 0.046 | [-0.06, 0.15] | .403 | .560 |  | -0.182 | [-1.92, 1.56] | .838 | .920 |  | 1.230 | [-0.48, 2.94] | .159 | .356 |
| Group 4 | 0.013 | [-0.10, 0.12] | .816 | .914 |  | -1.189 | [-2.97, 0.59] | .190 | .380 |  | -0.441 | [-2.28, 1.40] | .639 | .796 |
| Group 5 | 0.054 | [-0.06, 0.17] | .361 | .546 |  | -0.845 | [-2.80, 1.11] | .397 | .560 |  | 0.266 | [-1.65, 2.18] | .786 | .914 |
| **Secondary outcomes I.ROC – Part 2** | | | |  |  |  |  |  |  |  |  |  |  |  |
|  | Number of comorbidities | | | |  |  |  |  |  |  |  |  |  |  |
|  | est | 95% CI | P | Padj |  |  |  |  |  |  |  |  |  |  |
| Group 2 | 0.085 | [-0.42, 0.59] | .740 | .882 |
| Group 3 | -0.017 | [-0.44, 0.41] | .939 | .939 |
| Group 4 | 0.029 | [-0.44, 0.50] | .904 | .935 |
| Group 5 | -0.292 | [-0.76, 0.18] | .224 | .380 |

\* Significance with P<0.05

Note: CI = confidence interval, P = P-value; I.ROC =Individual Recovery Outcomes Counter