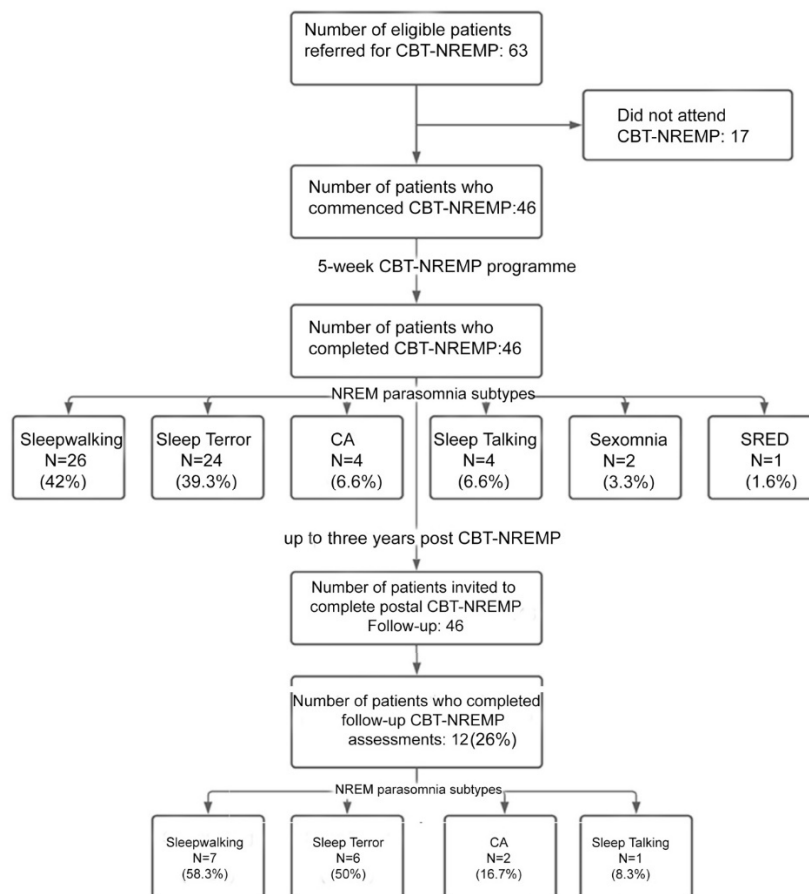


# Supplement to: Group Cognitive Behavioural Therapy for Non-Rapid Eye Movement Parasomnias: Long-term Outcomes and Impact of COVID-19 Lockdown

## Supplement Outline

1. Methods and Protocol
2. ICL Questionnaire
3. Supplementary Results

### 1. Methods and Protocol



**Figure S1.** Flowchart of the studied cohort of patients with NREM parasomnia. Some patients reported N>1 subtype of NREM parasomnia. Percentages indicate the prevalence of each NREM parasomnia subtype in our cohort. CBT-NREMP: Cognitive Behavioural Therapy for NREM parasomnia; CA: confusional arousal; SRED: sleep-related eating disorder; NREM: non-REM; N: number.

## 2. Impact of COVID-19 Lockdown on NREM Parasomnias Questionnaire (ICL)

### Questionnaire S1. IMPACT of COVID-19 lockdown on NREM Parasomnias Questionnaire

The purpose of this questionnaire is to understand if COVID-19 lockdown impacted your NREM parasomnias in any way. Please complete the questionnaire based on your overall experience of the COVID-19 lockdown to date. If a question is non-applicable to you, please circle the 'no change' option, or write N/A in the margin.

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#### Starting Questions - please circle the best option for you

Did you contract Covid-19?: yes/no

If yes, did you require hospital treatment?: yes/no

Were you home confined during lockdown (i.e. Did you work from home; remain essentially housebound)?:  
yes/no

Were you classified as an essential worker during lockdown (e.g. healthcare, police, fire service, or in a job that is COVID-19 essential?): yes/no

Did you live alone during lockdown? yes/no

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#### Sleep

My NREM parasomnias deteriorated during lockdown (e.g. my sleepwalking became more frequent)

|                      |   |   |   |           |   |   |   |   |                   |
|----------------------|---|---|---|-----------|---|---|---|---|-------------------|
| Strongly<br>Disagree |   |   |   | No Change |   |   |   |   | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10                |

My sleep overall deteriorated during lockdown

|                      |   |   |   |           |   |   |   |   |                   |
|----------------------|---|---|---|-----------|---|---|---|---|-------------------|
| Strongly<br>Disagree |   |   |   | No Change |   |   |   |   | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10                |

Lockdown continues to adversely affect my sleep

|                      |   |   |   |           |   |   |   |   |                   |
|----------------------|---|---|---|-----------|---|---|---|---|-------------------|
| Strongly<br>Disagree |   |   |   | No Change |   |   |   |   | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10                |

During lockdown, ...

A. It took me longer to fall asleep

|                      |   |   |   |           |   |   |   |   |                   |
|----------------------|---|---|---|-----------|---|---|---|---|-------------------|
| Strongly<br>Disagree |   |   |   | No Change |   |   |   |   | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10                |

B. I was awake for more of the night

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

C. I found it difficult to get up on time

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

D. I napped more during the day

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

E. My sleep quality overall was poorer

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

F. I felt more tired and fatigued during the day

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

G. It was more difficult to switch off my mind at night

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

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### *Mental Health*

I feel that my overall mental health deteriorated during lockdown

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

I felt anxious during lockdown

|                      |   |   |   |   |           |   |   |   |    |                   |
|----------------------|---|---|---|---|-----------|---|---|---|----|-------------------|
| Strongly<br>Disagree |   |   |   |   | No Change |   |   |   |    | Strongly<br>Agree |
| 1                    | 2 | 3 | 4 | 5 | 6         | 7 | 8 | 9 | 10 |                   |

I felt depressed during lockdown

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

I felt more stressed during lockdown

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

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*General wellbeing and lifestyle*

My ability to engage in exercise during lockdown reduced

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

My alcohol consumption increased during lockdown

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

My use of illicit substances (e.g. cannabis, cocaine, LSD etc) increased during lockdown

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

My diet deteriorated during lockdown (e.g. I gained weight and/or ate more unhealthily)

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

I felt lonely during lockdown

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

Lockdown affected my family and social relationships

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

My ability to connect and communicate with others deteriorated during lockdown

|                   |   |   |   |           |   |   |   |   |                |
|-------------------|---|---|---|-----------|---|---|---|---|----------------|
| Strongly Disagree |   |   |   | No Change |   |   |   |   | Strongly Agree |
| 1                 | 2 | 3 | 4 | 5         | 6 | 7 | 8 | 9 | 10             |

I have been adversely affected financially due to lockdown

Strongly Disagree 1 2 3 4 No Change 5 6 7 8 9 Strongly Agree 10

Working from home adversely affected my general wellbeing

Strongly Disagree 1 2 3 4 No Change 5 6 7 8 9 Strongly Agree 10

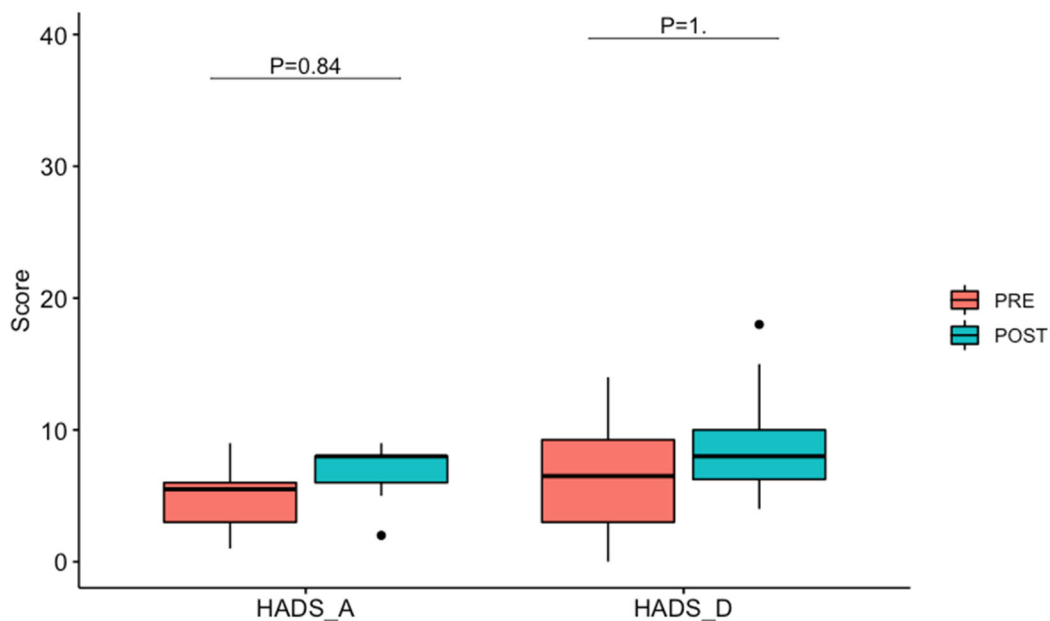
My responsibilities increased during lockdown e.g. I had to homeschool my children

Strongly Disagree 1 2 3 4 No Change 5 6 7 8 9 Strongly Agree 10

The ill effects of lockdown are still impacting my general wellbeing

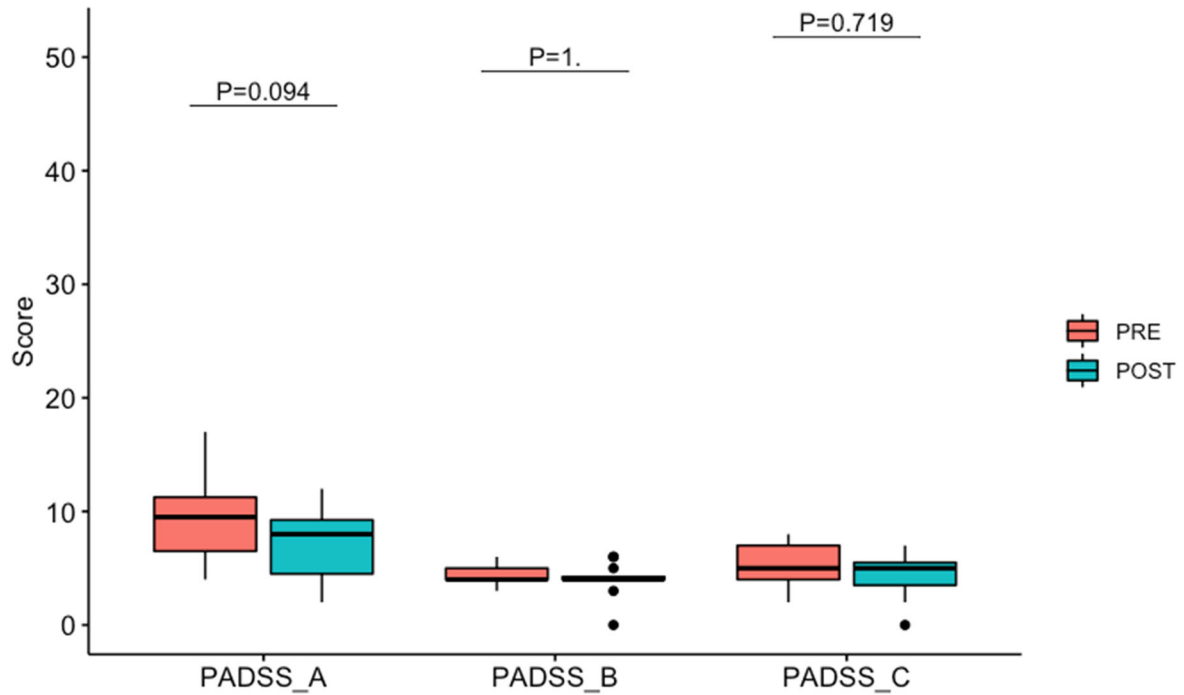
Strongly Disagree 1 2 3 4 No Change 5 6 7 8 9 Strongly Agree 10

### 3. Supplementary Results



**Figure S2.** Box plot of Assessment Score for PRE (after the CBT-NREMP intervention) and during lockdown (POST) for HADS components (note: P values are from Wilcoxon tests). PRE: post CBT-NREMP treatment; POST: follow-up. Box represents the 50% of the central data (between 25<sup>th</sup> and 75<sup>th</sup> percentiles), with a line inside that

represents the median. Dots represent points outside 1.5 times the interquartile range above the upper quartile and below the lower quartile.



**Figure S3.** Box plot of Assessment Score for PRE and POST for PADSS components (note: p values are from Wilcoxon tests). PRE: post CBT-NREMP treatment; POST: follow-up. Box represents the 50% of the central data (between 25<sup>th</sup> and 75<sup>th</sup> percentiles), with a line inside that represents the median. Dots represent points outside 1.5 times the interquartile range above the upper quartile and below the lower quartile.

**Table S1.** Pairwise comparison of pre-treatment, post-treatment and the current follow-up (lockdown) time points for scales of ISI, HADS, and PADSS using Wilcoxon signed rank test along with the adjusted p values for multiple tests using Bonferroni correction.

|  |         | Wilcoxon signed rank test statistics | P value | Adjusted p value |
|--|---------|--------------------------------------|---------|------------------|
| <b>Pre- (before CBT-NREMP intervention) vs Post- (after CBT-NREMP intervention) treatment comparison</b> |         |                                      |         |                  |
| ISI  | ISI     | 42.5                                 | 0.137   | 1                |
| HADS   | HADS    | 49.5                                 | 0.432   | 1                |
| HADS_A   | HADS_A  | 37                                   | 0.353   | 1                |
| HADS_D   | HADS_D  | 41.5                                 | 0.475   | 1                |
| PADSS  | PADSS   | 38.5                                 | 0.281   | 1                |
| PADSS_A  | PADSS_A | 33.5                                 | 0.207   | 1                |
| PADSS_B  | PADSS_B | 1.5                                  | 1       | 1                |
| PADSS_C  | PADSS_C | 18.5                                 | 0.667   | 1                |
| <b>Pre-(before CBT-NREMP intervention) vs Current F/U (postal survey) comparison</b>                     |         |                                      |         |                  |
| ISI  | ISI     | 51                                   | 0.365   | 1                |
| HADS   | HADS    | 17.5                                 | 0.332   | 1                |
| HADS_A   | HADS_A  | 1.5                                  | 0.073   | 1                |
| HADS_D   | HADS_D  | 22.5                                 | 0.646   | 1                |
| PADSS  | PADSS   | 52.5                                 | 0.012*  | 0.295            |
| PADSS_A  | PADSS_A | 65                                   | 0.005*  | 0.119            |
| PADSS_B  | PADSS_B | 3                                    | 0.371   | 1                |
| PADSS_C  | PADSS_C | 26                                   | 0.049   | 1                |
| <b>Post-(after CBT-NREMP intervention) vs Current F/U (postal survey) comparison</b>                     |         |                                      |         |                  |
| ISI  | ISI     | 42                                   | 0.844   | 1                |
| HADS   | HADS    | 11                                   | 0.102   | 1                |
| HADS_A   | HADS_A  | 6                                    | 0.105   | 1                |
| HADS_D   | HADS_D  | 12                                   | 0.438   | 1                |
| PADSS  | PADSS   | 50                                   | 0.024*  | 0.583            |
| PADSS_A  | PADSS_A | 52.5                                 | 0.012*  | 0.283            |
| PADSS_B  | PADSS_B | 6                                    | 0.174   | 1                |
| PADSS_C  | PADSS_C | 19                                   | 0.09    | 1                |

Abbreviations: CBT-NREMP, Cognitive Behavioural Therapy for Non-REM parasomnia; F/U, follow-up (i.e. the current postal survey); ISI, Insomnia Severity Index; PADSS, Paris Arousal Disorders Severity Scale (total score); PADSS-A, Paris Arousal Disorders Severity Scale-subset A score; PADSS-B; Paris Arousal Disorders Severity Scale subset-B score; PADSS-C, Paris Arousal Disorders Severity Scale subset-C score; HADS, Hospital Anxiety and Depression Scale (total score); HADS-A, Hospital Anxiety and Depression Scale-Anxiety subset score; HAD-D, Hospital Anxiety and Depression Scale - Depression subset score. Statistically significant values are shown. \*Wilcoxon signed rank test, along with adjusted p values for multiple tests using Bonferroni correction.

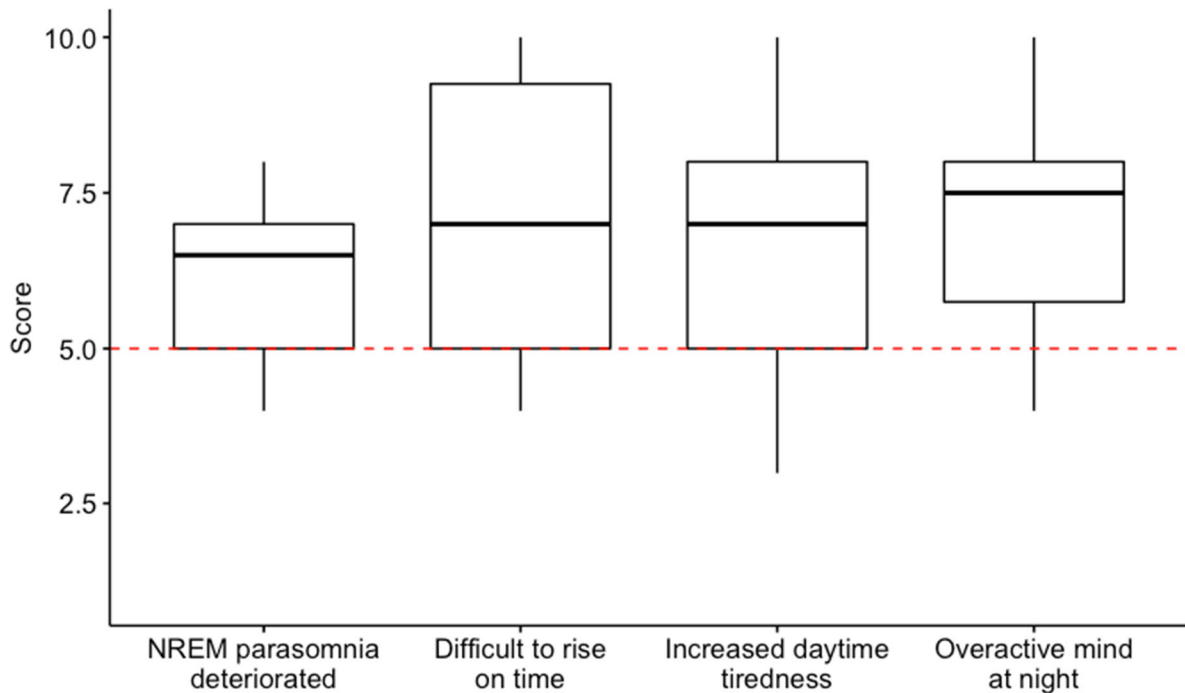
**Table S2.** Impact of Covid-19 Lockdown on depression, anxiety and each of the sleep-related scores (as measured via the ICLQ), using one sample Wilcoxon signed-rank test.

| Variables  | Z -Score      | P-Value<br>< 0.05 |
|--|---------------|-------------------|
| <b>NREM parasomnia deteriorated</b>                                      | <b>2.274</b>  | <b>0.023</b>      |
| Sleep deteriorated   | 1.791         | 0.073             |
| Lockdown continues to adversely affect my sleep                          | 0.060         | 0.952             |
| Increased sleep onset latency  | -0.085        | 0.932             |
| Increased wake-after-sleep-onset   | 0.000         | 1.000             |
| <b>Difficult to rise on time</b>   | <b>2.506</b>  | <b>0.012</b>      |
| Increased excessive daytime somnolence                                   | -0.120        | 0.905             |
| Poor sleep quality   | 1.521         | 0.128             |
| <b>Increased daytime tiredness</b>                                       | <b>2.039</b>  | <b>0.041</b>      |
| <b>Overactive mind at night</b>  | <b>2.620</b>  | <b>0.009</b>      |
| Mental health deteriorated   | 1.655         | 0.098             |
| <b>Increased anxiety</b>   | <b>2.210</b>  | <b>0.027</b>      |
| Increased depression   | 1.299         | 0.194             |
| <b>Increased stress</b>  | <b>2.032</b>  | <b>0.042</b>      |
| Reduced engagement with exercise   | 0.861         | 0.389             |
| Increased alcohol consumption  | 1.590         | 0.112             |
| <b>Increased illicit substance use</b>                                   | <b>-2.222</b> | <b>0.026</b>      |
| <b>My diet deteriorated</b>  | <b>2.070</b>  | <b>0.038</b>      |
| Increased loneliness   | 0.568         | 0.570             |
| Relationships were adversely affected                                    | 1.206         | 0.228             |
| Ability to communicate with others were adversely affected               | 1.206         | 0.228             |
| Finances were adversely affected   | 0.060         | 0.952             |
| Working from home had a negative impact on my general wellbeing          | 1.478         | 0.139             |
| My responsibilities increased  | -0.085        | 0.932             |
| The negative effects of lockdown continue to impact my general wellbeing | 0.981         | 0.327             |

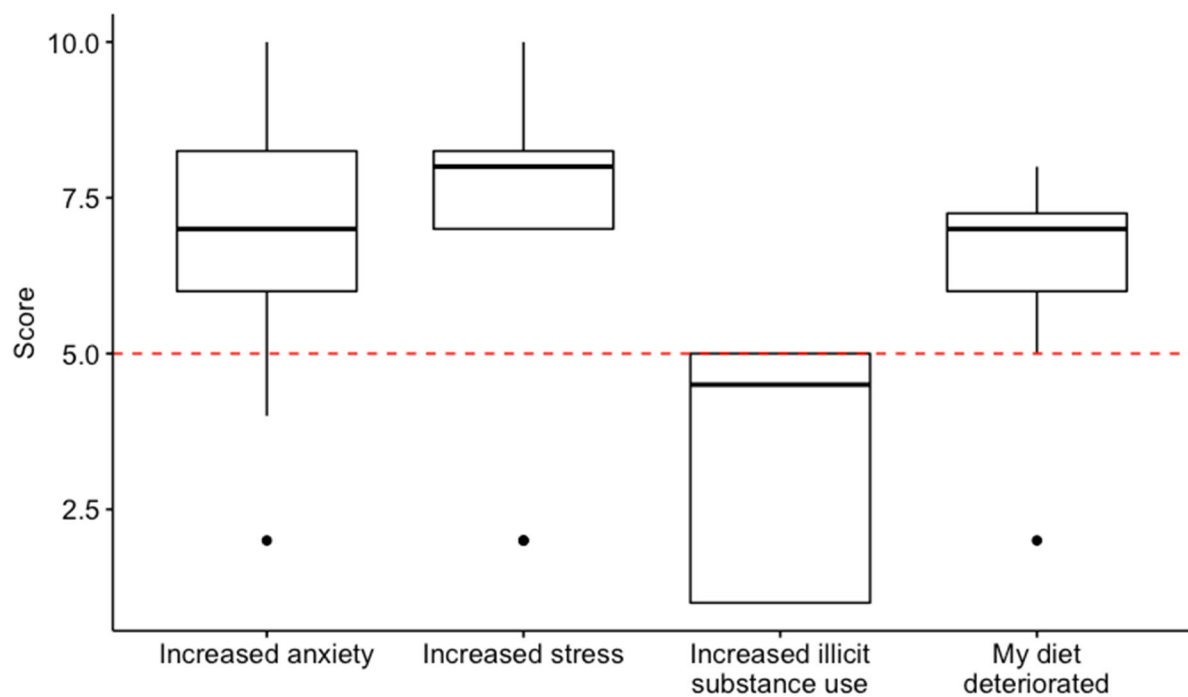
Abbreviations: ICLQ = Impact of COVID-19 Lockdown Questionnaire.



A one-sample Wilcoxon signed-rank test revealed significant effects across eight items. The main effects were primarily observed in the questionnaire's sleep subscale, where lockdown measures were shown to contribute to: the deterioration of NREM parasomnia ( $P = .023$ ;  $M = 6.5$ ; Table 4, Figure 3), patients' ability to wake up on time and sleep inertia ( $P = .012$ ;  $M = 7$ ), additional tiredness during the day or excessive daytime somnolence ( $P = .041$ ;  $M = 7$ ) and difficulties switching the mind off at night or hypervigilance ( $P = .009$ ;  $M = 7.5$ ; Table 4, Figure 4). Moreover, congruent with these scores, in the mental health, general wellbeing and lifestyle subscales, patients also reported: elevated levels of anxiety during lockdown ( $P = .027$ ;  $M = 7$ ; Tables 3, 4, Figure 4), increased amount of stress ( $P = .042$ ;  $M = 8$ ), dietary deterioration ( $P = .038$ ;  $M = 7$ ), but lower levels of illicit substance use ( $P = .026$ ;  $M = 4.5$ ). *Statistically significant results are indicated in bold*



**Figure S4.** Box plot of significant effects observed in sleep subscales. Red dotted line indicates a score of five which indicates no change in effect. Box represents the 50% of the central data (between 25th and 75th percentiles), with a line inside that represents the median. Dots represents points outside 1.5 times the interquartile range above the upper quartile and below the lower quartile.



**Figure S5.** Box plot of significant effects observed in mental health, general wellbeing and lifestyle subscales. *Red dotted line indicates a score of five which indicates no change in effect.* Box represents the 50% of the central data (between 25th and 75th percentiles), with a line inside that represents the median. Dots represents points outside 1.5 times the interquartile range above the upper quartile and below the lower quartile.