Large-scale implementation of insomnia treatment in routine psychiatric care: patient characteristics and insomnia-depression comorbidity

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Abstract
Treating comorbid insomnia is important for recovery from, and prevention of, depression. The objective of this study was to compare comorbidity and patient characteristics among patients having treatment for depression before and after implementation of cognitive behavioural therapy for insomnia (CBT-I) in a routine care internet treatment clinic. We hypothesized that insomnia comorbidity would be lower among patients having treatment for depression after the treatment for insomnia became available, and that depression levels would be high among patients in the insomnia treatment group compared to previous studies of insomnia. Patients were assessed face-to-face by physicians and guided through internet-delivered treatment by psychologists in a psychiatric setting. We retrieved patient data from 3 years before and 3 years after the CBT-I implementation. Measures were the Montgomery-Åsberg Depression Rating Scale-Self rated (MADRS-S) and Insomnia Severity Index (ISI). Pretreatment symptom levels were high in both the depression (MADRS-S = 23, n = 1467) and insomnia treatment (ISI = 20, n = 552) groups, indicating a true psychiatric sample. Contrary to the hypothesis, there were no significant changes in the group having treatment for depression regarding insomnia severity or comorbid insomnia diagnosis (from 66% to 68%) after CBT-I implementation. Also contrary to the hypothesis, comorbid depression levels among insomnia patients having CBT-I were similar to or slightly higher than in previous studies. It is likely that more patients with this comorbidity, who currently receive treatment for depression, would benefit from CBT-I. We suggest an emphasis on information on the benefits of CBT-I among patients and clinical staff involved in the implementation of treatments for insomnia in psychiatry, and further research into possible differences between patients actively seeking treatment for insomnia or depression.

KEYWORDS
cognitive behavioural therapy, comorbidity, depression, insomnia, psychiatry
INTRODUCTION

Depression is a major health problem, with a 12-month prevalence of around 4–10% (Kessler & Bromet, 2013). At least two thirds of depressed people have comorbid insomnia disorder (Geoffroy et al., 2018). Many studies have shown that treating insomnia with cognitive behavioural therapy for insomnia (CBT-I) reduces the severity of comorbid depression (Cunningham & Shapiro, 2018). Some studies even indicate that CBT-I is as effective in treating mild to moderate depression as other treatments for depression, for those with both diagnoses, and more effective in treating insomnia (Blom, Jernelöv, et al., 2015; Sadler et al., 2018). In addition, improvements in insomnia seem to mediate improvements in depression (Manber et al., 2016). Residual insomnia increases the risk of relapse into depression (Perlis et al., 1997), which emphasizes the importance of treating insomnia in patients with comorbid depression.

Therapist-guided internet-delivered cognitive behavioural therapy is an efficacious form of cognitive behavioural therapy (CBT) that has been implemented in routine care at several clinics around the world. The Internet Psychiatry Clinic in Stockholm, Sweden, has offered CBT for psychiatric disorders in a psychiatric setting since 2007 (Hedman et al., 2014), producing effects comparable to face-to-face treatment. Since 2017 the clinic has also offered treatment for insomnia disorder. The implemented CBT-I was tested in the first study comparing internet-delivered CBT-I to a control treatment (Kaldo et al., 2015) and in the first comparison of internet-delivered CBT-I to face-to-face treatment (Blom, Tarkian Tillgren, et al., 2015), which showed that it was non-inferior to group treatment, with large within-group effect sizes. Previous studies (Blom, Jernelöv, et al., 2015; Blom et al., 2017; Sadler et al., 2018) have indicated that CBT-I can be more beneficial for patients with both insomnia and depression than CBT for depression, and that CBT-I should be offered alone in addition to treatment for depression. This would be a paradigm shift in the treatment of depression when comorbid with insomnia. It is, however, unclear if this knowledge is being used in clinical practice.

This is, to the best of our knowledge, the first investigation of a large-scale implementation of treatment for insomnia within public health care. Effectiveness data, including effects on insomnia severity, are being prepared for publication in a forthcoming paper. Our aims with the current study were to use data from the Internet Psychiatry Clinic to:

1. explore if the introduction of CBT-I in 2017 affected the levels of insomnia among the patients receiving treatment for depression; and
2. explore the level of depressive symptoms among patients receiving treatment for insomnia.

The setting of the current study was the same as that for the previous studies showing superiority of CBT-I for patients with co-morbid depression and insomnia compared to CBT for depression. We therefore expected that awareness of this would lead to a high paradigm shift among the clinic’s staff. One hypothesis was, thus, that the implementation of treatment for insomnia would decrease the average level of insomnia severity among patients receiving treatment for depression after this option was available, because some patients with depression and insomnia comorbidity would be included in treatment for insomnia. Accordingly, we also hypothesized that the depression levels would be relatively high among the patients receiving CBT-I, compared to previous studies of insomnia.

METHODS

2.1 Setting and procedure

The Internet Psychiatry Clinic is a clinic within the specialized psychiatry unit within public health in Sweden, operating like a conventional psychiatric outpatient clinic, including face-to-face assessments, and assuming full responsibility for patients in its care (Hedman et al., 2014). The staff offer treatments for depression, several anxiety disorders, irritable bowel syndrome and, since 2017, insomnia. To date, more than 6000 patients have been treated within the clinic. Patients apply for treatment through a secure, government-managed website, where they fill out a number of forms and symptom scales and indicate which treatment they seek. All patients are then called in for a structured face-to-face diagnostic interview with a psychiatrist or psychiatrist-supervised physician. The interview encompasses anamnestic information, the Mini-International Neuropsychiatric Interview (M.I.N.I.) (Sheehan et al., 1998) and an assessment of symptom severity. All patients who fulfil criteria for a disorder for which the clinic offers treatment, who do not urgently require treatment for another disorder, and who are practically able to receive internet-delivered treatment, are included. Although patients indicate which treatment they are seeking as part of the screening process, the assessing clinician may end up suggesting another one of the treatments available at the clinic. All assessing physicians are fully aware of and educated on all treatments available at the clinic. A person who seeks treatment for depression but has comorbid insomnia could therefore be offered treatment for insomnia instead. Included patients then go through evidence-based CBT matching their diagnosis, with on-line support from their personal CBT-trained clinical psychologist. After treatment, patients are assessed again and if necessary referred for further treatment. The study of these participants was approved by the Regional Ethics Review Board in Stockholm, Sweden (2011/2091-31/3 and 2018/2550-32).

2.2 Treatments

The treatment for depression in the current study was implemented in 2007 and has been evaluated in an effectiveness study (Hedman et al., 2014), showing large effect sizes. The treatment for insomnia was implemented in 2017. The content of treatments for both
insomnia and depression can be found in the online supplement (Table S1).

2.3 | Measures

The Montgomery-Åsberg Depression Rating Scale - Self rated (MADRS-S) was used to measure depression severity in this study. MADRS-S is a commonly used scale, ranging from 0 to 54 points, with good psychometric properties (Svanborg & Ekselius, 2003).

The Insomnia Severity Index (ISI) was used to measure insomnia severity. It is the most commonly used insomnia severity scale, ranging from 0 to 28 points, with good psychometric properties (Bastien et al., 2001).

The Patient Health Questionnaire - 9 (PHQ-9) is a depression scale, ranging from 0 to 27 points, with good psychometric properties (Kroenke et al., 2001). In this study, the PHQ-9 was only used as a proxy for diagnosis of depression because it has established cut-offs.

Because secondary diagnoses were registered inconsistently between assessors, we used data from symptom scales for the diagnosis-related analyses in this study:

- Diagnosis of depression was based on having a PHQ-9 score of 10 points or more before treatment.
- Diagnosis of insomnia was based on having an ISI score of 11 points or more before treatment.

2.4 | Statistics

We calculated means with 95% confidence intervals of the chosen measures. We performed t-tests and chi-squared tests to compare the groups on baseline variables before and after the CBT-I implementation, and to compare the insomnia and depression groups after the CBT-I implementation.

3 | RESULTS

3.1 | Participants

All participants having treatment for depression (CBT-D, n = 1467) were diagnosed with depression and all patients in CBT-I (n = 552) were diagnosed with insomnia disorder prior to starting treatment; see Table 1 for patient characteristics and group comparisons of the demographics.

3.2 | Insomnia and depression

Table 2 shows symptom severities of the groups divided per year. The treatment for insomnia was implemented after year 3. The t-test of the level of insomnia severity in CBT-D year 1–3 compared to CBT-D year 4–6 was not significant (t = -1.59, df = 1465, p = .11). Figure 1 shows insomnia severity per group and year with overlapping 95% confidence intervals. $\chi^2$ analysis comparing number of

### TABLE 1 Demographics and pretreatment symptom levels

|                          | Treatment for depression, years 1–3 (before implementation of treatment for insomnia $N = 906$) | Treatment for depression, years 4–6 (after implementation of treatment for insomnia $N = 561$) | Treatment for insomnia, years 4–6 $N = 522$ |
|--------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------|
| Age (SD) Range           | 37 (12)                                                                                         | 37 (12)                                                                                  | 44 (13)$^{abc}$                           |
| Female (%)               | 566 (63%)                                                                                       | 354 (63%)                                                                               | 361 (65%)                                |
| Single household         | 263 (37%)                                                                                       | 216 (39%)                                                                               | 154 (28%)                                |
| Tertiary education (%)   | 422 (47%)                                                                                       | 295 (53%)                                                                               | 379 (69%)$^{abc}$                        |
| Employed or student (%)  | 609 (67%)                                                                                       | 505 (90%)                                                                               | 477 (86%)                                |
| Sick leave 50% or more   | 65 (7%)$^{abc}$                                                                                 | 18 (3%)                                                                                 | 13 (2%)                                  |
| Sought treatment for depression | 686 (95%)                                                                                     | 543 (98%)                                                                               | 9 (2%)                                   |
| Sought treatment for insomnia | NA                                                                                           | 0 (0%)                                                                                  | 531 (97%)                                |
| MADRS-S pretreatment Mean (SD) | 23.4 (6.5)                                                                                 | 23.3 (6.1)                                                                              | 14.6 (7.1)                               |
| ISI pretreatment         | 13.2 (5.9)                                                                                      | 13.5 (6.1)                                                                              | 20.3 (4.0)                               |

Abbreviations: ISI, Insomnia Severity Index; MADRS-S, Montgomery Åsberg Depression Rating Scale - Self rated; NA, not applicable; SD, standard deviation.

$^a$Significantly higher ($p < .05$) than treatment for depression, years 1–3.

$^b$Significantly higher ($p < .05$) than treatment for depression, years 4–6.

$^c$Significantly higher ($p < .05$) than treatment for insomnia.
### TABLE 2  Baseline symptoms of insomnia and depression in the years before and after implementation of treatment for insomnia

|                         | Year 1     | Year 2     | Year 3     | Year 4     | Year 5     | Year 6     |
|-------------------------|------------|------------|------------|------------|------------|------------|
| Treatment for depression, N | 347        | 279        | 280        | 221        | 201        | 139        |
| Treatment for Insomnia, N |            |            |            |            |            |            |
| ISI                     | 12.93 (12.30–13.55) | 13.07 (12.39–13.75) | 13.07 (12.37–13.77) | 13.86 (13.07–14.64) | 13.15 (12.28–14.02) | 13.54 (12.50–14.58) |
| Treatment for depression, M (95% CI) |            |            |            |            |            |            |
| ISI                     |            |            |            |            |            |            |
| Treatment for Insomnia, M (95% CI) |            |            |            |            |            |            |
| MADRS-S                 | 23.22 (22.53–23.92) | 23.24 (22.48–24.00) | 23.70 (22.95–24.45) | 23.31 (22.52–24.11) | 23.23 (22.39–24.07) | 23.18 (22.14–24.22) |
| Treatment for depression, M (95% CI) |            |            |            |            |            |            |
| Above cut-off for depression |            |            |            |            |            |            |
| Treatment for depression, N (%) | 274 (79%)   | 232 (83%)   | 237 (85%) | 183 (83%) | 165 (82%) | 114 (82%) |
| Treatment for Insomnia, N (%) |            |            |            |            |            |            |
| Above cut-off for Insomnia |            |            |            |            |            |            |
| Treatment for depression, N (%) | 226 (65%)   | 185 (66%)   | 186 (66%) | 155 (70%) | 130 (65%) | 98  (71%)  |
| Treatment for Insomnia, N (%) |            |            |            |            |            |            |

Abbreviations: CI, confidence interval; ISI, Insomnia Severity Index; MADRS-S, Montgomery Åsberg Depression Rating Scale - Self rated; M, means; N, sample size; Years 1–3, before implementation of insomnia treatment.
**FIGURE 1** Insomnia symptoms among patients having treatment for depression in the 3 years before implementation of cognitive behavioural therapy for insomnia (CBT-I) compared to the 3 years after, according to the Insomnia Severity Index. y-axes, mean value; 95% confidence intervals are shown.

**FIGURE 2** Baseline severity of comorbid insomnia and depression in the treatment groups. Years 1–3, before implementation of insomnia treatment; years 4–6, after implementation of insomnia treatment; subclinical depression, 0–13 points on the Montgomery Åsberg Depression Rating Scale - Self rated (MADRS-S); mild depression, 13–19 points on MADRS-S; moderate depression, 20–40 points on MADRS-S; severe depression, 41–54 points on MADRS-S; subclinical insomnia, 0–7 points on the Insomnia Severity Index (ISI); mild insomnia, 8–14 points on the ISI; moderate insomnia, 15–21 points on the ISI; severe insomnia, 22–28 points on the ISI.
4 | DISCUSSION

The pretreatment severity of depression was high in the group receiving treatment for depression (MADRS-S = 23) and severity of insomnia was high in the group receiving treatment for insomnia (ISI = 20), indicating that the treatments reach a psychiatric sample comparable to other outpatient psychiatric clinics. Aim 1 was to explore if the introduction of CBT-I affected the levels of insomnia among the patients receiving treatment for depression. When comparing patients receiving CBT-D at the clinic before and after CBT-I was implemented, we demonstrated that their levels of comorbid insomnia were unchanged and only small differences in demographic characteristics occurred. The hypothesis of Aim 1, that insomnia levels would decrease, was thus rejected. It seems that the patients receiving CBT-I form a new patient group, when considering levels of insomnia, depression and some baseline characteristics. Although the clinic and the senior psychiatrists who supervise physicians’ assessments at the clinic had been part of studies indicating that CBT-I might be a better choice than CBT-D for many patients with comorbid depression and insomnia, there was no formal training or policy guiding the physicians in this direction. It is thus possible that the reason insomnia levels in the CBT-D group did not change is that most patients and assessing physicians were not aware that treating the insomnia could be a (more) effective treatment for them, because it would, according to previous research (Blom et al., 2017; Cunningham & Shapiro, 2018; Sadler et al., 2018), be likely to improve both depression and insomnia, whereas treatment for depression has inferior effects on insomnia. Aim 2 was to explore the level of depressive symptoms among patients receiving treatment for insomnia. The level of comorbid depression was equivalent to mild depression, similar to or slightly higher than in other studies of insomnia (Blom, Turk and Tiller, et al., 2015; Christensen et al., 2016). Thus, the hypothesis of Aim 2, that levels of depression would be comparatively high in CBT-I, was also rejected. It is possible that patients who have taken part in clinical trials of comorbid insomnia and depression have been recruited in a way that speaks to those who view insomnia as their main problem. They may thus have more in common with the patients undergoing this treatment for insomnia with mild to moderate depressive symptoms, than with those undergoing treatment for depression with insomnia symptoms who, instead, probably view their depression as the main problem. More research is needed to ascertain whether the patient groups are different in their symptomatology or other biological factors, or if the difference lies in their understanding or opinion of the importance of treating insomnia for their well-being. This also warrants investigation into whether these subgroups of patients respond differently to treatments. Table 1 shows that almost all patients received the treatment they indicated as a preference in the application to the clinic, which could indicate that the patients’ own perceptions of their problems affect treatment allocation more than expected.

4.1 | Limitations

This study is based on data from a clinic providing internet-delivered treatments, where patients contact the clinic directly via the internet and do not need referral from other healthcare providers. Although it is set within psychiatry and patients get a full psychiatric assessment, and both patients’ characteristics and treatment outcomes are very similar to regular outpatient psychiatric clinics, this limits generalization of the results.

4.2 | Conclusion

After implementation of CBT-I at an up-and-running internet CBT clinic within psychiatry, the levels of severity of insomnia of patients receiving CBT for depression were unchanged, and levels of severity of depression among patients in CBT-I were similar to those in previous studies on insomnia. It seems that patients with comorbid depression and insomnia still receive treatment for depression to the same degree, unless they actively seek CBT-I, despite evidence suggesting that more patients with this comorbidity would benefit from receiving CBT-I.

The findings warrant further research into possible clinical differences between patients with this comorbidity who seek CBT-I, compared to those who seek CBT-D. We also suggest that anyone implementing treatment for insomnia at a psychiatric clinic considers the need for information about the benefits of CBT-I, for clinical staff and patients with comorbid insomnia and depression.

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CONFLICT OF INTEREST

MK, EF and KB have no conflicts of interest to disclose.

AUTHOR CONTRIBUTIONS

All authors were involved in the design of the study and the acquisition of data, contributed to the statistical analysis and interpretation of data, drafted the manuscript, and have read and approved the manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.
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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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