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# The Effect of Support on Internet-Delivered Treatment for Insomnia: Does Baseline Depression Severity Matter?

Jaap Lancee
University of Amsterdam
Marjolijn J. Sorbi
Maarten C. Eisma
Utrecht University
Annemieke van Straten
VU University and EMGO Institute
Jan van den Bout
Utrecht University

**Internet-delivered cognitive-behavioral treatment is effective for insomnia. However, little is known about the beneficial effects of support. Recently we demonstrated that motivational support moderately improved the effects of Internet-delivered treatment for insomnia. In the present study, we tested whether depressive symptoms at baseline moderate the effect of support on Internet-delivered treatment for insomnia. We performed a multilevel intention-to-treat analysis on 262 participants in a randomized controlled trial. We found that baseline depressive symptoms moderated the effect of support on sleep efficiency, total sleep time, and sleep onset latency (but not on wake after sleep onset, number of nightly awakenings, or the Insomnia Severity Index). This means that for these variables, people with high levels of depressive symptoms benefit from support, whereas people with low levels of depressive symptoms improve regardless of support. The data show that baseline depression severity plays an important role in the way Internet treatments need to be delivered. These findings open up opportunities to personalize the support offered in Internet-delivered treatments.**

*Keywords:* CBT; depression; insomnia; Internet

THE SLEEP DISORDER INSOMNIA has a prevalence of approximately 10% in the general population (Ohayon, 2002) and has serious negative consequences in the daily life of sufferers (Kyle, Morgan, & Espie, 2010; LeBlanc et al., 2007; Roth & Drake, 2004; Simon & Vonkorff, 1997). Insomnia is treated most effectively with cognitive-behavioral therapy (CBT; Morin et al., 2006; Smith et al., 2002). Demand for CBT is increasing and only limited resources are available, however. It is argued that insomnia should be treated within a stepped-care model and Internet-delivered treatment for insomnia is proposed as a good first option (Espie, 2009). The efficacy of Internet-delivered CBT for insomnia (CBT-I) has been demonstrated in multiple trials (Espie et al., 2012; Lancee, van den Bout, van Straten, & Spoormaker,

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Address correspondence to Jaap Lancee, Ph.D., Department of Clinical Psychology, University of Amsterdam, Weesperplein 4, 1018 XA Amsterdam, The Netherlands; e-mail: j.lancee@uva.nl.

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2012; Ritterband et al., 2009; Ström, Pettersson, & Andersson, 2004; van Straten et al., in press; Vincent & Lewycky, 2009).

Several authors argue that feedback is an essential element in any Internet-delivered treatment (e.g., Spek et al., 2007). For insomnia, we were the first to demonstrate that feedback does indeed improve the Internet-delivered treatment (Lancee, van den Bout, Sorbi, & van Straten, 2013). In this study, the most important aspects of the support were reminding and motivating the participants to complete the exercises. It was found that a total of 40 minutes spent on e-mail support (about 5 minutes per week) by a personal coach moderately enhanced the efficacy compared with an unsupported Internet-delivered treatment.

These results are in line with those of previous studies on paper-and-pencil-delivered insomnia treatment (Jernelov et al., 2012) and a meta-analysis on Internet-delivered treatment (Spek et al., 2007). This suggests that Internet-delivered CBT-I is preferably offered with some form of support. However, it is not clear as yet whether support is necessary for all patients or whether the effects of support are more pronounced in certain subgroups. Identifying subgroups that are particularly likely to benefit from support is crucial, because it can enhance both the efficacy and the cost-efficiency of Internet-delivered CBT-I.

One group of participants for whom support may be particularly beneficial are people with high levels of depressive symptoms. Depression and insomnia are strongly related, and people interested in insomnia treatment often report high levels of depression (Taylor, Lichstein, Durrence, Reidel, & Bush, 2005). Face-to-face CBT-I seems to be equally effective for insomnia patients with low and high depression levels (Manber et al., 2011). Furthermore, face-to-face CBT-I for depressed patients can have an additional effect to medication (Manber et al., 2008). It was also demonstrated that a brief CBT-I intervention can help in reducing residual depression (Watanabe et al., 2011). A brief intervention of two face-to-face sessions and one follow-up via the telephone also showed positive effects on sleep and depression outcomes (Wagley, Rybarczyk, Nay, Danish, & Lund, 2013).

Previously, it was assumed that people with higher levels of psychopathology (e.g., depression) may respond poorly to Internet-delivered treatment. For this reason, people with high levels of depressive complaints were excluded from several studies on Internet-delivered CBT-I (e.g., Lancee et al., 2012). Recently, however, Bower and colleagues (2013) demonstrated that people with high levels of depressive symptoms benefit at least equally from Internet-delivered treatment for depression compared with people with low levels of depressive symptoms. In line with this, it was also found that Internet-delivered CBT-I is effective regardless of baseline depression scores (Lancee, van den Bout, van Straten, & Spoormaker, 2013). Therefore, excluding people with depressive complaints from Internet-delivered CBT-I is not warranted.

Nevertheless, the severity of depressive symptoms may play a role in the need for support. People higher on depressive symptoms are more prone to inactivity and lack of motivation and may therefore have problems with adhering to therapeutic exercises aimed at changing their (sleep) behaviors. We found that the motivational feedback encourages more people to complete their exercises (Lancee et al., 2013). This seems particularly relevant for people with high versus low levels of depressive symptoms. People high on depression are assumed to have a harder time initiating exercises and adhering to assignments and therefore may benefit more from support.

In the current study, we tested this hypothesis. We performed a secondary analysis on the data obtained in a study on the effect of support in Internet-delivered CBT-I (Lancee et al., 2013). The prediction was that baseline depressive symptoms would moderate the effects of support on Internet-delivered CBT-I. Specifically, we expected that insomniacs with high levels of depressive symptoms would benefit more from CBT-I than people with low levels of depressive symptoms.

## Method

### PROCEDURE

The current article reports on a secondary data analysis of a randomized controlled trial (RCT) in which people with insomnia were randomly assigned to an Internet-delivered treatment with support (Group 1, $n = 129$) or without support (Group 2, $n = 133$; Lancee et al., 2013). The study was conducted in line with the Declaration of Helsinki, approved by the Medical Ethical Committee of the University Medical Center Utrecht, and registered at ClinicalTrials.gov (ID: NCT01456637). The original study (Lancee et al., 2013) was powered to find an effect size of Cohen's $d = 0.4$ (power: 0.8, $p < 0.05$, two-tailed). Participants were recruited via a popular-scientific Dutch insomnia Web site (www.insomnie.nl) and required to fill in a written informed consent and an online diary before participation.

### PARTICIPANTS

Two hundred and sixty-two participants were included in the RCT. Inclusion criteria were as follows: