For whom are internet-based occupational mental health interventions effective? Moderators of internet-based problem-solving training outcome

Magdalena N. Junge [a,b], Dirk Lehr [a], Claudi L.H. Bockting [c], Matthias Berking [a,d], Heleen Riper [a,e,f], Pim Cuijpers [a,e,f], David Daniel Ebert [a,d,g,*]

[a] Innovation Incubator, Division Health Training Online, Leuphana University, Rotenbleicher Weg 67, 21335 Lüneburg, Germany
[b] Department of Psychiatry and Psychotherapy, Technische Universität München, Klinikum rechts der Isar, Ismaningerstr. 22, 81675 München, Germany
[c] Clinical and Health Psychology, University of Utrecht, Heidelberglaan 1, 3584 CS Utrecht, The Netherlands
[d] Department of Clinical Psychology and Psychotherapy, Friedrich-Alexander-University Erlangen-Nuremberg, Bismarckstr. 1, 91054 Erlangen, Germany
[e] GGZ inGeest, Regional Mental Health Service Centre, VU University Medical Centre, Amsterdam, The Netherlands
[f] EMGO Institute for Health and Care Research, VU University Amsterdam and VU Medical Center, Van der Boechorststraat 7, 1081 BT Amsterdam, The Netherlands
[g] Department for Health Care Policy, Harvard Medical School, Harvard University, Boston, USA

A B S T R A C T

Internet-based problem-solving training (IPST) effectively reduces depressive symptoms in employees. Yet, it is unknown which employees benefit most from this particular treatment. The study aimed to identify predictors and moderators of treatment outcome in IPST offered to employees with depressive symptoms. Within a randomized controlled trial (N = 150), designed to test the effectiveness of IPST, variables that predict and moderate the effects of IPST when compared with a waitlist control group (WLC) were explored. The outcome was change in depression severity, assessed using the Center for Epidemiological Studies Depression Scale (CES-D). Both depression severity and other psychopathological symptoms and potential predictors/moderators were assessed as self-reports at baseline (t1) and in follow-up assessments after seven weeks (t2), three months (t3) and six months (t4). Higher depression severity at baseline predicted improvement in depressive symptomology in follow-up assessments after seven weeks, and three- and six months. Depression severity moderated the effectiveness of IPST assessed at six-month follow-up. Simple slope analyses revealed that the long-term effectiveness of the intervention was more pronounced among participants with high (CES-D range: 33–44, M = 37.0, SD = 3.2) and moderate (CES-D range: 14–32, M = 23.1, SD = 5.6) depression baseline scores, compared to participants displaying low depression baseline scores (CES-D range: 5–13, M = 9.0, SD = 2.2). No indication was found that participants presenting low depression severity at baseline significantly benefitted from IPST in the long-term. IPST might be appropriate for employees with a wide range of different characteristics. While there appears to be no reason to exclude employees with severe depression from Internet-based occupational mental health interventions, for employees low in depression severity, watchful waiting or potentially no intervention should be considered. These findings may not apply to other low-intensity interventions and/or target groups.

1. Introduction

Occupational stress is a risk factor for mental health problems, such as depression (Stansfeld and Candy, 2006). Even though depression is both preventable and treatable at the workplace (Corbière et al., 2009; Tan et al., 2014) and positive effects of psychological interventions on work-productivity have been found (Wang et al., 2007), the majority of affected individuals remain untreated (American Psychological Association, 2013; Goldberg and Steury, 2001). Consequently, depression is highly prevalent in working populations, with a 12-month prevalence rate of 7.1% for men and 6.2% for women (Andrea et al., 2004; Blackmore et al., 2007; Shields, 2006; Wang et al., 2010a,b). Moreover, the disease not only causes a considerable burden for individuals, society, and employers (Mathers and Loncar, 2006; Wittchen et al., 2011), but also incurs costs due to productivity loss and absenteeism (Lerner and Henke, 2008; Wang et al., 2010a).

* Corresponding author at: Leuphana University Lüneburg, Innovation Incubator, Division Health Trainings Online, Rotenbleicher Weg 67, 21335 Lüneburg, Germany.
E-mail address: ebert@inkubator.leuphana.de (D.D. Ebert).

1.1. Internet-based interventions

A possible solution for the current treatment gap is offered by the emergence of effective Internet-based interventions in the treatment of depressive symptoms (Richards and Richardson, 2012). Internet-based interventions are well suited for the workplace, because (1) they are easily accessible at any time and place, (2) anonymity is assured when employees want to avoid stigmatization or self-disclosure in group settings, (3) participants can work at their own pace and review materials as often as they want, and (4) such interventions may reach affected employees earlier than traditional mental health services, hence preventing the onset of more severe mental health problems. Finally (5), Internet-based interventions are easily scalable, implying that only a small increase in therapeutic resources is required to reach a greater proportion of the suitable population using these interventions (Ebert et al., 2014a; Heber et al., 2013).

Internet-based interventions have been shown to be feasible for the prevention and treatment of depression at the workplace (Geraedts et al., 2014a). Yet, results concerning the effectiveness are still conflicting. While a recent randomized controlled trial demonstrated that an Internet-based problem solving training (IPST) directed at employees was effective in reducing symptoms of depression (Ebert et al., 2014b), another trial did not find any additional benefits of IPST compared to care-as-usual for employees with mild depressive symptoms (Geraedts et al., 2014b; Geraedts et al., 2014c).

To date, there are no indications of which individual characteristics determine the effectiveness of IPST with respect to depression at the workplace. However, identifying factors that determine the effect of treatment outcome is of important clinical value for several reasons. First, appropriate populations can be recognized. Second, interventions can be adjusted to the precise needs of the individual. Third, by recognizing certain subpopulations, distinct causal mechanisms or progression of the disease can eventually be perceived. Fourth, health care resources can be assigned on an evidence-based level (Kraemer et al., 2002).

1.2. Predictors and moderators of (Internet-based) interventions

A variable that predicts outcome regardless of the treatment intervention is called a predictor; a variable that identifies for whom and under what conditions treatments have different effects is called moderator (Kraemer et al., 2002). To date, few studies have explored the participant characteristics that determine the effectiveness of Internet-based interventions for depressed individuals (Donker et al., 2013; Ebert et al., 2013; Warmerdam et al., 2013).

One of these studies compared the response to online cognitive behavioural therapy (CBT) for depression to a waitlist control group (Button et al., 2012). The authors found that higher pre-treatment depression severity was associated with a greater benefit in treatment. Furthermore, separated/widowed/divorced patients benefitted most from the intervention, whereas patients with a higher number of recent adverse life stressors were associated with a poorer treatment outcome. Another study that explored predictors and moderators of response to Internet-based CBT and IPST found higher baseline depression and higher education as predictors of improvement (Warmerdam et al., 2013). However, these authors found none of the variables explored in the study to moderate the differential effectiveness of the two treatments. Additional research that compared the effects of Internet-based to group-based face-to-face CBT for patients with sub-threshold depression (Spek et al., 2008) found high scores on neuroticism to predict a poorer treatment outcome, whereas higher depression scores at baseline, being female, and a higher education level were predictors of improvement. De Graaf et al. (2010) investigated pre-treatment and short-term improvement variables as predictors/moderators of outcome of unsupported computer-based CBT, usual primary care (TAU), and computer-based CBT combined with TAU for depression. They

found that low pre-treatment illness severity, short-term improvement on clinical variables, and current employment predicted improvement, irrespective of treatment.

All in all, up to this point findings on the potential characteristics that predict outcome and/or determine the effectiveness of Internet-based therapy in comparison to a control group are relatively scarce and inconsistent. Most studies explored CBT outcome, whereas remarkably little research has been carried out with respect to PST. In addition, to the best of our knowledge, no study has examined which employees might or might not benefit from this specific kind of treatment and delivery.

1.3. Purpose and hypotheses of the study

The study explored both predictors and moderators for IPST treatment response in depressed employees. This was done by performing secondary analysis on the data of a randomized controlled study that examined the efficacy of IPST for employees in the educational sector (teachers) with depressive symptoms (Ebert et al., 2014b). An exploratory approach including a vast number of possible baseline variables was employed in order to maximize the generation of hypotheses to be tested specifically in future studies (Kraemer et al., 2002). According to Kraemer et al. (2002) hypothesis-generating analyses are important because the hypotheses tested in hypothesis-testing studies are frequently weak. Moreover, the design of hypothesis-testing studies is often based on erroneous assumptions rather than being grounded in the empirical and thus often lacks the power to identify treatment effects. Hence, the results of exploratory studies would be able to function as general guides to make ideal decisions for future randomized clinical trials (RCT). The selection of predictors and moderators was based upon (a) evidence of former studies exploring predictors/moderators of outcome in face-to-face CT (Hamilton and Dobson, 2002), (b) evidence of former studies exploring predictors/moderators of outcome in Internet-based intervention studies (Button et al., 2012; de Graaf et al., 2010; Donker et al., 2013; Spek et al., 2008; Warmerdam et al., 2013), and (c) theoretical assumptions based on working-related or intervention characteristics. Thus, the final list of potential predictors and moderators explored in the current study included: *Demographics*: age, sex, weekly working hours, experience with therapy/training; *Clinical Pre-treatment Characteristics*: depression severity, emotional exhaustion; and *Motivational Variables*: general self-efficacy. The primary research questions of the study were: (1) Do any of the included baseline characteristics predict/moderate the effectiveness of IPST in comparison to a waitlist control group? (2) In the case of predicting/moderating effects, do employees characterized by 'unfavourable scores' on identified moderators still profit from IPST?

2. Method

2.1. Study design

Secondary analyses were conducted based on the data of a randomized controlled trial examining the effectiveness of IPST in reducing depressive symptoms in teachers in comparison to a waitlist control group (WLC) (N = 150) (Ebert et al., 2014b). Study outcomes were measured using self-report data at baseline (t1), and in follow-up assessments after seven weeks (t2), three months (t3), and six months (t4). The primary outcome was depressive symptoms (CES-D) (Radloff, 1977; German version: Hautzinger et al., 2012). The study found evidence that IPST reduced depressive symptoms, measured at post-treatment, in teachers compared to waitlist-subjects (Cohen's d = 0.59). Enduring effects of IPST were also reported after three (between-group effect size: d = 0.37) and six months (between-group effect size: d = 0.38). For more elaboration