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The efficacy and effectiveness of online CBT
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In 1997, researchers of the University of Amsterdam developed one of the first psychotherapeutic applications of the internet. They implemented a standardised cognitive behavioural treatment (CBT) of post-traumatic stress symptoms in a website, and used this site to treat a small number of students with matching symptoms. The results were surprisingly encouraging. Almost every participant reported a strong reduction in symptoms. Subsequently, controlled trials confirmed the value of this pilot study, and showed that a large part of the improvements could be attributed to the intervention. To implement the treatment in routine practice, the researchers founded an online clinic. With this clinic, the Interapy clinic, they introduced online psychotherapy in the Dutch mental healthcare system.

In this dissertation, we explore the wider applicability of online CBT, in four randomised controlled trials (Chapter 2 to 5) and a routine practice study (Chapter 6). The research included almost 2000 patients with a variety of psychological symptoms. In the controlled studies (N = 456), we assess the efficacy of online CBT for work-related stress, mild to moderate depression, and symptoms of panic disorder and bulimia nervosa. In the fifth study, we examine the effectiveness of online CBT in routine clinical practice (N = 1500).

Chapter 1, the introduction, starts with a brief description of the motivation behind our research. Epidemiological studies suggest that a considerable portion of the people with mental health problems do not receive adequate treatment. People do not seek help, or are not treated in accordance to current practice guidelines. Psychological, social, geographical, and organizational factors contribute to this gap between what we know and do in clinical psychotherapy. Internet applications have reduced or removed such barriers in many areas of life. Psychotherapeutic internet interventions may support public mental healthcare in a similar vein. The second part
of the introduction provides a brief overview of internet intervention research. Three different types of internet interventions are identified: online self-help (which does not include therapist support), online guided self-help (which includes limited therapist support, up to about 90 minutes per treatment, often in combination with face-to-face contact), and online psychotherapy (which includes more intensive therapist support, and no face-to-face contact). In this dissertation, we studied this last form of online treatment. Previous controlled trials established that online psychotherapy yields promising results in the treatment of post-traumatic stress. Would similar positive results be achieved with other mental health disorders? And would these results generalise to routine clinical practice?

Chapter 1 describes a randomised controlled trial of an online treatment for work-related stress. For this, a new treatment protocol was developed. Similar to the aforementioned online treatment of post-traumatic stress, the new treatment is fully online, manualised, and based on therapeutic techniques that are commonly applied in CBT. Clients and therapists communicate over the internet, without face to face contact. The nature and the sequence of the interventions is standardised, and therapists use default feedback texts which they adapt to the situation of their clients. The treatment comprises psycho-education, awareness training through self-monitoring and writing exercises, relaxation training, positive self-verbalisation, social skills training through behavioural experiments, time management and relapse prevention.

The trial was announced in national Dutch newspaper. Adult applicants were screened through online administration of validated questionnaires and a semi-structured telephone interview. Demographic data, symptom severity and contraindications for online treatment were assessed. Applicants with suicidal ideation, alcohol- or substance abuse, or increased risk of dissociation of psychosis were excluded and referred to other mental health institutions. We assessed 342 applicants, of which 239 were accepted. Participants started online treatment immediately (n = 177), or after a waiting period of seven weeks (n = 62). Three years later, follow-up measurements were taken.

The online treatment had positive effects on stress, depression and emotional exhaustion. On relevant subscales of self-report questionnaires, the Depression Anxiety
Stress Scales (DASS) and the Maslach Burnout Inventory - General Survey (MBI), treated participants scored better in comparison to untreated participants, even after conservative corrections for dropout (26%) and multiple statistical testing ($P < 0.003; 0.6 > d > 0.3$). The treatment increased the likelihood of recovery from stress symptoms from 16% to 50% (Odds Ratio = 5.1, $P < .0001$). At follow-up, three years after treatment, gains were found to be maintained. The study had some limitations. The average treatment took longer than estimated. Hence, post-test measurements in the two experimental groups were taken at slightly different times, which resulted in interpretative difficulties. In addition, the follow-up results could not be contrasted to a control group, because all participants had followed treatment when follow-up measurements were taken. Although these limitations demand further research, the results provided a first indication that online psychotherapy is efficacious for psychological problems other than post-traumatic stress.

Encouraged by the results of the first trial, we developed an online treatment for mild-to-moderate depression. **Chapter 3** describes the randomised controlled trial in which we assessed the efficacy of this intervention. The design of this study is similar to the first study. After online screening and a telephone interview, participants ($N = 54$) started treatment immediately ($n = 36$), or after 13 weeks ($n = 18$). After 18 months, all participants were invited for online follow-up measurements. Changes in the severity of depressive symptoms and general psychopathology were assessed through the Beck Depression Inventory (BDI), the Depression Subscale of the Symptom Check List (SCL90-R), and the DASS.

Results were striking. Participants in the control condition reported strong reductions in depressive symptoms ($d = .9$) after the waiting period, despite the fact that they had not been offered treatment. However, since the observed improvements in the treatment group were very large ($d = 1.6 - 1.9$), the differences between both experimental groups remained large and significant (a pooled effect size of $d = .9; P < .03$). Treated participants were more likely to recover from their depressive symptoms (although it should be mentioned that this difference was significant on just one of the two outcome measures - the SCL90R depression subscale). Follow-up data showed that the improvements were stable on the long term. The large effect sizes and the positive evaluations of the patients carried a clear message. The results confirmed
that face-to-face contact is not a necessary requirement of efficacious treatment. Furthermore, the study provided further support to the hypothesis that the amount of therapist support is a critical determinant of the impact of an online intervention.

In the third study, which is presented in chapter 4, we focused on the online treatment of symptoms of panic disorder. Fifty-eight participants with clinical or subclinical panic symptoms followed a fourteen-week online treatment program, consisting of psycho-education, in vivo and in vitro exposure, relaxation training and cognitive restructuring. Half of the group started treatment immediately, and the other half started after fourteen weeks. In this study, we conducted a follow-up after three years. The severity of panic symptoms was assessed through a self-report measure, the Panic Disorder Severity Scale Self-Report (PDSS-SR), and a panic diary, in which participants recorded the intensity and frequency of their panic attacks. Bodily sensations, agoraphobic cognitions and avoidance and general psychopathology were assessed with the Bodily Sensations Questionnaire (the BSQ), the Agoraphobic Cognitions Inventory (ACQ), the Mobility Inventory (MI), and the DASS.

Drop-out was low: 89% of the participants completed the full treatment. Another strength of this study is that 81% of the participants could be traced for the three-year follow-up measurements. The treatment group improved significantly more in comparison to the control group ($P < .03$), with regard to every outcome measure, with exception of the agoraphobic measures. The significant effects were moderate to large ($0.4 < d < 1.1$), and were more most pronounced in the panic diary data. Treated participants reported less frequent and less intensive panic attacks in comparison to untreated participants. The treatment increased the probability of a reduction of the number of panic attacks of at least 50% from 14% to 52%. The follow-up data suggested that the effect of treatment increased over time. Despite the positive results, the controlled effects of treatment were somewhat less than expected. This might be explained by our choice to include a heterogeneous group in the study. This explanation received some support from ad-hoc explorative analyses, which suggested that the treatment was more effective for participants, who presented with more severe symptoms.

Chapter 5 presents the design and results of the fourth and last RCT of the dissertation, in which we assessed the efficacy of online CBT in the management of
bulimic symptoms. This study had three experimental arms. One-hundred-and-five participants were randomly assigned to online treatment (n = 35), to a waiting list (n = 35), or to bibliotherapy (n = 35), in which participants received a self-help book, but no therapist guidance. The online treatment takes about twenty weeks, and comprises awareness training, exposure and response prevention, cognitive restructuring, behavioural experiments, and relapse prevention. The self-help book is based on a similar therapeutic approach (i.e., CBT), and comprises similar psychotherapeutic techniques. Primary outcome measures were the Eating Disorder Examination-Questionnaire (EDE-Q) and the frequency of binge eating and purging episodes. Disturbances in body satisfaction were measured through the Body Attitude Test (BAT).

Changes in the waiting list group were marginal. Participants, who followed online treatment, experienced significantly less bulimic symptoms than the participants in both control groups (d = .9, P < .04), while the changes in the bibliotherapy group did not differ significantly from the changes in the group assigned to the waiting list (d = .2, P = .99). The effect of online treatment on body satisfaction was less pronounced, and was significant only in comparison to the waiting list. The data suggested that online treatment increases the likelihood of recovery from bulimic symptoms from 20% to 40%. Interpretation of the results was complicated by the occurrence of a rather high drop-out rate in the bibliotherapy group (35%). In addition, we found that 31% of the participants in this group had sought additional treatment in the period between the pre-test and the post-test. This also might explain the results of the follow-up. In the online CBT group, improvements at post-test remained stable up to one-year after treatment. However, in the bibliotherapy group, participants strongly improved after the end of treatment, which resulted in non-significant differences between the two experimental groups at follow-up. Since the bibliotherapy did not have effects at post-test, it is likely that bibliotherapy had an indirect delayed effect. We concluded that online CBT is superior to no treatment and bibliotherapy on the short-term, and that bibliotherapy may increase the probability of recovery by promoting positive attitudes towards treatment in a considerable portion of patients.

Expectations with regard to the clinically utility of the results of controlled research are sometimes rather low. Since the conditions in routine practice are typically
complex, routine practice is only partially informed by controlled research, in which conditions are artificially simplified. It is therefore recommended to examine the performance of tested interventions in routine practice as well. This was the aim of a large naturalistic study of the effectiveness of online CBT, which is presented in chapter 6. This was an analysis of electronic patient records of $N = 1500$ clients of the Dutch Interapy clinic. Between 2002 and 2008, the clinic offered these patients online treatment for depression ($n = 413$), panic ($n = 139$), burnout ($n = 470$), or post-traumatic stress ($n = 478$). The study included consecutive patients, until the predetermined sample size was reached. The anonymised records provided demographic data, process data and patient satisfaction data, and pre/post/follow-up data of validated psychological self-report questionnaires of specific and general psychopathology, including the BDI, the PDSS-SR, the Impact of Event Scale (IES), the Oldenburg Burnout Inventory (OLBI), and the DASS. The online treatments, the procedures and effect measures that are used in the clinic were identical to those that were used in the controlled research. Therefore, because of the manualisation and the high degree of treatment fidelity, we expected that the effects of treatment in routine practice would be similar to those observed in the controlled studies.

Post-test measurements were available for 79% of the patients. The drop-out rate (the percentage of patients not completing the full treatment) was 29%, which is relatively low in comparison to other internet-based interventions and comparable to known drop-out rates in Dutch clinical practice. Clients evaluated the services of the clinic very positively. On the short-term (at post-test and six-weeks follow-up), clients reported significant improvements ($P < .001$) in specific and general psychopathology. The effects on the specific outcome measures ($0.7 < d < 1.9$) were somewhat better in comparison to those observed in the controlled studies. Among those, who completed treatment, 71% experienced a statistically reliable improvement, and 52% experienced a statistically reliable recovery. The results of the one-year follow-up should be interpreted with caution, since only 33% of the clients returned for follow-up measurements. However, the available data suggest that improvements are maintained up to one year after treatment.

In chapter 7, the general discussion, the studies are revisited from a birds-eye perspective, and re-evaluated within the context of the general aims of the research
program. Previous studies identified online CBT as an efficacious treatment alternative for post-traumatic stress. Would this also hold for psychological symptoms which have a less clear etiology, such as work-related stress, depression, panic attacks and bulimic symptoms? The controlled studies in this research suggest this to be the case. In addition, the routine practice study shows that these effects generalise to the applied setting. Online CBT appears to earn its place in the public health system. Treatment adherence is acceptable, treatment effects are comparable to regular face-to-face CBT, and clients highly appreciate this form of treatment.

Future research should focus on direct comparisons between online CBT and treatment alternatives, especially with regard to the cost-effectiveness and the optimal amount of human guidance. In addition, more attention should be given to clients who respond less to treatment. Some clients end treatment with residual symptoms, which calls for continued research efforts to enhance the effectiveness of treatment. For this, we need to increase our understanding of the effective components of online treatment. In addition, we may need more flexible forms of treatment. Finally, there is a clear need for independent replication research. In our studies, we evaluated the treatments that we also developed. Although this is common practice in internet intervention research, independent replications would significantly strengthen the evidence base of online CBT.

In the Netherlands, online CBT is reimbursed since 2005. Online CBT has been an accessible treatment alternative for patients with a variety of mental health symptoms for several years. At present, nonetheless, only a marginal fraction of Dutch mental healthcare is provided online. Referrers appear to be unable to see the wood for the trees. It is hoped that this dissertation will provide some clarification.