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Cognitive Behaviour Therapy

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Long-Term Effects of an Internet-Based Treatment for Posttraumatic Stress

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Abstract. Advances in communication technology offer additional strategies for providing psychological treatment. Previous trials of Internet-based treatment approaches reported significant reductions in posttraumatic stress and related symptoms in response to Internet-based treatments relative to control groups. However, empirical data on the long-term effects of those approaches are sparse. In order to evaluate the long-term effect of an Internet-based intervention, the authors conducted an 18-month follow-up of an Internet-based cognitive behavioural therapy for posttraumatic stress. Severity of posttraumatic stress symptoms was the primary outcome. Additional measures were depression, anxiety, mental and physical health, and health care utilization during the follow-up period. Treatment group participants (n = 34) were assessed 1.5 years after completing treatment. Results indicated that reductions in symptoms of posttraumatic stress symptoms, depression, and anxiety found at posttreatment were sustained during the 18-month follow-up period. Preliminary evidence on long-term effects of Internet-based health care as shown in this study is promising. However, research with larger and clinically more diverse samples is needed to fully assess the clinical impact and potential of Internet-based health care provision. Key words: online therapy; Internet; randomized controlled trial; long-term effects; cognitive behavioural treatment; PTSD.

In the past two decades, a substantial body of research has examined potential treatment possibilities for posttraumatic stress disorder (PTSD). Generally, it was found that psychotherapy for PTSD leads to large improvements in psychological functioning. A recent meta-analysis including 26 studies revealed an average effect size (Cohen’s d) of 1.1 for active versus wait-list control group comparisons (Bradley, Greene, Russ, Dutra, & Westen, 2005). However, the majority of individuals who suffer from PTSD do not receive the care they need (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). High prevalence rates generate a need for the provision and dissemination of alternative accessible and cost-effective therapeutic services (Newman, 2004). Despite scientific support for the efficacy of exposure therapies to treat PTSD and posttraumatic stress, they are neither widely available nor routinely used. The Internet represents a unique opportunity to influence the availability of expert therapeutic service in a dramatic way. Online therapeutic services could help to eliminate disparities in health resulting from inequities in people’s access to resources. This applies especially to people challenged by financial, geographic, physical, or attitudinal barriers to traditional service (Taylor & Luce, 2003). Also, because
of its visual anonymity, the Internet might provide an alternative information and treatment opportunity for people who avoid care because of concerns about the stigma of receiving mental health treatment. A number of controlled and randomized controlled trials demonstrated that the Internet provides a feasible way of offering treatment for trauma survivors (Knaevelsrud & Maercker, 2006, 2007; Lange, Rietdijk, et al., 2003; Lange, van de Ven, Schrieken, & Emmelkamp, 2001; Litz, Engel, Bryant, & Papa, 2007). Previously, we reported on the efficacy of an Internet-based treatment approach for PTSD (Interapy). The 5-week intervention is a cognitive behavioural writing therapy and comprised three components: exposure, cognitive reappraisal, and social sharing (Lange, Rietdijk, et al., 2003).

Results of a randomized controlled trial (RCT) indicated that, relative to the wait-list group, the treatment group experienced significant statistical and clinical reductions in the severity of the posttraumatic stress symptoms as well as in depression and anxiety at posttreatment and at 3-month follow-up (Knaevelsrud & Maercker, 2007). Because Internet-based therapy is a relatively new form of treatment, very little is known about the long-term outcomes of Internet-based interventions. The goal of this follow-up study was to determine whether symptom improvement could be maintained for participants with PTSD and general psychopathology presented in Knaevelsrud and Maercker (2007) at 18-month follow-up.

**Method**

Initially, an RCT was conducted to evaluate the efficacy of an Internet-based therapy (Interapy) for posttraumatic stress in a German-speaking population (Knaevelsrud & Maercker, 2007). Ninety-six participants with posttraumatic stress reactions were randomly allocated to either 10 sessions of Internet-based cognitive behavioural therapy (CBT) conducted over a 5-week period or to a wait-list control group. Severity of posttraumatic stress was the primary outcome. Secondary outcome variables were depression, anxiety, and mental and physical health. Applicants were sent screening questionnaires by e-mail and completed the assessment using their home computer. The wait-list group received treatment after the postassessment of the Interapy treatment condition. Follow-up assessments were conducted at the end of treatment and 3 months after treatment. Participants were recruited by means of radio and newspaper advertisements as well as advertisements posted on Web sites for different groups (e.g. crime victims, sexual abuse victims, bereaved parents). To be initially included in the study, participants had to (a) have experienced a traumatic event (based on the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, criteria; American Psychiatric Association, 1994) that occurred at least 1 month before treatment; (b) be 18 years of age or older, (c) not exceed the cutoff scores for dissociation and psychosis, (d) not abuse alcohol or other drugs, (e) not consume neuroleptics, (f) be fluent in written German, and (g) not be receiving treatment elsewhere. All contact between therapists and participants during the 5-week period of 10 writing assignments occurred via e-mail. The treatment comprised three modules: exposure, cognitive restructuring, and social sharing. Participants were sent two weekly 45-min writing assignments and received individual feedback on their writing exercises (for further details of the treatment protocol, see Knaevelsrud & Maercker, 2007; Lange, Rietdijk, et al., 2003). Pretreatment, posttreatment, and 3- and 18-month follow-up self-report assessments were administered through e-mail. The treatment was conducted by cognitive behavioural psychologists who had received special training in therapeutic writing in the treatment of posttraumatic stress. The therapists also participated in weekly supervision sessions.

**Participants**

Of the 41 participants who were initially included in the treatment group and who completed the treatment, 34 (83%) participated in the 18-month follow-up study. The final sample included 30 (88%) women and four (12%) men, with a mean age of 34 years. Sixteen (47%) had a university degree, 10 (29%) had a high school diploma, and the remaining eight (24%) had attended secondary school. Participants reported the most distressing traumatic event to be sudden or violent death of a close person (n = 14 [41%]) and sexual abuse incest or rape (n = 13 [38%]). Time elapsed since the traumatic
event at the beginning of the treatment ranged from 2 to 432 months ($M = 103$, $SD = 123$).

**Procedure**

All participants who completed the treatment were contacted through e-mail 18 months after treatment completion and were invited to complete the 18-month assessment. If we received no response within 14 days, we approached participants via telephone. As before, participants performed the assessment through e-mail from their home computer. Eight participants were untraceable at the 18-month follow-up because of an inactive e-mail address or change of phone number. Whether some of these participants did not receive the e-mail or alternatively refused to complete the questionnaire was unclear. An analysis comparing 18-month follow-up completers with noncompleters revealed no significant differences in terms of pretreatment and posttreatment measures of posttraumatic stress, depression, and anxiety (all $p$s > .10). The same accounted for differences concerning demographic variables such as age, educational level, and time elapsed since the traumatic event between the two groups.

**Measures**

The revised version of the Impact of Event Scale (IES-R; Weiss & Marmar, 1997) was used to assess symptoms of posttraumatic stress. The Depression and Anxiety subscales of the short form of the Symptom Checklist-90 (Brief Symptom Inventory [BSI]; Derogatis, 1992) measured symptoms of depression and anxiety. The Short Form-12 (SF-12; Ware, Kosinski, & Keller, 1996), a 12-item short form of the Medical Outcome Study Self-Report, was used to assess physical and psychological functioning. A detailed description of all measurements and a complete overview of all screening instruments are given in Knaevelsrud and Maercker (2007).

**Statistical analysis**

Descriptive statistics was used to examine the demographic data. Chi-square analyses were conducted to determine differences in terms of gender, education level, and marital status between those who completed the 18-month follow-up and those who did not. Independent-samples $t$ tests were used to assess differences in terms of age, years since the trauma, as well as pretreatment and posttreatment psychopathology of 18-month follow-up completers and noncompleters. Paired $t$ tests were used to analyze treatment effects at two time points (pretreatment and follow-up) of the follow-up completers. Effect sizes were calculated using Cohen’s $d$ for repeated measures to quantify the magnitude of change in mean symptoms between pre- and 18-month follow-up, respectively. By Cohen’s standards for research in the behavioural sciences, an effect size of $d = 0.8$ for treatment effects in psychotherapy is considered large.

**Results**

Findings on posttraumatic stress, depression, anxiety, and general psychological and physical functioning are summarized in Table 1. Because outcomes at posttreatment and 3-month follow-up relative to pretreatment have been reported previously (Knaevelsrud & Maercker, 2007), the present analysis is restricted to outcomes at 18-month follow-up relative to pre- and posttreatment. Table 1 documents the means and standard deviations at all four time points for illustrative purposes.

Paired $t$ tests revealed that the treatment gains observed in the three symptom domains of posttraumatic stress at posttreatment were maintained at 18-month follow-up: intrusion, $t(33) = 0.87, p = .390$; avoidance, $t(33) = 0.85, p = .404$; and hyperarousal, $t(33) = 0.77, p = .446$. The same applies to BSI scores for depression, $t(33) = -0.63, p = .536$, and anxiety, $t(33) = 0.68, p = .504$ (see Table 1). Likewise, scores on the SF-12 subscales assessing general psychological functioning, $t(31) = -0.94, p = .355$, did not reflect significant change in symptoms since posttreatment. A small but nonsignificant decline on physical functioning was found, $t(31) = -0.81, p = .424$.

Accordingly, paired $t$ tests revealed highly significant symptom improvements from pretreatment to 18-month follow-up, with large effect sizes on all relevant psychological constructs (all $p$s < .001): intrusion, $t(33) = 8.5, p < .001, d = 1.9$; avoidance, $t(33) = 6.1, p < .001, d = 1.4$; and hyperarousal, $t(33) = 9.4, p < .001, d = 1.8$. The same applies to BSI scores for depression,
Posttreatment symptom levels were maintained at 18-month follow-up. These findings apply to both posttraumatic stress symptoms as well as indicators for general psychological complaints (depression, anxiety). This is in line with prior findings of Internet-based treatment of posttraumatic stress (Lange, van de Ven, & Schrieken, 2003) and complicated grief (Wagner & Maercker, 2007). The majority of the participants indicated that they reread their own essays and half of the participants reread their therapist’s comments. This might have functioned as relapse prevention. By rereading the therapeutic materials, participants might get back in touch with initial reactions and the alternative and more constructive actions/thoughts they developed as a result of their therapy. It would be interesting to compare follow-up results from two different conditions that either prevent or allow the use of the therapeutic documents after therapy ended to gain more insight into the influence of the archiving of the therapeutic process.

Because it was a naturalistic follow-up, about 24% of the participants indicated that they engaged in face-to-face therapy during the follow-up period. This is substantially lower than the findings of Lange, van de Ven, and Schrieken (2003), who reported that 47% of their sample engaged in some sort of psychotherapy during the follow-up period. There is an ongoing controversy concerning the comparability of Internet samples and face-to-face samples. Naturally, online participants tend to be self-selected (Kraut et al., 2004). However, in their review, Gosling, Vazire, Srivastava, and John (2004) concluded that Internet users do not differ from nonusers.
on markers of adjustment and depression. Other controversial aspects refer to the psychometric issues and the comparability of online and offline assessments. Ritter, Lorig, Laurent, and Matthews (2004) compared the psychometric properties of Internet-based versus mailed paper-and-pencil questionnaires. They found that questionnaires administered through the Internet were reliable and answered as often as the paper-and-pencil questionnaire. Still, in an earlier review by Buchanan (2002), mixed findings concerning the psychometric properties for Internet-based questionnaires were presented. Because of the lack of comparative studies including face-to-face conditions, the findings reported in this study should not be generalized to offline clinical populations.

Additional study limitations include the use of self-reports. Treatment outcomes were exclusively measured by self-rated questionnaires administered through the Internet. Clinical interviews and other independent sources of assessment would have added more evidence to the validity and clinical value of the results. In addition, there is no control for a comparison of the natural course of disorder. Because we used a wait-list controlled design, it would have been unethical to deny treatment to those participants originally randomized to the wait list. Consequently, there was no control group against which the outcomes of the treated sample could be compared. Also, the sample size is small. Therefore, subtle effects that would affect outcome may not be detectable and could affect conclusions that can be drawn from the data. We lost 17% from the 3-month follow-up to the 18-month follow-up. Although this is comparable to other long-term follow-ups (Cottraux et al., 2008), it clearly reduces the generalizability of the results. Recruitment and retention are regular problems in studies examining the psychopathological long-term response of trauma victims. In the present study, respondents were comparable to dropouts in pre- and posttest psychopathology. However, there might be psychopathological dimensions that have been not captured, so that potentially more healthy participants took part in the long-term follow-up. In addition, only four respondents (12%) were males and the sample was highly educated. Additional research is needed to determine the degree to which our results would generalize to male trauma victims and trauma victims with lower education levels. Moreover, participants were recruited by means of announcements in the print media and on specific Web sites for trauma victims. Therefore, our sample may have been biased in that participants were already actively looking for help on the Internet and might felt more comfortable using the Internet. This is particularly relevant, because Carey, Wade, and Wolfe (2008) found that regular prior technology use significantly influenced treatment response.

Despite these limitations, this study provides preliminary support for the efficacy of Interapy for posttraumatic stress. PTSD and posttraumatic stress are frequent disabling and potentially chronic conditions (Kessler et al., 1995) and thus are a considerable public health concern. Therefore, effective and accessible treatment alternatives such as Interapy are of substantial interest from the viewpoint of public health.

Acknowledgements

This study was cofunded by the German organization for crime victims “Weisser Ring.” The authors declare that they have no competing interests. Christine Knaevelsrud has made substantial contributions to conception and design, coordination, acquisition of data, analysis and interpretation of data, and writing the article. Andreas Maercker has made substantial contributions to conception and design, analysis and interpretation of data, and manuscript revision. Both authors read and approved the final article.

The authors thank Alfred Lange, Pieter van Hoogstraten, and other team members of Interapy for their intellectual and logistic support and for helpful suggestions at various stages of our treatment study. We also thank our colleague Birgit Wagner for serving as a therapist and for providing essential suggestions at various stages of our treatment study.

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