

## Interapy: Treatment of Post-traumatic Stress via the Internet

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**Abstract.** This paper describes the theoretical background and procedures (including psycho-education, screening, treatment protocol and outcome measurement) involved in a protocol-driven internet treatment of post-traumatic stress and grief in a group of people who have suffered from mild to relatively severe trauma. The paper examines the results of 3 outcome and process studies, which were carried out initially in a student population and subsequently in the general population of highly traumatized people. In the latter study, participants in the experimental condition ( $n = 69$ ) improved significantly more than participants in the waiting list control condition ( $n = 32$ ), with respect to trauma-related symptoms and general psychopathology. The effect sizes were large. More than 50% of the participants treated showed reliable change and clinically significant improvement after treatment for avoidance and depression. Treatment proved most beneficial for participants who had suffered from intentional trauma and those who had not previously discussed the traumatic events with significant others. Content analysis of the publications indicates a remarkable increase in cognitive coping during treatment. The possibilities for future research into internet-driven treatment of post-traumatic stress symptomatology are discussed, including the proposal to study the effects of sending a final written letter to a significant other person. **Key words:** *Internet, cognitive behavioural treatment, trauma.*

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The internet increases the therapeutic possibilities of computers. It enables patients who engage in computer-mediated therapy to interact with their therapists. In computer-guided therapy the computer selects the feedback to provide to the patient (Marks, 2000). The advantage of internet-mediated therapy is that therapists can provide feedback via a computer, tailored to their clients' needs. People living in remote areas, physically disabled patients with restricted mobility, or patients who are afraid to seek face-to-face therapy due to anxiety or stigmatization, may be reached through the internet. Furthermore, some people prefer to reveal their innermost thoughts and feelings to a computer-screen than to a real person (Erdman, Klein, & Greist, 1985; Miller & Gergen, 1998; Postmes, 1997). These advantages might lower the barriers that prevent people from engaging in psychotherapy.

During the last few years several articles have been published on psychological treatment presented via the internet (Barak, 1999; Botella et al., 2000; Celio et al., 2000; Klein & Richards, 2001; Smith & Senior, 2001; Ström, Pettersson, & Andersson, 2000). Some of these articles focus mainly on providing psycho-education (e.g. Celio et al., 2000), others provide information and standard instructions on a web site, and maintain contact with the clients via e-mail (Carlbring, Westling, Ljungstrand, Ekselius, & Andersson, 2001).

It is sometimes argued that treatment via the internet might also have disadvantages (L'Abate & Kern, 2002). The internet does not seem to be the medium of choice when therapy requires a lot of

discussion and probing between the therapists and patients. Hence, the internet will probably be suited only to administering well-established treatment protocols for clearly defined disorders. The present paper presents such a treatment for post-traumatic stress (termed "Interapy"). The treatment applies to patients who suffer from unprocessed negative life events but who do not formally meet all criteria of post-traumatic stress disorder (PTSD). Therefore, we adhere to the concept "post-traumatic stress" (PTS). The next section describes the theoretical background of the treatment protocol and presents the internet proceedings. We then present the results of 3 experiments that were carried out to investigate the effects of this internet-driven treatment of PTS. All 3 experiments make use of the same protocol, measures and procedures.

## Theoretical background of the treatment-protocol

Three mechanisms are most widely considered to be crucial in overcoming traumatic events: (i) habituation to the frightening stimuli that occurs after exposure to the traumatic memories and avoided stimuli (Foa & Riggs, 1995; Lepore, Greenberg, Bruno, & Smyth, 2002; Vaughan & Tarrier, 1992); (ii) cognitive reappraisal of the traumatic experiences (Lepore et al., 2002; Lutgendorf & Ullrich, 2002; Resick & Schnicke, 1992); and (iii) social sharing and support (Sarason et al. 1991; Sarason, Sarason, & Pierce, 1990).

Two main components in the cognitive behavioural treatment of PTSD and pathological grief are based on the first 2 mechanisms. *In vivo* and imaginary exposure (self-confrontation) is used to help patients to confront the sensory perceptions, emotions and thoughts that they usually avoid. The effectiveness of treatment by self-confrontation is well established (Jaycox & Foa, 1996; Jaycox, Foa, & Morral, 1998). Cognitive reappraisal implies challenging dysfunctional automatic thoughts and stimulating reinterpretation of misattributions about the traumatic event in order to accommodate a new symbolic meaning about the experience. There is evidence for the effectiveness of cognitive therapy for patients with PTSD and pathological grief (Ehlers & Clark, 2000; King, 2002; Shalev, Bonne, & Eth, 1996). Lange et al. (1999), Rimé (1995) and Smyth & Pennebaker (1999) have provided some evidence for the importance of a third element in treatment of post-traumatic stress: disclosure and sharing.

Structured writing assignments provide an alternative for imaginary confrontations during sessions with a therapist. The method combines self-confrontation and cognitive reappraisal and facilitates the process of sharing. The effects of structured writing assignments on health and well being have been investigated in many case studies (Lange, 1994; 1996) and experiments (Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Lepore & Smyth, 2002; Smyth, 1998), using a brief writing intervention developed by Pennebaker (Pennebaker & Beall, 1986). In his meta-analysis, Smyth (1998) showed that the average effect size of structured writing in this type of experimental studies was  $d = 0.47$  (range  $40 < d < 0.70$ ), which is comparable to the effects of other psychological interventions. This is a promising statistic since the protocols used in most of these trials were less intensive than those used in clinical practice.

In a series of experiments, Klein (2002) demonstrated that writing about trauma increases the working memory. She argues that the increase in working memory enhances problem solving ability, which increases the possibility of breaking the vicious circles in which traumatized people find themselves. This confirms the theoretical thinking of Smyth and Pennebaker (1999). They propose that traumatic stress has a negative influence on the organization of memory. Necessary selectivity in memory decreases the degree of unwanted recalls and intrusions. By writing about the traumatic events the mind reorganizes itself, reintegrating cognitions and feelings in a meaningful way.

We generated a protocol that combines screening, pre-tests, and treatment of post-traumatic stress by structured writing assignments, post-test and follow-up test. The protocol is based on a series of case studies and experiments (Lange, 1994; 1996; Lange, Schoutrop, Schrieken, & Van

de Ven, 2002; Lange, Van de Ven, Schrieken, Bredeweg & Emmelkamp, 2000a; Schoutrop, 2000; Schoutrop, Lange, Hanewald, Davidovich & Salomon, 2002; Schoutrop, Lange, Hanewald, Duurland & Bermond, 1997). The full process, including contact between therapist and client, takes place on the Interapy web site. E-mail is used only for additional support, if required.

### The Internet site ([www.interapy.nl](http://www.interapy.nl))

In order to establish computer-mediated communication between participants and therapists, an interactive web site was developed. Participants and therapists can use a normal web browser to follow the complete therapeutic procedure, which includes completing questionnaires, writing essays and reading instructions for the next stage. As a web browser, any recent version of Netscape Navigator or Internet Explorer is sufficient. Interapy is set up as a Client-Server System (for details, see Lange et al. 2000a). The client side (the interface between participants and therapists) is provided by a set of web pages, wherein the information and functionality presented depend on the data that are available on the Server side. The Server side is the part of the system where all information is gathered, processed and stored. A special computer, the *Web Server*, examines every action performed by participants and therapists, stores the necessary information in another special computer (the relational Database Server) and finally returns the feedback given by the therapists. The *Web Server* provides the security of all information that is sent over the network connection. Several steps ensure the privacy of clients. First, clients use a login combination known only to them. Second, all communication between clients and therapists is encrypted using the standard https protocol, thus preventing data from being intercepted during transmission over the internet. Therapists use a group-login account in addition to their personal account to enter the site. Recently, Interapy was re-implemented on a Linux system, with additional security safeguards.

### The Interapy procedures

When potential clients contact the Interapy home page, seeking help to overcome post-traumatic stress, their first step in the treatment process includes browsing the "Information Pages". These pages provide psycho-education about the symptoms of post-traumatic stress and pathological grief and the main features of treatment, with emphasis on imaginary exposure and structured writing assignments. These pages also provide information about the supervisors and therapists of Interapy, about the manner in which to apply for treatment, about institutions where they may seek treatment if they decide not to continue with Interapy or if they are excluded, and about references for further reading.

After applying for treatment, participants enter the *screening procedure* during which they complete questionnaires (described in the section about screening measures). The Interapy system automatically examines the answers, computes scale scores and compares these with the inclusion cut-off scores. Participants can only proceed to the next page if they have answered all questions on the previous page. This also applies to the measures of the effects. The system immediately informs the participants whether they meet the inclusion criteria. Therapists check only the questions about quantity and type of medication in order to decide whether the pharmacological situation of the participant allows inclusion. Participants who do not meet the inclusion criteria receive information about other institutions where they may seek help.

Participants who are admitted complete the pre-test online. Subsequently, they describe the traumatic experiences. The system then assigns each participant to one of the therapists. Treatment starts when the therapist has received by post the informed consent form signed by the client. In principle, this is the only interaction between therapists and clients that does not take place via the internet.

### **Screening measures**

Applicants are excluded from Interapy if they meet one of the following criteria:

- *Severely depressed mood.* Potential participants are excluded if their score on the Depression subscale of the Symptom Checklist (SCL-90; Derogatis, 1977) is above the cut-off score of the highly depressed group in the Dutch norm tables for the psychiatric population ( $>58$  for women and  $>53$  for men; Arrindell & Ettema, 1986). For these applicants we consider it inappropriate to follow a treatment protocol that stimulates self-confrontation without the possibility of adjusting the protocol and adding other elements, including medication.
- *Inclination to psychological dissociation.* This is measured by the 5-item Somatoform Dissociation Questionnaire (SDQ-5; Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1997). The internal consistency of the SDQ-5 is good ( $\alpha = 0.80$ ). The cross-validation is satisfactory and the instrument discriminates highly between groups of patients and non-patients (Nijenhuis et al., 1997). We exclude potential participants if their scores are above the cut-off score of the SDQ-5.
- *Risk of psychosis.* Risk of psychosis is measured by the Dutch Screening Device for Psychotic Disorder (SDPD; Lange, Schrieken, Blankers, Van de Ven, & Slot, 2000). This 7-item inventory has a high internal consistency ( $\alpha = 0.82$ ) and is a valid predictor of psychotic episodes. Agreement between self-report by a group of 33 patients and the reports about them by their clinicians has been shown to be high ( $r = 0.85$ ). Participants are excluded if they score above the cut-off for the Dutch norm group. Furthermore, participants are excluded if their answers to the questions about medication suggest the use of neuroleptica.
- The following criteria are established by the *Biographical Information Questionnaire (BIQ)*; Lange et al., 2000b): substance abuse, traumas suffered less than 1 month previously, incest, younger than 18 years of age, or applicants are currently in treatment elsewhere.

### **Outcome measures**

- The *Impact of Events Scale* (IES; Horowitz, Wilner, & Alvarez, 1979; Dutch version by Kleber & Brom, 1986): The IES assesses symptoms that are related to Avoidance and Intrusions, the 2 main characteristics of psychological dysfunction after a traumatic event. Participants indicate on a 5-point Likert scale whether they have experienced a given symptom during the last week. Cronbach's  $\alpha$  varies between  $\alpha = 0.66$  and  $\alpha = 0.78$  for the Avoidance scale and between  $\alpha = 0.72$  and  $\alpha = 0.82$  for the Intrusion scale; the external validity of both scales has been found to be good (Kleber & Brom, 1986).
- The subscales Anxiety, Depression, Somatization and Sleeping Problems (SCL-90) are used to measure the effects of treatment on psychological dysfunction in dimensions that are related to post-traumatic stress symptoms.

### **Exploratory measures**

- The *Biographical Information Questionnaire (BIQ)*; Lange et al., 2000b) is used for exploratory use, i.e. time passed since trauma, educational level, degree of computer and internet experience and level of typing skills.

### **Elements of treatment**

During a period of 5 weeks, participants have 10 writing sessions, 2 45-minute sessions a week. They write 4 times in the self-confrontation phase, then 4 times in the phase of cognitive reappraisal and, finally, twice in the last phase of sharing and taking leave. They are requested to make a timetable, which is registered in the database at the beginning of each of 3 treatment phases. The first instruction/feedback is after the trauma-description. In the middle of each phase and at the end of each phase, the therapists provide the participants with feedback about their

writings and instructions on how to proceed. This amounts to 7 feedback sessions: 1 + 2 + 2 + 2. The participants receive these instructions within 1 working day of sending their essays. The treatment protocol comprises the following 3 phases:

- *First phase: Self-confrontation.* At the start of treatment the participants receive on-screen psycho-education about the rationale of self-confrontation (exposure). Accordingly, the therapists instruct the participants not only to describe their traumatic event in detail, but also to write about their intimate fears and thoughts concerning the traumatic events. This is the theme of the first 4 writing sessions (Lange, 1994; Lange et al., 2002). To stimulate self-confrontation, participants are required to write in the first person and in the present tense, describing in the greatest detail the sensory perceptions they experienced at the time of the traumatic event, including olfactory, visual and auditory stimuli. Participants are instructed to write freely without concern for style, spelling, grammar, or chronology.
- *Second phase: Cognitive reappraisal.* Participants receive psycho-education about the principles of cognitive reappraisal. In this phase, the main goal is to challenge dysfunctional automatic thinking and to develop new views on the traumatic event, and to regain a sense of control (Resick & Schnicke, 1992). For example, therapists may instruct participants to write an encouraging advice to a hypothetical friend who has experienced the same traumatic event. The advice should deal with issues such as the possible positive bearing of the event on this person's life and what could be learned from it.
- *Third phase: Sharing and Farewell Ritual.* Participants receive psycho-education about the positive effects of sharing. Subsequently, participants take symbolic leave of the traumatic experience by writing a letter to someone who has been involved in the traumatic event, or to a significant other person, or to him/her)self. It is possible, but not necessary to send the letter.

In the studies described later, the Interapy-treatments have been carried out by graduate students in clinical psychology, aged between 24 and 50 years. They have followed advanced courses in behavioural and cognitive psychotherapy, and received special training in the application of writing assignments in the treatment of post-traumatic stress and pathological grief. During the Interapy treatment, therapists may use standard examples of the feedback and instructions they may forward to patients in each particular phase of treatment. After the client has sent his "work", the therapists have 24 working hours respite before they have to give feedback and new instructions. There are weekly supervision sessions with experienced supervisors.

## Research

Three studies into the effectiveness have been carried out. The Interapy protocol was first tested in an uncontrolled pilot study (study 1; Lange, et al., 2000b). Twenty students who had experienced traumatic life events (including sudden death of beloved ones, sexual and physical assaults) and showed symptoms of post-traumatic stress participated in the Interapy treatment as described above. The subjects improved strongly from pre- to post-treatment and follow-up on post-traumatic stress and grief symptoms. Nineteen of the participants had gained full clinical recovery from their symptoms. Below we describe 2 controlled studies: 1 study with traumatized student-participants and, more extensively, our main study in the general Dutch population.

### ***Study 2: Controlled trial with traumatized students***

Forty-one traumatized undergraduate students applied for the Interapy treatment in this 2 (between conditions) by 3 (within conditions, repeated measures) Interapy trial. Eleven of them did not pass the screening. Participants were assigned at random to treatment or to the waiting-list control condition (5 participants in the latter condition dropped out of the study). The participants in the control condition received the Interapy treatment after the experimental group had

terminated treatment. They had to wait about 6 weeks after their inclusion in the study. Altogether, 16 women and 9 men participated in the study. Their average age was 22 years ( $SD = 4.9$ ; range 18–37 years). The participants had suffered from traumatic events, such as the loss of a beloved one, sexual abuse, physical abuse and traffic accidents. On average, the traumas had occurred 6 years before the participants applied for participation in Interapy. Participants in the 2 conditions did not differ in the severity of trauma-related symptoms. For exploratory reasons, a follow-up test was held 6 weeks after termination of treatment.

Seven graduate students in clinical psychology (6 females and 1 male) conducted the treatment. Their average age was 29 years ( $SD = 3.5$ ) varying from 25 to 46 years. Lange, Van de Ven, Schrieken and Emmelkamp (2001) describe the study in detail. Below we summarize the main results.

*Decrease in trauma-related symptoms.* Participants showed a strong reduction from pre- to post-treatment in intrusion and avoidance in the treatment group. Improvements sustained during the 6-week follow-up period, with a further decrease in avoidance and intrusions. The control condition also showed a small reduction in symptoms. However, MANOVA showed the improvement in the treated group to be significantly larger ( $F(2,22) = 5.14, p < 0.015$ ). Using Cohen's (1988) criteria of effect sizes ( $d = M_1 - M_2 / \sigma_{\text{pooled}}$ , where  $\sigma_{\text{pooled}} = \sqrt{[(\sigma_1^2 + \sigma_2^2)/2]}$ ), the effect sizes of the treatment were large (Dunlop, Cortina, Vaslow, & Burke, 1996).

*Decrease in general psychopathology.* The participants in the treatment condition showed a strong decrease in anxiety, depression and somatization from pre- to post-treatment, which sustained during the follow-up. The difference in change between treatment and control group, tested by MANOVA, showed the expected interaction effect to be significant ( $F(3,21) = 3.69, p < 0.03$ ). The effect sizes were all larger than  $d = 1.0$ .

### **Study 3: Controlled trial in the general population**

In this study non-student clients from the community participated, with trauma symptoms in a range from mild to severe. They had applied after publicity in the media. The study comprised a 2 (between conditions) by 2 (within, pre-post-follow-up) design. The participants were randomly allocated to the treatment or control condition. Treatment lasted 5 weeks. Participants in the treatment condition received treatment immediately after the screening procedure. Participants in the control condition had to wait 6 weeks before treatment started. Follow-up tests were completed 6 weeks after treatment. For ethical reasons, the participants in the control condition were not kept waiting till the treatment group had completed the follow-up. They received treatment directly after the experimental group had terminated treatment. The measures described above were used for screening, testing the hypotheses, or exploratory analyses.

The media had by now given ample publicity to the Interapy treatment. Subsequently, 1217 persons visited the web site to consult the psycho-information pages. 301 potential participants did not commit themselves to the screening procedure. 479 persons did not pass the screening as described above. They were referred to other institutions.

Of the 437 clients who passed the screening, 184 persons committed themselves to treatment by returning the informed consent form. Reasons why 253 subjects who had passed the screening did not return the informed consent form are not known. However, analyses revealed that there were no significant differences on SCL-90 and IES between the subjects who did not commit themselves to the Interapy treatment and subjects who signed the informed consent form. Since we had a fairly large group of participants, we decided to assign more participants to the immediate treatment condition, still allowing for a large enough control condition to ensure sufficient statistical power to detect differences. Therefore, the random chance was not set at 1:1 but 3:2. This yielded a treatment condition of 122 persons and a control condition of 62 persons. Forty-four participants in the treatment condition did not complete treatment. They were sent an extra questionnaire by e-mail to establish the reasons for their dropping out. This revealed that 18

persons (41%) quit because of technical problems (network and computer); 13 persons (29.5 %) dropped out because they preferred face-to-face contact; 13 persons (29.5 %) dropped out because they experienced writing about their stressful events to be too much of a burden.

Seventy-eight participants completed the treatment. Completers and dropouts significantly differed on a few characteristics only. More men (71%) than women (19%) dropped out of treatment. Completers were older ( $M = 38$ ,  $SD = 10.6$ ) than dropouts ( $M = 33$ ,  $SD = 10.3$ ) and more often lived together with a partner than dropouts (73% and 27%, respectively). Dropouts were more experienced with computers and the internet than completers. No differences were found in level of education, time elapsed since trauma, degree of disclosure of the trauma, and general psychological functioning measured with the IES and the SCL-90. Nine participants in the treatment group did not complete the post-test. Of the remaining 69 participants, 12 participants in the treatment condition failed to complete the 6-week follow-up tests. In the waiting-list control condition 30 persons did not complete their post-test. Most of them failed to respond. Others mentioned reasons such as the decision not to wait or to seek therapy elsewhere, leaving us with a control group of 32 participants.

There were no significant differences at pre- and post-test between those who had not completed the follow-up and those who had. The average age of the group that completed the whole therapy and the follow-up was 39 years ( $SD = 10.5$ ; range 19–71 years). Twenty percent were men and 80% women. On average, the traumas had occurred 9 years before the participants applied for participation in Interapy ( $SD = 11.60$ ; range 0.5–57 years). Traumas included the sudden loss of a beloved one (21), sexual abuse (3), physical abuse/robbery (7), loss of health/house/job (6), traffic accidents (3), divorce or other traumatic events within the family (13). Their scores on the IES indicated that the participants suffered greatly. The mean scores on Intrusions ( $M = 20.6$ ,  $SD = 7.86$ ) and on Avoidance ( $M = 15.41$ ,  $SD = 8.25$ ) were in the upper regions of the norm table for Dutch PTSD patients (Kleber & Brom, 1986). Of the 101 participants finally included, 91 scored above the Dutch cut-off score for PTSD (90%). The participants also showed a high level of psychological dysfunctioning as measured by the Dutch adaptation of the SCL-90. There were no differences between the control group and the treatment group on any of these variables.

### ***Changes in post-traumatic stress symptoms and general psychological dysfunction***

Table 1 shows the means on Intrusions and Avoidance, Depression, Anxiety, Somatization and Sleeping problems at pre- and post-treatment and follow-up for the treatment and control group. As the table demonstrates, intrusions and avoidance decreased strongly in the experimental group between pre- and post-treatment. The control group revealed no decrease in trauma symptoms in the same period.

Multivariate analysis of variance (MANOVA) for repeated measures (Avoidance and Intrusions), with time (pre-post) as the within-factor and condition as the between-factor, reveals that the interaction effect in symptom decrease is highly significant ( $F(2,95) = 12.49$ ,  $p < 0.001$ ). Avoidance and Intrusions separately show the same pattern. Univariate testing by ANOVAs shows that the improvement in the experimental group was substantially larger than in the control group with large effect sizes, for both Intrusions: ( $F(1,96) = 23.94$  ( $p < 0.0001$ );  $d = 1.28$ )) and Avoidance: ( $F(1,96) = 15.00$  ( $p < 0.001$ ),  $d = 1.39$ )). Inspection of Table 1 also suggests that the improvement not only sustained but that the level of symptoms in the treated group slightly decreased, though not statistically significant, during the follow-up period.

Table 1 also demonstrates that general psychopathology decreased during treatment. Means on the subscales of the SCL-90 show a significant decrease in Anxiety, Depression, Somatization and Sleeping problems. The control group showed no reduction in any of these measures. Multivariate analysis of variance (MANOVA) for repeated measures of all 4 subscales with time (pre-post) as the within-factor and condition as the between-factor showed a highly significant time  $\times$  between

Table 1. Means and standard deviations intrusion and avoidance (IES), and depression, anxiety, somatization and sleeping problems (SCL-90) in the experimental and control condition from pre- to post-test and follow-up of the experimental condition.

Scale	Condition	Pre-test		Post-test		Follow-up	
		M	SD	M	SD	M	SD
Intrusions	Experimental	20.22	7.50	11.12	9.27	10.46	9.42
	Control	19.91	8.22	21.97	8.60		
Avoidance	Experimental	14.05	8.02	6.17	7.14	5.70	7.51
	Control	16.78	8.48	17.28	8.29		
Depression	Experimental	37.90	9.79	26.42	10.33	25.70	12.28
	Control	35.50	10.96	37.25	9.67		
Anxiety	Experimental	20.12	6.88	15.32	5.65	14.84	7.33
	Control	19.59	6.77	20.41	7.38		
Somatization	Experimental	22.29	7.04	17.52	6.34	16.34	7.02
	Control	21.56	8.22	22.88	7.74		
Sleeping problems	Experimental	7.25	3.67	5.80	2.96	5.18	2.79
	Control	5.10	2.00	5.50	2.40		

group interaction-effect:  $F(4,96) = 9.19; p < 0.0001$ . Separate ANOVAS for these variables revealed that the large improvements in the experimental group were significant for all of the 4 measures: Depression ( $F(1,99) = 33.11, p < 0.0001; d = 1.04$ ); Anxiety ( $F(1,99) = 19.16, p < 0.001; d = 0.76$ ); Somatization ( $F(1,99) = 21.68, p < 0.0001; d = 0.73$ )); Sleeping problems ( $F(1,99) = 15.17, p < 0.0001; d = 0.60$ ). Table 1 confirms that the improvement in psychological functioning not only sustained, but that the level of general psychopathology in the treated group slightly decreased during the follow-up period.

### Individual improvement

To assess whether participants improved clinically significant, we calculated for each participant on each subscale whether the change was reliable ( $RC = (X_{post} - X_{pre})/\sqrt{2(SE^2)}$ ) and whether the participant improved beyond the cut-off of that score,  $(X_{post} - X_{cut})/SE$  (Jacobson & Truax, 1991). In the treatment condition, both indicators revealed that fairly high percentages of participants improved on a clinical significant scale; only on intrusions and sleeping problems the percentages were lower than 50%. All other subscales revealed percentages of clinical and reliable improvement well above 50%. Few participants in the control condition also showed clinical significant improvement. Detailed data are given by Lange et al. (in press).

### Exploration: increase in cognitive coping

Studies into the effectiveness of cognitive behavioural therapy generally draw their conclusions on patients' answers on self-report questionnaires. So far, we are not aware of studies that have directly investigated to what degree patients change their coping styles. Interapy provides a unique opportunity to do just that, by conducting content analyses of the writings of the participants. We generated contrast groups of the 10 most improved and 10 least improved participants (Table 2). Independent raters (blind to the group and to which essay) rated the writings 1, 3, 8, and 10 on 3 aspects of cognitive coping: *insight in the process of overcoming the traumatic events* (e.g. showing reflection on dysfunctional automatic thoughts), *functional coping by expressing behavioural adaptation* (e.g. decrease in avoidance behaviour, showing more assertiveness; Donnelly & Murray, 1991; Murray & Seagal, 1994), and *future orientedness* (e.g. planning positive things, using words such as "I will"). This was shown to be predictive of

Table 2. Averages and standard deviations of the most improved ( $n = 10$ ) and least improved ( $n = 10$ ) participants on pre- and post-test on intrusions, avoidance and general psychopathology (SCL-90).

		Pretest		Post-test	
		M	SD	M	SD
IES Intrusions	Most improved	24.70	4.82	3.10	2.33
	Least improved	16.05	6.68	12.80	8.56
IES Avoidance	Most improved	19.90	3.55	0.60	0.81
	Least improved	8.90	7.30	8.32	8.15
SCL-90 total	Most improved	203.80	26.15	116.00	9.83
	Least improved	171.35	30.47	158.22	33.34

improvement in face-to-face therapies (Van Zuuren, Schoutrop, Lange, Louis, & Slegers, 1999). The interrater reliability was sufficient ( $r > 0.65$ ) for all 3 dimensions (Lemmen & Maas, 2001).

Figure 1 demonstrates a large increase in functional coping after essay 4. This means that the participants expressed more functional behaviour in the essays 8 and 10. This result is to be expected according to the therapeutic model where the first writings are devoted to self-confrontation and the later writings to cognitive restructuring and sharing. The overall increase

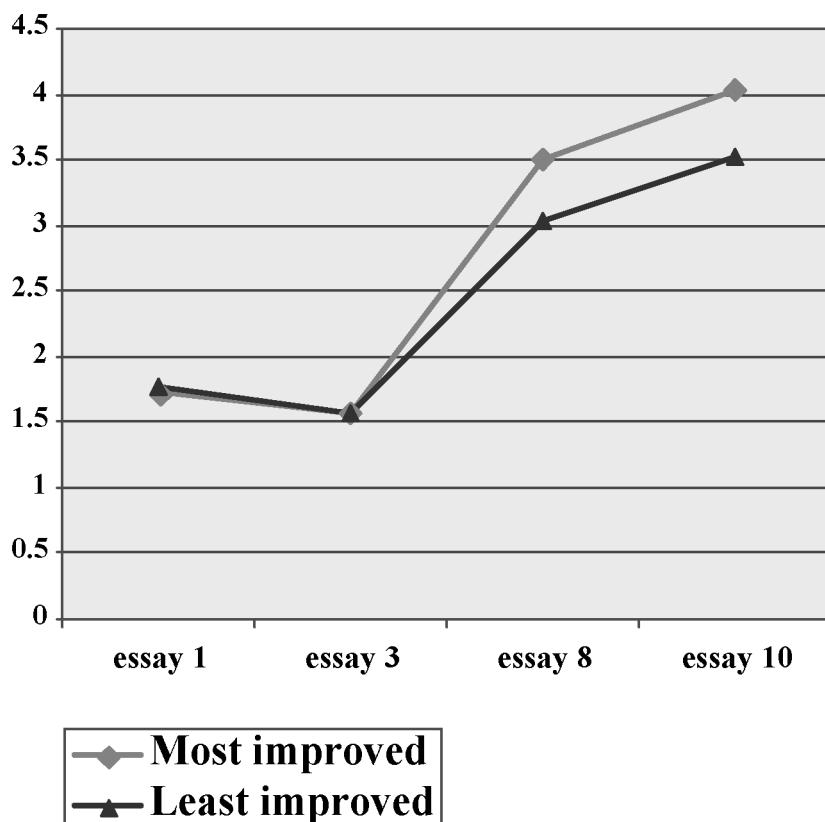


Figure 1. Increase in expression of functional coping in the essays 1, 3, 8 and 10 for the most and least improved participants (0 = no cognitive coping to 5 = effective cognitive coping).

is highly significant  $F(3,54) = 40.11, p < 0.0001$ , with an extremely high effect size ( $d = 3.26$ ). We also notice that the increase is higher in the most improved compared with the least improved participants. Yet, this difference is not significant ( $F(1,19) = 2.26, p < 0.15$ ). The pattern of improvement is similar for the other 2 features of coping as expressed in the writing: insight ( $F(3,54) = 46.83, p < 0.0001, d = 3.55$ ) and future orientedness ( $F(3,54) = 40.11, p < 0.0001, d = 3.06$ ).

### ***Exploration: mediating variables, disclosure and intentionality of the trauma***

Previous research suggested several variables to be predictive of a positive outcome (Lange et al., 2002; Lange et al., 2001). Participants who had not disclosed their experiences before seemed to benefit more than those who had shared the experiences. Also, younger participants seemed to profit more than the elder. Yet, the small number of participants in those studies did not allow for multivariate stepwise regression analyses and henceforth no strong conclusions could be drawn. In the present study, some new predictor variables were added to the variables that had come up as predictors in the previous studies. Regression analyses were carried out on the data of all participants, including the control group that was treated 5 weeks after the experimental group. The large number of participants ( $n = 101$ ) allowed multivariate stepwise regression analyses with a considerable number of predictor variables. Analyses were carried out with the IES as dependent variable on post-treatment and follow-up, respectively. The pre-treatment score on the IES was forced as first independent variable to control for pre-treatment level of trauma symptoms. The other independent variables were: age; prior disclosure or not (measured by a question in the Biographical questionnaire, in which participants could state on a 5-point scale to what degree they had shared the events with others); degree of depression prior to treatment; waiting list or immediate treatment; duration of treatment (delay during treatment or not); intentionality (whether the trauma was caused on purpose or not). Traumas were classified as intentional if the participant's trauma description comprised a perpetrator. Unintentional traumas were caused by events including catastrophes or illnesses. If there were natural causes but also a perpetrator, e.g. a doctor who failed to do his work correctly, the trauma was classified as intentional. None of the potential predictor variables intercorrelated higher than  $r = 0.45$ .

Intentionality of the trauma was shown to predict 19% of the variance in the post-treatment scores on the IES. Beta-coefficient =  $-0.31$ , showing an inverse relationship: participants who suffered from an intentionally caused trauma had lower final IES-scores. They benefited more than participants who had suffered an unintentional trauma. Disclosure predicted 14% of the variance in follow-up scores of the IES. The beta-coefficient (0.26) shows a direct relationship: participants who had not previously disclosed their traumatic experiences to significant others had lower final IES-score. They benefited more than participants who had shared the experiences.

### ***Exploration: long-term follow-up***

Hammer and Holleman (2003) approached the participants who terminated treatment 18 months before ( $n = 61$ ). Seventeen participants could not be reached, due to changes of addresses. Four participants refused to co-operate. A new web page was generated on which the participants could complete the questionnaires (IES and SCL-90 subscales) and newly constructed evaluation questionnaires were administered by e-mail. Comparison with Table 1 shows that trauma symptoms had increased slightly compared with the post-test and first follow-up (Intrusions:  $M = 11.19$  ( $SD = 8.44$ ); Avoidance:  $M = 6.31$  ( $SD = 6.28$ )). The differences between pre-treatment and long-term follow-up were highly significant with still large effect sizes for Intrusions ( $t(35) = 7.40, p < 0.0001, d = 1.30$ )) and Avoidance ( $t(35) = 6.22, p < 0.0001, d = 1.38$ )). The SCL-90 showed a minor relapse for Depression  $M = 27.83$  ( $SD = 11.54$ ) and Anxiety  $M = 14.97$  ( $SD = 5.66$ ). The other subscales yielded similar patterns. The differences between pre-treatment

and long-term follow-up were highly significant with still large effect sizes. For Depression:  $t(35) = 5.15; p < .0001; d = 0.95$  and for Anxiety:  $t(35) = 4.56, p < 0.000, d = 0.91$ .

In this 18-month follow-up, participants also evaluated different aspects of the internet treatment. The items were answered on a scale from 1 (most negative) to 5 (most positive). Writing about their feelings was evaluated most positive ( $M = 4.36; SD = 0.91$ ). The participants expressed their trust in the therapists and in the way they treated their "material" ( $M = 4.09; SD = 0.78$ ). Their average general evaluation of the internet treatment is  $M = 3.73$  ( $SD = 1.28$ ).

## Discussion

The subsequent studies consistently demonstrate positive effects of the short highly structured and protocolled treatment of post-traumatic stress through the internet. The effect sizes are substantially higher than those reported in meta-analyses and literature reviews of the effects of writing therapy for grief and traumatic events (Esterling, L'Abate, Murray, & Pennebaker, 1999; Smyth, 1998; Smyth & Pennebaker, 1999). The third study demonstrates the usefulness of this internet-driven treatment in a sample of non-student clients from the community in a range from mild to serious trauma symptomatology. Since it was not possible to assess the participants by means of a structured diagnostic interview the findings should not be generalized to the population of PTSD patients that meet the DSM-IV criteria or patients diagnosed with acute stress disorder. Yet, the scores on the IES (Horowitz et al., 1979) indicate a high average level of trauma symptoms in these participants, as their mean scores are above the mean score established in PTSD patients. For example, the mean IES score ( $M = 36.0$ ) in the present study is considerably higher than in other Dutch studies with trauma victims: victims of traffic accidents,  $M = 17.4$  (Brom, Kleber, & Hofman, 1993) and victims of bank robbery,  $M = 13.8$  (Kamphuis & Emmelkamp, 1998), and is comparable to that of victims of stalking,  $M = 39.7$  (Kamphuis & Emmelkamp, 2001). Furthermore, the pre-treatment scores of 91 of the 101 participants on the IES are above the cut-off score for PTSD on the IES. It would nevertheless be a challenge to directly compare internet-driven treatment with similar face-to-face treatments in a randomized controlled trial with structured interviews to establish diagnoses formally.

The positive outcome might be due to the elegance of the protocol with its 10 sessions of writing in a specific order that is based on an established theoretical model. The protocols in most of the face-to-face experiments reported by Esterling et al. (1999), Smyth (1998), Smyth and Pennebaker (1999) and Schoutrop (2000) were simpler, with fewer writing sessions, less order in the writing and less precise feedback, or no feedback at all. Furthermore, most of the participants indicated that the Interapy format was highly appealing to them. Amongst others, the participants highly appreciated the "time-bar", through which they (and the therapists) always see at what point in the treatment they are and how far they still have to go (or how near they are to the end). This might be a small but important characteristic, which increases motivation and enhances attention through the therapy process.

The last phase of the Interapy treatment comprises the writing of a dignified letter. This is supposed to be beneficial because of the extra effort made by the participant in creating a meaningful document and the symbolic power this exerts. The fact that the letter may be shared with a significant other might also be beneficial. Reports from clinical practice (Lange, 1996) and studies including Rimé (1995) support this notion. In a study by Schoutrop (2000), participants who had been stimulated to send off their final letter had improved significantly more at a 1-year follow up than those participants who were not induced to do so.

The writing model we advocate is based on clinical practice. The elements of the protocol were derived from case studies (Lange, 1994; 1996). Several of the details seem to be of special importance, such as the fixed amount of time and the exact schedule, both helping the patient not to get too involved in the writing process. Since structured writing may be hard for patients it is

important that the therapists offer unconditional support when they have to confront patients with their avoidance of painful elements. The Interapy studies show that it is possible to demonstrate support and commitment through the internet. The 18-month follow-up in study 3 reveals that participants did not object to sharing their inner feelings through the internet rather than sitting face-to-face with a therapist. They expressed their satisfaction with the support they received and experienced the relationship with their therapist as satisfactory. These findings are in line with recent studies into treatment by e-mail (King, Engi, & Poulos, 1998; Murphy & Mitchell, 1998; Sampson, Kolodinsky, & Greeno, 1997). The positive quality of the client/therapist relationship was probably enhanced by the fact that the therapists did not have to react immediately. Whenever one of the therapists felt unsure, he or she discussed the participants' written material and his or her own previous feedback with a colleague or supervisor. The long-term follow-up also demonstrates that the outcome of Interapy-PTS is not restricted to a short period. Although there was a slight relapse in symptoms the comparison with pre-treatment still shows large effect sizes.

We investigated whether there are variables that predict more or less improvement. The findings were stable. No relationship was found between improvement and gender or level of education. Contrary to what was to be expected, experience with internet and duration of time that passed since the trauma did also not affect the outcome. However, some of these variables played a role in the drop-out rate. Eighteen participants quit therapy prematurely because of technical problems with the network or computer. These participants were considered as drop-outs. Since the technical equipment and internet technology will further improve, we expect some of these practical problems to decrease in the future. The reasons for the other 26 participants to drop out were related to the form and content of the therapy. The drop-outs were more often men, young, single and highly experienced in using the internet. This suggests that the threshold to internet therapy was probably higher for the completers than for the drop-outs, who might have been less serious in their decisions to start the internet therapy. In future studies we will include a measure of pre-treatment motivation to test this line of reasoning.

Since the Interapy protocol is a demanding therapy we do consider it obligatory to exclude applicants who have a tendency to dissociate, have a high risk of psychosis or suffer from a severe depression. Yet, Interapy appeared not to be the therapy for "light cases". The predictor analyses show that depressed, anxious and highly traumatized chronic patients did benefit to the same degree as participants who "only" suffered from mild trauma symptoms. These findings are different from findings reported by Smyth and Pennebaker (1999). Their studies made use of much "lighter" protocols (less writing sessions, less precise instructions and no feedback) than we did.

We did find 2 predictors for a positive outcome. Participants who had suffered from a traumatic event that was not intentionally brought upon benefited less than participants who had suffered traumatic losses or were harmed intentionally. This might be due to the fact that the latter had a more clear focus for their self-confrontations during the writing process. As might have been expected, participants who had not previously spoken about the traumatic events benefited significantly more than those who had shared their suffering.

The Interapy procedure is highly transparent, allowing supervisors to inspect the input by the participants and all the instructions and feedback by the therapists. The transparency of the entire process is not only beneficial for the patient-therapist relationship, it is also important for enhancing treatment integrity.

The Interapy protocol combines 3 main elements: self-confrontation (exposure to painful stimuli), cognitive reappraisal and social sharing. Schoutrop (2000) tried to investigate the relative contribution of all 3 of them in experimental designs, manipulating each of these variables in face-to-face therapies. The high increase of cognitive coping as expressed in the writings of our least and most improved participants confirms the importance of cognitive reappraisal instructions during the writing treatment. Surprisingly, the least improved participants also

demonstrate significant improvement in cognitive coping. This might be due to the fact that even they had improved considerably.

So far, Interapy-PTS is a Dutch phenomenon, only open to Dutch reading and writing participants. An English adaptation of Interapy for English clients and for clients who speak other languages will be available soon, providing possibilities for cross-national help and cross-cultural research.

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