

---

# Efficacy of Eye Movement Desensitization and Reprocessing in the Treatment of Specific Phobias: Four Single-Case Studies on Dental Phobia



**A. De Jongh**

*Academic Centre for Dentistry, Amsterdam, and  
Institute for Psychotrauma, Zaltbommel, The Netherlands*



**H.J.M. van den Oord**

*Centre for Special Dental Care, Amsterdam*



**E. ten Broeke**

*Centre for Psychotrauma and Psychotherapy,  
Bilthoven, The Netherlands*

A series of single-case experiments was used to evaluate the application of Eye Movement Desensitization and Reprocessing (EMDR) to traumatically induced dental phobia. Following two to three sessions of EMDR treatment, three of the four patients demonstrated substantially reduced self-reported and observer-rated anxiety, reduced credibility of dysfunctional beliefs concerning dental treatment, and significant behavior changes. These gains were maintained at six weeks follow-up. In all four cases, the clinical diagnosis present at pretreatment was not present at posttreatment at a clinical level. All patients actually underwent the dental treatment they feared most within three weeks following EMDR treatment. The findings support the notion that EMDR can be an effective treatment alternative for phobic conditions with a trauma-related etiology. © 2002 Wiley Periodicals, Inc. *J Clin Psychol* 58: 1489–1503, 2002.

**Keywords:** EMDR; dental fear; phobia; single-case study; psychological trauma

---

Correspondence concerning this article should be addressed to: Ad De Jongh, Department of Social Dentistry and Dental Health Education, Academic Centre for Dentistry Amsterdam, Louwesweg 1, 1066 EA Amsterdam, The Netherlands; e-mail: info@psycho-trauma.nl.

Epidemiological studies that have attempted to evaluate the prevalence of fears and phobias show that phobic symptoms are remarkably common in the general population (Agras, Sylvester, & Oliveau, 1969; Chapman, 1997). In fact, specific phobias are more prevalent than any other group of psychiatric disorders studied, with lifetime prevalence rates over 10% (Chapman, 1997; Robins et al., 1984). While many phobic individuals suffer from social and occupational impairment, relatively few end up in treatment for their problems (Agras et al., 1969; Boyd et al., 1990).

For those who do seek treatment, there is a wide array of psychological interventions available including systematic desensitization (e.g., Gelder & Marks, 1968), imaginal flooding (e.g., Gelder et al., 1973), direct exposure (e.g., Barlow, Leitenberg, Agras, & Wincze, 1969), modeling (e.g., Williams, Dooseman, & Kleifield, 1984), and cognitive restructuring (e.g., De Jongh, Muris, Ter Horst, Van Zuuren, Schoenmakers, & Makkes, 1995). Although many of these methods have demonstrated good long-term effectiveness (Craske & Rowe, 1997), there is considerable evidence to suggest that the most effective and durable treatment effects occur when the individual is exposed to their feared stimuli. Yet, while in vivo exposure has become the treatment of choice for specific phobias (Emmelkamp, Bouman, & Scholing, 1992), controlled outcome studies to date have been focused mainly on the treatment of monosymptomatic phobias such as spiders, snakes, and injections. Controlled outcome research on more complex types of phobias, such as choking phobia, vomiting phobia, or certain types of medical phobia, is completely lacking (De Jongh, Ten Broeke, & Renssen, 1999).

Several years ago, a new treatment for anxiety-related problems was introduced called Eye Movement Desensitization and Reprocessing (EMDR; Shapiro, 1989, 1995). Contrary to imaginal exposure, which involves repeated and lengthy confrontations with phobic stimuli until fear reduces, EMDR combines short-exposure periods with an external distracting stimulus. This can be a hand of the therapist, alternating sets of auditory tones, or hand taps (Shapiro, 1995). An emerging body of controlled research supports EMDR's effectiveness with posttraumatic stress disorder (PTSD; e.g., Marcus, Marquis, & Sakai, 1997; Rothbaum, 1997; Van Etten & Taylor, 1998; Wilson, Becker, & Tinker, 1997).

EMDR also has been claimed to be an effective treatment for specific phobias (Shapiro, 1995). Both uncontrolled (e.g., De Jongh & Ten Broeke, 1998; Kleinknecht, 1993; Marquis, 1991) and controlled (e.g., Lohr, Tolin, & Kleinknecht, 1996) case reports demonstrated that EMDR can produce significant improvements within a limited number of sessions (for a review, see De Jongh et al., 1999). On the other hand, the results of randomized controlled research suggest that EMDR is of limited value compared to the results of as powerful a procedure as exposure in vivo (Muris, Merckelbach, Holdrinet, & Sijsenaar, 1998; Muris, Merckelbach, van Haaften, & Mayer, 1997). According to the authors, the findings of these studies demonstrated that "EMDR has no additional value in the treatment of specific phobias and that exposure remains the treatment of choice for this condition" (Muris & Merckelbach, 1999, p. 216).

The question is whether this is true. Although the EMDR studies on spider phobia offer support for the relevance of using exposure in vivo for treating spider-phobic individuals, the findings may not simply be generalizable to other types of fear and phobia. For example, several studies have indicated that the specific phobia-diagnostic category is a heterogeneous collection of phobias (Fredrikson, Annas, Fischer, & Wik, 1996; Himle, Crystal, Curtis, & Fluent, 1991). Spider phobia is known as one of the most treatable phobic conditions, and conceptually, it has fewer similarities with other, more complex types of phobias that require more elaborate treatment. With regard to EMDR, the main treatment goal is to resolve the memories of a precipitating event that is perceived as

traumatic (e.g., De Jongh & Ten Broeke, 1998). However, spider phobics have almost no recall of traumatic experiences associated with spiders or other direct conditioning experiences that could explain the onset of their fear (Davey, 1992; Kleinknecht, 1982). There is even evidence to suggest that people avoid spiders not because of perceived danger but because these creatures display disgusting properties (Mulkins, de Jong, & Merckelbach, 1997). Thus, there are indications that spider "fear" is atypical in its responsiveness to EMDR, and that EMDR may prove useful particularly for patients who suffer from conditions of traumatic origin (see De Jongh et al., 1999).

The purpose of the present study was to examine the applicability of EMDR treatment to traumatically induced specific phobia. EMDR treatment outcome was tested with four dental-phobic individuals by means of a single-subject experimental design. Direct conditioning experiences are frequently found in the etiology of this particular type of specific phobia (De Jongh, Muris, Ter Horst, & Duyx, 1995; Moore, Brodsgaard, & Birn, 1991). However, contrary to other types of phobias, behavioral treatment has been found to be of limited success (Moses & Hollandsworth, 1985; Smith, Kroeger, Lyon, & Mullins, 1990). It has been estimated that approximately one third of patients do not benefit from treatment or cannot follow through (Kent, 1997; Van der Zijpp, Ter Horst, De Jongh, & Makkes, 1996). The present study can be considered as an experimental alternative to uncontrolled case studies on the application of EMDR with traumatic phobias (e.g., De Jongh & Ten Broeke, 1998) and a precursor to more rigorous outcome research.

## Method

### *Participants*

Participants were four patients of a clinic specialized in the treatment of dental-phobic patients in Amsterdam, The Netherlands. They met the DSM-IV (American Psychiatric Association, 1994) criteria for specific phobia: (a) all patients demonstrated excessive and persistent fear of dental objects or treatment and avoided treatment for several years, (b) anticipation of dental treatment interfered significantly with their daily social life, and (c) the patients indicated that it was unreasonable to show such marked reactions. Although the phobic condition of all patients was the result of a traumatic experience, none fulfilled the criteria for posttraumatic stress disorder (PTSD; American Psychiatric Association, 1994). In addition, none of the four participants met the criteria for specific phobia other than their dental phobia, and none of them received treatment concurrently with this study.

Mark is a 24-year-old man with dental phobia, particularly fear of extractions. The fear started 5 years ago as a result of dental treatment during which two teeth were pulled by his dentist. The local analgesic didn't work, and he experienced extreme pain. A salient feature of the situation was that he heard the sound of breaking bone while the dentist continued as if nothing happened. After this experience, he felt too frightened to have further dental work done. However, it also was determined that in the near future four wisdom teeth needed to be removed through dental surgery.

Carly is a 39-year-old woman with a 30-year history of being extremely anxious about dental treatment. When she was 8 years old, she visited a dentist who treated her in a violent way. She recalls having a clamp placed in her mouth so that it could not be closed. She experienced difficulties swallowing, and when she struggled to get away the dentist slapped her face. She started to avoid dental treatment after this incident due to the fact that encounters with the dental environment immediately evoked memories of the horrific incident. Consequently, due to neglect, 20 years ago, she was forced to have

all her teeth in the upper jaw removed by general anesthesia. Despite the pain she felt as a result of the continued deteriorated oral condition in the lower jaw, she visited her dentist once a year, but only for regular checkups; treatment was impossible. However, the extreme pain has now caused her to seek treatment for her remaining teeth.

Shirly is a 34-year-old woman with dental phobia. She started to avoid dental treatment seven years ago after a treatment by a dental surgeon to remove a wisdom tooth. During treatment, she was covered with a green cloth without warning and felt helpless. The treatment was extremely painful. The surgeon did not respond when she indicated that it hurt. Afterwards, it appeared that a part of the bone structure in the lower jaw was broken off. Her main fear involves inadequate treatment in which her teeth could be irreparable damaged. The problem is that she needs to visit a dental surgeon for extraction of another inflamed wisdom tooth.

Joany is a 25-year-old women with an extreme fear of dental treatment, which she developed after she was molested two years ago. After this incident, her jaw remained painful but she didn't call for medical help. After four days of extreme pain, she visited a doctor who referred her to a hospital because it appeared that her jaw was broken. A dental surgeon tried to bring the bone pieces together, but this became an extremely painful experience. After this incident, she started to avoid necessary dental treatment. She is motivated to overcome her fears, but just the sound of a drill from a distance provokes a panic attack during which she suffers from extreme sensations of pain at the spot where her jaw was once broken.

### *Design and Procedure*

The experimental protocol followed the basic A-B-A design, except for Patient 4 (Joany). In her case, the effect of a baseline (A) phase was compared to an exposure in vivo treatment phase (B), an EMDR treatment phase (C), dental treatment (D), and a follow-up (A).

For the first three patients, the period during the initial baseline (A) phase between the first and the second data point was one year whereas the period between the second and the third data point lasted one month. In the case of Joany, the period between the first two data points was one month. Pretreatment assessment included severity of dental fear [Dental Anxiety Scale (DAS); Corah, 1969], occurrence and believability of negative cognitions regarding dental treatment [Dental Cognitions Questionnaire (DCQ); De Jongh et al., 1995], and general psychopathology [Revised Symptom Checklist; (SCL-90-R); Derogatis, 1977]. All patients who applied for treatment at the clinic received a series of questionnaires by mail. They were requested to fill out these measures and sent them back to the clinic. After a waiting period of one year, patients were invited for a first appointment to the clinic. Prior to this appointment, the patients received a second set of the questionnaires by mail.

The first appointment involved a screening interview which was conducted by both a dentist specializing in the treatment of anxious and difficult patients and the clinical psychologist of the clinic. After this interview, it was decided which treatment method (dental treatment in combination with behavioral management, nitrous oxide sedation, intravenous sedation, general anesthesia, or psychotherapy) would fit best the individual need of the patient. For the purpose of the present study, it was determined that the first four patients for whom it was clear that (a) regular dental treatment would not be possible and (b) the fear was based on a single traumatic experience were invited to participate in the present investigation. Patients who fulfilled both criteria and who were interested in participating in the study were given an appointment with the psychologist (second author)

of the clinic. The psychologist determined appropriateness of each participant for the study by means of a clinical interview to assess anxiety, mood, and possible other disorders. Furthermore, severity of the condition was assessed (CSR), and a behavior test was administered.

In addition, information about EMDR and the procedures of the study were explained in detail, and all patients received written information about EMDR to read at home. Written informed consent was gathered after the procedure had been fully explained. Next, the phobic memories and images that would serve as the content for the EMDR procedure were identified. In most cases, the primary target was the etiologic event of the disorder. The patients were administered the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979). Furthermore, the degree of disturbance in reference to the traumatic issue was obtained [Subjective Units of Distress (SUD) rating; Wolpe, 1991]. Finally, a third set of questionnaires was given to the patient to complete the day prior to the first therapeutic session one week later.

EMDR was provided in weekly sessions of 60 min. Subjects received differing numbers of sessions based on their needs. The patients completed the DCQ and SCL-90-R the day prior to each next treatment session, which provided a week-by-week evaluation of patients' cognitive aspects of dental anxiety and level of psychological dysfunctioning. After each session, another set of questionnaires was given to the patients to fill out the day prior to the next session. In-session assessment focused on patients' subjective report concerning the level of disturbance associated with the target image (SUD ratings). SUD ratings were obtained according to the EMDR protocol; that is, immediately after returning to the target image. Validity of cognition (VoC) ratings were obtained as part of the clinical procedure.

A posttreatment assessment was conducted two weeks after the last EMDR session (phase A). All participants completed the same set of self-report measures. Moreover, a second behavior test was administered. Follow-up assessment was scheduled six weeks following the termination of treatment. The patients were contacted by mail, then completed the DAS, DCQ, and SCL-90-R and sent them back.

### *Questionnaires*

Dental anxiety was measured with the DAS (Corah, 1969). The DAS is a reliable and valid four-item scale measuring dental trait anxiety, which has been widely used in studies on dental anxiety. Responses are scored from 1 to 5, giving total scores ranging from 4 (*not anxious at all*) to 20 (*extremely anxious*). Individuals who score 12 or above are considered to be dentally anxious.

Believability of negative thoughts related to dentistry was assessed with the DCQ (De Jongh, Muris, Schoenmakers, & Ter Horst, 1995). The first section of the questionnaire contains a list of 14 negative beliefs pertaining to dentistry in general (e.g., "Dentists don't care when it hurts") and to the patient himself (e.g., "I can't stand pain"). The second section consists of 24 negative self-statements that pertain to thinking during treatment (e.g., "Everything goes wrong"). Patients are instructed to rate the degree to which they believe each statement by filling in a percentage (0% = "I don't believe this thought at all" to 100% = "I am absolutely convinced that this thought is true"). A mean percentage believability score was computed over all 38 items.

The IES was used to assess the extent of intrusive symptoms and avoidance reactions (Horowitz, Wilner, & Alvarez, 1979; Zilberg, Weiss, & Horowitz, 1982). The IES is a 15-item, self-report questionnaire measuring two dimensions of PTSD: trauma-related

intrusions (e.g., "Pictures about it popped into my mind") and avoidance (e.g., "I tried to remove it from my memory"). Patients were requested to keep in mind the imaginal representation of the conditioning event while scoring the IES, and to indicate how frequently the comments were true during the past seven days. The frequency of each symptom is scored on a scale of 1 (*not at all*) to 4 (*often*). For the Dutch version of the IES, it is suggested that a score of 26 is the cutoff point for a clinically significant level of trauma-related symptomatology (Kleber, Brom, & Defares, 1992).

The SUD scale was used to index intensity of subjective distress or disturbance (i.e., in reference to bringing up the target memory). The SUD scale (Wolpe, 1991) is widely used and has been shown to correlate with several physiological measures of stress (Thyer, Papsdorf, Davis, & Vallecorsa, 1984). This 11-point scale uses 10 as the highest level of distress/disturbance and 0 as the lowest level, or absence of distress/disturbance.

The Dutch version of the SCL-90-R (Arrindell & Ettema, 1986; Derogatis, 1977) was used to assess the severity of psychological complaints. This questionnaire consists of 90 items which provide an indication of psychological dysfunctioning on eight dimensions: Agoraphobia (7 items), Somatization (12 items), Anger-Hostility (6 items), Depression (16 items), Interpersonal Sensitivity and Paranoid Ideation (18 items), Anxiety (10 items), Cognitive-Performance Difficulty (9 items), and Sleep Disturbance (3 items). The Dutch version differs from Derogatis' original version in that the former uses a 5-point scale. For the present study, the total score was used. This is the sum of the items of the eight subscales, including nine nonscalable items, and can vary between 90 and 450.

### *Additional Assessment*

At pretreatment and posttreatment, severity of the phobic condition was rated on a 9-point scale [Clinical Severity Ratings (CSRs)] ranging from 0 (*no features*) to 8 (*very severely disturbing, disabling*). A CSR below 4 (*definitely disturbing, disabling*) was considered to represent subclinical features of the disorder while a CSR higher than 4 was considered to represent clinical features warranting a formal DSM-IV diagnosis (see Chorpita, Vitali, & Barlow, 1997).

To assess the behavioral consequences of the condition, the patient engaged in a behavior test. The behavior test was applied on a previously agreed-upon task that targeted a salient aspect of the phobia (e.g., listening to the sound of drill in case of an extreme fear of drilling) and was administered both prior and after treatment. Before and after the task, the patient was asked to rate his or her anxiety on an 11-point SUD scale where 0 indicated "no discomfort" and 10 indicated "maximum discomfort." Both behavior tests were videotaped and rated for observed anxiety level (0–10) by a blind and independent observer.

### *Treatment*

Treatment was administered by a psychologist who received a complete (Level II) training in EMDR. The EMDR phobia protocol was followed as described by Shapiro (1995, pp. 222–226; De Jongh et al., 1999). Particularly, the phobia protocol involves a three-pronged approach of past, present, and future. It consists of the following steps: (a) alleviating the distress related to one or more old memories, (b) deconditioning the effects of present stimuli that trigger the fear response, and (c) preparing the patient for future confrontations with the conditioned stimuli.

In short, patients first learn to apply self-control procedures, such as techniques to relax or to distract oneself, to master their fears when necessary. Then, patients are asked



to describe a variety of events and situations in which they experienced the fear (i.e., the first time, the most representative or most frightening experience, the most recent time it was experienced), any ancillary events that contributed to the acquisition of the condition, any associated present stimuli, and physical manifestations of patient's fear response. These so-called targets are used as a focus for a series of EMDR procedures that are applied separately, each involving a distinct target event.

Basically, in EMDR the patient is asked to focus on a discrete memory, preferably the imaginal representation of the conditioning event. Further, a negative dysfunctional statement is identified (i.e., belief statement) that feels especially true when the patient focuses on the target image (Negative Cognition, NC; e.g., "I am helpless"). In addition, a positive self-statement, to be used as a replacement for the NC, is selected (Positive Cognition, PC; e.g., "I can handle it"). The patient is requested to assess the validity of the PC, while focusing on the target image, using a 1 (*completely false*) to 7 (*completely true*) VoC scale. In the next step of the procedure, the patient brings to mind the target memory together with the NC and focuses on the sensations of fear in his or her body. The patient is asked to measure the level of disturbance subjectively, using the 0 (*no disturbance*) to 10 (*extreme disturbance*) SUD scale. Then, the therapist asks the patient to identify the location of the physical sensation associated with it and to focus on it.

The therapist asks the patient to follow a moving object (i.e., hand of the therapist) so that the patient's eyes also move back and forth in front of the face while letting images, thoughts, sensations, or feelings occur. After a number of these repetitive movements, the patient is asked to report briefly on what has come into awareness (i.e., a feeling, a fantasy, a physical sensation, an image, or another memory). The therapist refrains from interpretations, asks the patient to focus on this, and begins a new set of eye movements (SEM). New SEMs are made with appropriate variations and changes of focus. Once nothing new comes up, or when there is no apparent change, the patient is asked to return to the target image. He or she is asked to focus on whatever comes up, and a new SEM is done. New SEMs are made when new material comes up. If not, disturbance ratings (on the SUD scale of 0–10) are gathered.

If, while holding in mind the target image the SUD rating achieves a level of 0 or 1, the next phase of the protocol (the installation of the PC) is applied. More specifically, the patient is asked to track the therapist's finger while rehearsing the new, preferred belief (PC). It is attempted to enhance the credibility of the PC by repeating this sequence until the new statement feels completely true to the patient (i.e., 7 on the VoC scale).

A positive template for the future is installed by asking the patient to mentally progress in time to identify a mental image of a desired successful future action. The patient is asked to hold in mind the PC while SEMs are made. This part of the procedure (combining the mental image and the PC) is repeated as long as the patient reports a strengthening of validity. Moreover, the patient is asked to "run a mental video." That is, imagining oneself in the future and mentally run a videotape of the time between the present session and a next possible (but successful) confrontation with the anxiety-provoking stimulus or situation. Further, the patient is asked to identify any disturbing aspect of the mental video. This is targeted with SEMs when it seems appropriate. The "mental videotape" is repeated until it can be viewed entirely without distress.

The next phase is the "body scan," which serves as a check whether all material is resolved properly. The patient is asked to hold in mind the target event and the positive self-belief while mentally scanning the body. Finally, the therapist assesses the necessity to teach the patient to apply self-control and relaxation techniques or other relevant exercises by which the patient learns to confront the anxiety-provoking situation in real life.

Results

Mark

Mark received two sessions of EMDR, during which the SUD ratings went from 8.5 to 1 and a positive cognition ('I am confident') could be installed. The results in terms of DCQ scores and SUD ratings are presented in Figure 1. Visual inspection of the data reveals a rapid reduction of both DCQ-believability scores and SUD ratings throughout the treatment (B) phase. The DAS score dropped from 13 in the pretreatment (A) phase to 11 (subclinical) after treatment. At one-month follow-up, it appeared that these improvements were maintained (DAS = 11). Mark's pretreatment IES score was 25 ("mild") and remained at the same level after treatment (25). Pretreatment SCL-90-R total score was 107 ("below average"). The posttreatment score was 96, and 95 at one-month follow-up ("very low"). The posttreatment behavior test demonstrated greatly reduced self-reported and observer-rated anxiety (SUDs). Self-reported anxiety level during the behavior test dropped from 8.5 (pretreatment) to 1 (posttreatment) while observer-rated anxiety level dropped from 4 to 1. On the basis of the initial assessment, a principal diagnosis of "specific (i.e., dental) phobia" was assigned (CSR = 4). At posttreatment, Mark displayed features not warranting the assignment of the diagnosis "dental phobia" at a clinical level (CSR = 1). The effects of the treatment were most salient in the fact that two weeks after the last EMDR session two wisdom teeth could be removed by a dentist. One week later, the third one was removed while the last one had to be removed by the dental surgeon. During all three occasions, the patient was fully conscious and experienced a low level of fear.

Carly

The treatment of Carly consisted of three sessions of EMDR. In the third session, the PC ("I can handle it") was installed. As can be seen from Figure 2, Carly had varying baseline scores on the DCQ while only a small effect of treatment upon DCQ-believability

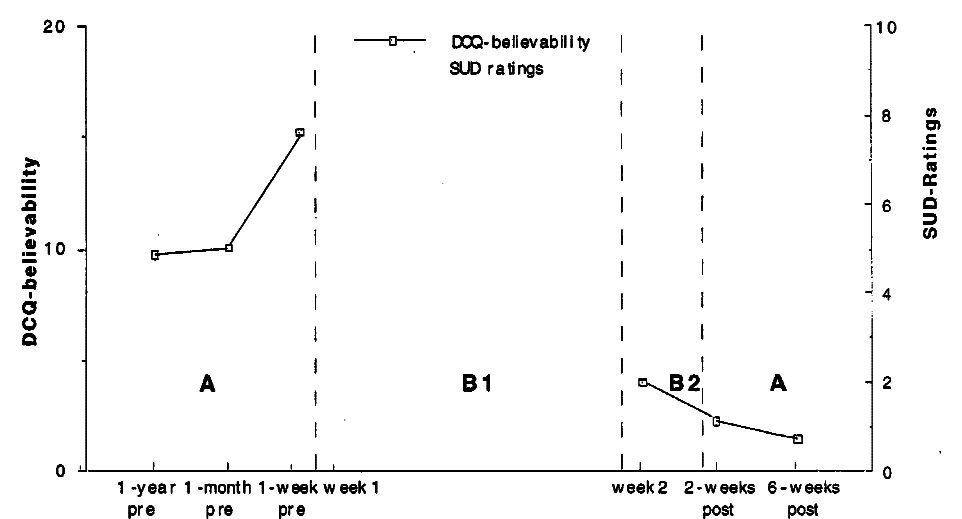


Figure 1. DCQ-believability scores and SUD ratings for Mark across baseline (A), treatment (B), and follow-up (A).



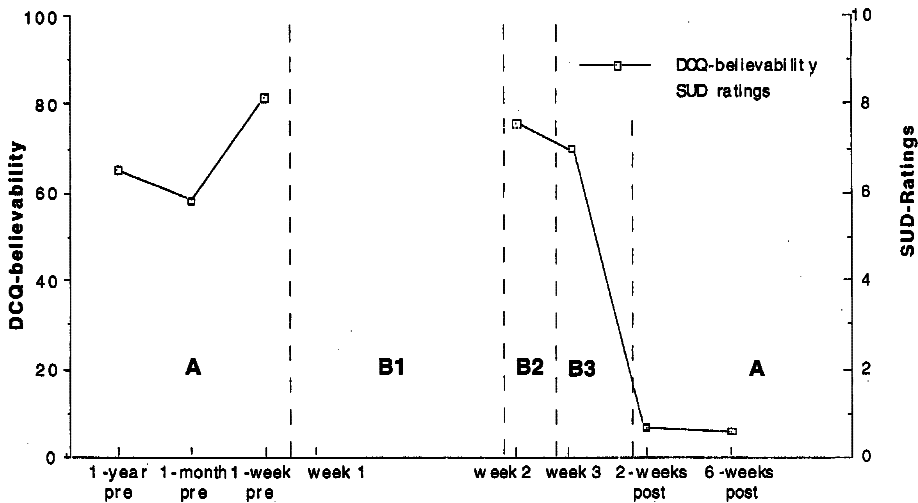


Figure 2. DCQ-believability scores and SUD ratings for Carly across baseline (A), treatment (B), and follow-up (A).

scores across the first two treatment sessions was obtained. However, as a result of the third session, the DCQ scores decreased considerably (from 71.3 to 7.9). In addition, the SUD ratings showed profound phase-change differences over the course of treatment. Carly's DAS score dropped from 20 (pretreatment) to 5 (posttreatment). At one-month follow-up, this improvement was maintained (DAS = 5). The scores on the IES went from 21 ("mild") to 11 ("mild") after treatment. The SCL-90-R total score was 122 ("average") prior to treatment and dropped to 102 ("low") at posttreatment. At one-month follow-up, her SCL-90-R score was further reduced 99 ("very low"). The posttreatment behavior test displayed a strong reduction of both self-reported and observer-rated anxiety. Self-reported anxiety level during the behavior test dropped from 10 (pretreatment) to 1.5 (posttreatment) while observer-rated anxiety level dropped from 8 to 1. Prior to treatment, the diagnosis of specific phobia was assigned (CSR = 6), but after treatment the patient no longer met the criteria of specific phobia (CSR = 0). The treatment strongly reduced her anticipatory anxiety, and she was able to undergo dental treatment two weeks later during which she felt remarkably calm.

### Shirly

Shirly received three sessions of EMDR. The application of the EMDR procedure was accompanied by a gradual reduction of disturbance to near zero (Figure 3). Likewise, the curve produced by the DCQ-believability scores shows a downward slope. During the third session, the PC ("I am in power") was installed after which the phobia protocol was concluded. The rest of the session involved preparing Shirly to undergo treatment at the hospital where the dental surgeon would remove a wisdom tooth. The DAS score dropped from 16 in the pretreatment period to 12, and remained unchanged at one-month follow-up (12). The EMDR phase revealed a strong reduction of IES scores—from 44 at pretreatment to 7 at the end of treatment. Shirly's total score on the SCL-90-R dropped from 114 ("below average") to 113 ("below average") and further to 105 ("low") at follow-up, indicating only a small improvement. Unfortunately, due to technical problems, it was

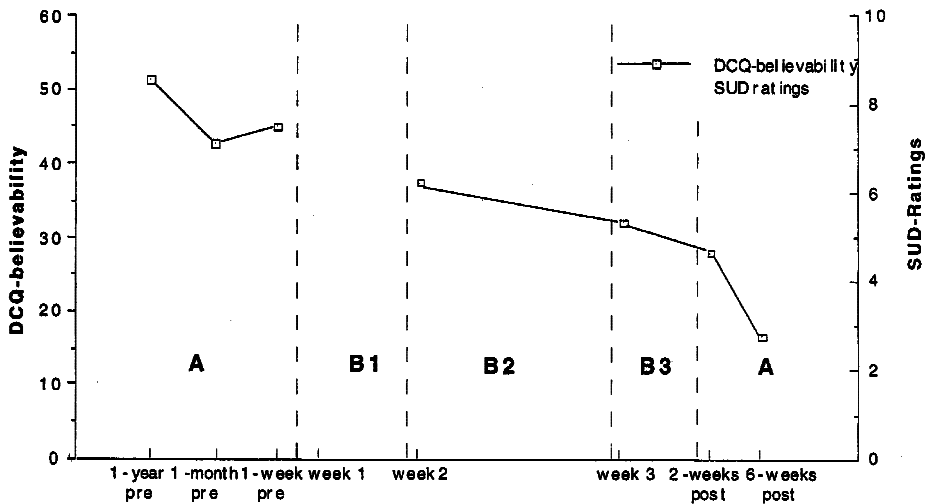


Figure 3. DCQ-believability scores and SUD ratings for Shirly across baseline (A), treatment (B), and follow-up (A).

not possible to administer a behavior test. Prior to EMDR phase, a principal diagnosis of specific phobia was assigned (CSR = 5). At posttreatment, the patient appeared to no longer meet the DSM-IV criteria of this condition (CSR = 1). Three weeks after the last EMDR session, Shirly voluntarily went to a dental surgeon who removed the wisdom teeth without any difficulties while she experienced a manageable level of distress. Moreover, she visited a dentist to undergo further necessary treatment.

### *Joany*

The treatment of Joany differed from the other three patients in that she initially received one session of exposure in vivo treatment (Phase B) in which she was gradually exposed to the sound of the drill. However, exposing her to the sound of the drill for just a few seconds at a distance of two meters evoked such an intense fear that it plateaued at an extremely high level for several minutes. Remarkably, during the session, no tendency towards habituation was noted. Since she indicated that she would stop therapy if the treatment continued in the same manner, it was decided to include her in the study and further implement an EMDR procedure. The next (C) phase consisted of one EMDR session during which she experienced high levels of anger towards the person who had beaten her up. This appeared to have only a mild effect on the disturbance ratings as indicated by the curve (Figure 4). Since the SUD ratings had not been reduced significantly, a positive cognition could not be installed. However, at the beginning of the next treatment session, she indicated that she felt ready to undergo dental treatment. Despite the efforts of the therapist to convince her of the need to complete the EMDR treatment, she held to her decision to start with the dental work that had to be carried out because she didn't "feel the necessity to be confronted with the anger anymore." At that moment, a dentist was available. Therefore, it was indeed possible to start with dental treatment immediately (phase D). Local anesthesia was administered, and Joany appeared to be able to control her anxiety to a reasonable degree. The dentist could drill for several minutes and placed a filling. The dental treatment was videotaped so that it could serve as

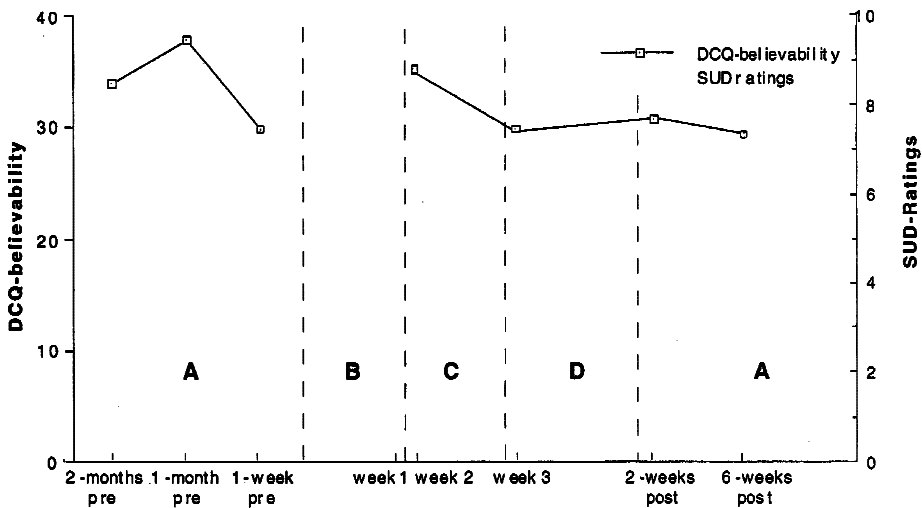


Figure 4. DCQ-believability scores and SUD ratings for Joany across baseline (A), one session of exposure in vivo (B), one session EMDR (C), dental treatment (D), and follow-up (A).

a behavior test. Inspection of the graph in Figure 4 shows that DCQ-believability remained almost unchanged during the treatment phase (Phases B, C, and D). Her DAS score prior to treatment was 18, dropped one point after exposure treatment, and again one point after EMDR. After dental treatment, no further reduction of the DAS score was noted. As a result of the combined treatment (Phases B and C), the IES score dropped from 48 ("severe") to 27 ("moderate"). Pretreatment SCL-90-R total score was 129 ("average") and was somewhat further reduced as a result of treatment (121) or at follow-up (119; "average"). In contrast, self-reported anxiety level during the behavior test dropped from 10 (pretreatment) to 5 (posttreatment) while observer-rated anxiety level went from 10 to 6. On the basis of the initial assessment, a principal diagnosis of specific phobia was assigned (CSR = 8), but at posttreatment the patient no longer met the DSM-IV criteria of the disorder.

### Discussion

The present single case studies were carried out to explore the efficacy of the EMDR phobia protocol with four cases of dental phobia. Treatment effects were evaluated by disturbance ratings, standardized measures, independent assessments, and behavior tests. In one case, unfortunately, psychological treatment could not be completed. On inspection of the individual scores of the other three patients, it appears that the treatment effects were rather dramatic; the implementation of EMDR was followed by a clear reduction in SUD ratings and credibility of dysfunctional beliefs related to dental treatment. Patients' DAS and IES scores displayed the same pattern, although in Mark's case the IES stayed the same. At six weeks follow-up, the treatment gains were maintained. In addition, the behavior tests demonstrated considerable progress. After treatment, none of the four patients fulfilled the diagnostic criteria of dental phobia, and all patients actually underwent the treatment they feared most within three weeks following treatment. Given the length of the baseline period and the fact that treatment entailed three sessions or less, these improvements converge to suggest the efficacy of the intervention.

The present results are consistent with other case studies involving the treatment of traumatically induced phobias (e.g., vomiting phobia, choking phobia, dental phobia and claustrophobia), showing considerable improvement after only a few sessions EMDR (De Jongh & Ten Broeke, 1998; De Jongh et al., 1999; Lohr et al., 1996). To this end, it is important to note that all case studies on specific phobias that have been published to date, and of which it has been demonstrated that EMDR was an efficient intervention, were phobias with a clear traumatic event in the etiology of the condition (De Jongh et al., 1999). Typically, when individuals who have experienced a horrific incident are confronted with a stimulus situation comparable with the original incident, they suddenly feel overwhelmed by anxiety-eliciting memories. It would seem that due to the application of EMDR the memory gradually loses its charge and, consequently, its ability to elicit a powerful emotional response. Unfortunately, this didn't hold true for the fourth case, as the patient (Joany) chose not to complete both the exposure and the EMDR treatment. Therefore, it is impossible to distinguish the separate effects of these treatments and to determine the extent to which EMDR contributed to the motivation of the patient to start with dental treatment. Although it is not clear why both interventions or their combination were less successful than the utilization of EMDR in the other cases, it is obvious that both the assault incident and the dental incident would need to be targeted further.

One aspect of EMDR that most distinguishes it from imaginal exposure is the addition of induced eye movements. It has been argued that the movement of the eyes should be considered as superfluous and therapeutically inert and that the mechanisms of action "are likely to be non-specific effects, imagery re-exposure, or both" (Lohr, Tolin, & Lilienfeld, 1998, p. 149). The question is whether this line of reasoning has much credibility. On one hand, the EMDR procedure contains many elements that are not novel or unique, and can be found in various conventional behavioral and cognitive-behavioral therapeutic strategies. Thus, there may be a large number of variables that synergistically contribute to the treatment outcome. To this end, exposure may well be an active ingredient of the EMDR procedure. On the other hand, treatments utilizing a cognitive-behavioral approach generally have not demonstrated rapid treatment effects with traumatically induced phobias (e.g., Craske & Rowe, 1997; Öst, 1997). For instance, one of the few controlled outcome studies on behavioral treatment of dental phobia (Moses & Hollandsworth, 1985) found an average reduction on the DAS of 1.1 in a group of 24 dental phobics after a continuous 3.5-hr session of stress inoculation training (SIT). This lack of responsiveness may relate to a conceptual difficulty involving the clinical application of exposure *in vivo*. For example, given the horrific character of the precipitating dental experiences of all four subjects (e.g., breaking bone, extremely painful extractions), it is difficult to imagine how exactly the exposure *in vivo* procedure should be carried out and, more specifically, to which conditioned stimuli the client should be confronted (also see De Jongh et al., 1999). Perhaps an imagery exposure procedure, as proposed for people suffering from PTSD, would be a more appropriate alternative. However, we are not aware of any other studies which have used imagery exposure with traumatically conditioned specific phobias with comparable treatment results to those described in the present study.

A second issue concerning the purported similarities between EMDR and a cognitive-behavior approach involves the fact that in the former case the intention of the therapist is to disrupt exposure to the memory by directing patient's attention to his hand. In fact, the initial internal focusing on the traumatic material is one of the few moments a directed form of exposure is applied. Therefore, the total amount of exposure a client receives will generally be less than 10 min per session. In the exposure literature, this is considered to

be ineffective: "Brief interrupted exposures are known to be ineffective for fear reduction, probably because they are insufficient for habituation to occur" (Foa & Kozak, 1985, p. 451). Indeed, cognitive avoidance and distraction have been found to impede exposure therapy for animal phobia (Sartory, Rachman, & Grey, 1982). Conversely, there are indications that alternate (or dual) attention has a potentiating effect on exposure. In a study by Wells and Papageorgiou (1998), four socially phobic patients underwent one session of exposure alone. This was followed by one session of exposure plus an external attention focus. Four other patients received these sessions in the reversed order. The results showed that by shifting to an external attention focus the effectiveness of brief exposure significantly increased; that is, the manipulation facilitated decreases in both anxiety and negative beliefs. Likewise, Lohr et al. (1996) treated two claustrophobic subjects and found substantial changes in disturbance ratings, but only after the eye movements were added to an imagery exposure procedure. These findings are in line with the contention that short exposures to a feared image in combination with an alternate attention stimulus, as utilized in EMDR, act as an unreinforced trial which, with repetition, results in the extinction of anxiety (e.g., Dyck, 1993).

Taken together, the results of the present single case evaluations indicate that the application of the EMDR phobia protocol resulted in reduced anxiety, cognitive changes, and more adaptive behavior. These improvements could be obtained within a limited number of sessions of one hour each. Contrary to the limited effects of EMDR with spider phobia as opposed to an exposure in vivo approach (Muris et al., 1998; Muris et al., 1997), it may be that EMDR is particularly effective in trauma-related anxiety conditions such as medical fears and phobias. Clearly, the application of EMDR to the treatment of various types of phobias requires further, more rigorous investigation.

### References

- Agras, W.S., Sylvester, D., & Oliveau, D.C. (1969). The epidemiology of common fears and phobias. *Comprehensive Psychiatry*, 10, 151–156.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Arrindell, W.A., & Ettema, J.H.M. (1986). *SCL-90: Handleiding bij een multidimensionele psychopathologie-indicator* [Manual of a multidimensional psychopathology indicator]. Lisse, The Netherlands: Swets Test Services.
- Barlow, D.H., Leitenberg, H., Agras, W.S., & Wincze, J.P. (1969). The transfer gap in systematic desensitization: An analogue study. *Behaviour Research and Therapy*, 7, 191–196.
- Boyd, J.H., Rae, D.S., Thompson, J.W., Burns, B.J., Bourdon, K., Locke, B.Z., & Regier, D.A. (1990). Phobia: Prevalence and risk factors. *Social Psychiatric and Psychiatric Epidemiology*, 25, 314–323.
- Chapman, T.F. (1997). The epidemiology of fears and phobias. In G.C.L. Davey (Ed.), *Phobias: A handbook of theory, research and treatment*. New York: Wiley.
- Chorpita, B.F., Vitali, A.E., & Barlow, D.H. (1997). Behavioral treatment of choking phobia in an adolescent: An experimental analysis. *Journal of Behavior Therapy and Experimental Psychiatry*, 28, 307–315.
- Corah, N.L. (1969). Development of a dental anxiety scale. *Journal of Dental Research*, 48, 596.
- Craske, M.G., & Rowe, M.K. (1997). A comparison of behavioral and cognitive treatments of phobias. In G.C.L. Davey (Ed.), *Phobias: A handbook of theory, research and treatment*. New York: Wiley.
- Davey, G.C.L. (1992). Characteristics of individuals with fear of spiders. *Anxiety Research*, 4, 299–314.

- De Jongh, A., Muris, P., Schoenmakers, N., & Ter Horst, G. (1995). Negative cognitions of dental phobics: Reliability and validity of the Dental Cognitions Questionnaire. *Behaviour Research and Therapy*, 33, 507–515.
- De Jongh, A., Muris, P., Ter Horst, G., & Duyx, M. (1995). Acquisition and maintenance of dental anxiety: The role of aversive experiences and cognitive factors. *Behaviour Research and Therapy*, 33, 205–210.
- De Jongh, A., Muris, P., Ter Horst, G., Van Zuuren, F.J., Schoenmakers, N., & Makkes, P. (1995). One-session cognitive treatment of dental phobia: Preparing dental phobics for treatment by restructuring negative cognitions. *Behaviour Research and Therapy*, 33, 947–954.
- De Jongh, A., & Ten Broeke, E. (1990). Treatment of choking phobia by targeting traumatic memories with EMDR: A case study. *Clinical Psychology and Psychotherapy*, 5, 264–269.
- De Jongh, A., Ten Broeke, E., & Renssen, M.R. (1999). Treatment of specific phobias with eye movement desensitization and reprocessing (EMDR): Protocol, empirical status, and conceptual issues. *Journal of Anxiety Disorders*, 13, 69–85.
- Derogatis, L.R. (1977). Administration, scoring and procedures manual I for the revised version and other instruments of the psychopathology rating scale series. Baltimore: Clinical Psychometrics Research Unit, Johns Hopkins University School of Medicine.
- Dyck, M.J. (1993). A proposal for a conditioning model of eye movement desensitization treatment for posttraumatic stress disorder. *Journal of Behavior Therapy & Experimental Psychiatry*, 24, 201–210.
- Emmelkamp, P.M.G., Bouman, T.K., & Scholing, A. (1992). *Anxiety disorders: A practitioner's guide*. Chichester, England: Wiley.
- Foa, E.B., & Kozak, M.J. (1985). Treatment of anxiety disorders: Implications for psychopathology. In A.H. Tuma & J.D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 445–473). Hillsdale: Erlbaum.
- Fredrikson, M., Annas, P., Fischer, H., & Wik, G. (1996). Gender and age differences in the prevalence of specific fears and phobias. *Behaviour Research and Therapy*, 34, 33–39.
- Gelder, M.G., Bancroft, J.H.J., Gath, D.H., Johnston, D.W., Mathews, A.M., & Shaw, P.M. (1973). Specific and non-specific factors in behaviour therapy. *British Journal of Psychiatry*, 123, 445–462.
- Gelder, M.G., & Marks, I.M. (1968). Desensitization and phobias: A crossover study. *British Journal of Psychiatry*, 114, 323–328.
- Himle, J.A., Crystal, D., Curtis, G.C., & Fluent, T.E. (1991). Mode of onset of simple phobia subtypes: Further evidence of heterogeneity. *Psychiatry Research*, 36, 37–43.
- Horowitz, M.J., Wilner, N.R., & Alvarez, W. (1979). Impact of Event Scale: A measure of subjective distress. *Psychosomatic Medicine*, 41, 208–218.
- Kent, G. (1997). Dental phobias. In G.C.L. Davey (Ed.), *Phobias: A handbook of theory, research and treatment*. New York: Wiley.
- Kleber, R.J., Brom, D., & Defares, P.B. (1992). *Coping with trauma. Theory, prevention and treatment*. Lisse, The Netherlands: Swets & Zeitlinger.
- Kleinknecht, R.A. (1982). The origins and remission of fear in a group of tarantula enthusiasts. *Behaviour Research and Therapy*, 20, 437–443.
- Kleinknecht, R.A. (1993). Rapid treatment of blood and injection phobias with eye movement desensitization. *Journal of Behaviour Therapy and Experimental Psychiatry*, 24, 211–217.
- Lohr, J.M., Tolin, D.F., & Kleinknecht, R.A. (1996). An intensive design investigation of eye movement desensitization and reprocessing of claustrophobia. *Journal of Anxiety Disorders*, 10, 73–88.
- Lohr, J.M., Tolin, D.F., & Lilienfeld, S.O. (1998). Efficacy of eye movement desensitization and reprocessing: Implications for behavior therapy. *Behavior Therapy*, 29, 123–156.
- Marcus, S.V., Marquis, P., & Sakai, C. (1997). Controlled study of treatment of PTSD using EMDR in an HMO setting. *Psychotherapy*, 34, 307–315.



- Marquis, J.N. (1991). A report on seventy-eight cases treated by eye movement desensitization. *Journal of Behavior Therapy and Experimental Psychiatry*, 22, 187–192.
- Moore, R., Brodsgaard, I., & Birn, H. (1991). Manifestations, acquisition and diagnostic categories of dental fear in a self-referred population. *Behavior Research and Therapy*, 29, 51–60.
- Moses, A.N., & Hollandsworth, J.G. (1985). Relative effectiveness of education alone vs. stress inoculation training in the treatment of dental phobia. *Behavior Therapy*, 16, 531–537.
- Mulkens, A.A.N., de Jong, P.J., & Merckelbach, H. (1997). Disgust sensitivity and spider phobia. *Journal of Abnormal Psychology*, 105, 464–468.
- Muris, P., & Merckelbach, H. (1999). Traumatic memories, eye movements, phobia, and panic: A critical note on the proliferation of EMDR. *Journal of Anxiety Disorders*, 13, 209–223.
- Muris, P., Merckelbach, H., Holdrinet, I., & Sijnsaar, M. (1998). Treating spider phobic children: Effects of EMDR versus exposure. *Journal of Consulting and Clinical Psychology*, 66, 193–198.
- Muris, P., Merckelbach, H., van Haaften, H., & Mayer, B. (1997). Eye movement desensitization and reprocessing versus exposure in vivo. A single-session crossover study of spider phobic children. *British Journal of Psychiatry*, 171, 82–86.
- Öst, L.-G. (1997). Rapid treatment of specific phobias. In G.C.L. Davey (Ed.), *Phobias: A handbook of theory, research and treatment*. New York: Wiley.
- Robins, L.N., Helzer, J.E., Weissman, M.M., Orvaschel, H., Gruenberg, E., Burke, J.D., & Regier, D.A. (1984). Lifetime prevalence of specific psychiatric disorders in three sites. *Archives of General Psychiatry*, 41, 949–958.
- Rothbaum, B.O. (1997). A controlled study of eye movement desensitization and reprocessing for posttraumatic stress disorder sexual assault victims. *Bulletin of the Menninger Clinic*, 61, 317–334.
- Sartory, G., Rachman, S., & Grey, S.J. (1982). Return of fear: The role of rehearsal. *Behaviour Research and Therapy*, 20, 123–133.
- Shapiro, F. (1989). Eye movement desensitization: A new treatment for post-traumatic stress disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, 20, 211–217.
- Shapiro, F. (1995). *Eye movement desensitization and reprocessing. Basic principles, protocols, and procedures*. New York: Guilford Press.
- Smith, T.A., Kroeger, R.F., Lyon, H.E., & Mullins, M.R. (1990). Evaluating a behavioral method to manage dental fear: A 2-year study of dental practices. *Journal of the American Dental Association*, 121, 525–530.
- Thyer, B.A., Papsdorf, J.D., Davis, R., & Vallecorsa, S. (1984). Autonomic correlates of the Subjective Anxiety Scale. *Journal of Behavior Therapy and Experimental Psychiatry*, 15, 3–7.
- Van der Zijpp, A.T., Ter Horst, G., De Jongh, A., & Makkes, P.C. (1996). Angst voor de tandheelkundige behandeling. Evaluatie van behandeling van patiënten met angst [Treatment of dentally anxious patients evaluated]. *Nederlands Tijdschrift voor Tandheelkunde*, 103, 213–215.
- Van Etten, M.L., & Taylor, S. (1998). Comparative efficacy of treatments for posttraumatic stress disorder: A meta-analysis. *Clinical Psychology and Psychotherapy*, 5, 126–144.
- Wells, A., & Papageorgiou, C. (1998). Social phobia: Effects of external attention on anxiety, negative beliefs, and perspective taking. *Behavior Therapy*, 29, 357–370.
- Williams, S.L., Dooseman, G., & Kleifield, E. (1984). Comparative effectiveness of guided mastery and exposure treatment for intractable phobias. *Journal of Consulting and Clinical Psychology*, 52, 502–518.
- Wilson, S.A., Becker, L.A., & Tinker, R.H. (1997). Fifteen-month follow-up of eye movement desensitization and reprocessing (EMDR) treatment for PTSD and psychological trauma. *Journal of Consulting and Clinical Psychology*, 65, 1047–1056.
- Wolpe, J. (1991). *The practice of behavior therapy* (4th ed.). New York: Pergamon Press.
- Zilberg, N.J., Weiss, D.S., & Horowitz, M.J. (1982). Impact of Event Scale: A cross validation study and some empirical evidence supporting a conceptual model of stress response syndromes. *Journal of Consulting and Clinical Psychology*, 50, 407–414.