Treating Spider Phobics with Eye Movement Desensitization and Reprocessing: A Controlled Study

Peter Muris and Harald Merckelbach

Limburg University, The Netherlands

The present study examined the efficacy of eye movement desensitization and reprocessing (EMDR) in the treatment of a specific phobia. Twenty-four spider phobic subjects were randomly assigned to either (1) an EMDR group (n=8), (2) an imaginal exposure group (n=8), or (3) a control group (n=8). Both the EMDR and the imaginal exposure group underwent a one-hour treatment. The control group initially received no treatment, and waited for one hour. Next, all groups received exposure in vivo. Treatment outcome was evaluated with a standardized Behavioural Avoidance Test (BAT). No evidence was found for EMDR being more effective than imaginal exposure or waiting list control. In fact, only exposure in vivo therapy resulted in significant improvement on the BAT.

Introduction

Eye movement desensitization (EMD) is a relatively new technique that has been proposed as a treatment for post-traumatic stress disorder (PTSD; Shapiro, 1989a; Shapiro, 1989b; McCann, 1992). In EMD, patients imaginarily expose themselves to a traumatic or aversive memory, while simultaneously engaging in lateral eye movements that are induced by the therapist. The idea is that through the eye movements, negative memories are emotionally processed and assimilated (e.g., Shapiro, 1991).

In the past years, a number of authors have claimed that EMD is not only successful in the treatment of PTSD, but can also be fruitfully applied to other psychopathological conditions such as obsessive-compulsive disorder (Rosenthal, 1993), grief (Solomon & Shapiro, in press), nightmares (Pellicer, 1993), and panic disorder (Goldstein & Feske, 1994). Recently, Shapiro (1994a) has qualified these claims. She stressed that EMD is especially effective in disorders in which traumatic and aversive memories play a pivotal role. Several authors have argued that a substantial proportion of specific phobias can be traced back to aversive experiences (e.g., Hugdahl,

---

Reprint requests to Dr Peter Muris, Department of Psychology, Limburg University, PO Box 616, 6200 MD Maastricht, The Netherlands.

© 1997 British Association for Behavioural and Cognitive Psychotherapies
1989). Therefore it is not surprising that EMD has been put forward as a treatment for specific phobias (see e.g., Marquis, 1991; Shapiro, 1994b). Furthermore, some clinicians have suggested that EMD may provide a good alternative when practical considerations make it difficult to treat a specific phobia with exposure in vivo (e.g., flying phobia; see Eschenröder, 1995).

Support for the efficacy of EMD in specific phobias was found in a case study of Kleinknecht (1993). This study described a woman with blood and injection phobias treated with EMD. Both self-report and physiological measures (e.g., blood pressure) seemed to indicate that EMD reduced anxiety symptoms. Furthermore, Kleinknecht reported that the patient eventually succeeded to receive injections and to have blood drawn. It is of interest to note, however, that this observation was not documented with a standardized Behavioural Avoidance Test as is commonly used in treatment studies concerned with phobias. In contrast, a case study of Acienro, Tremont, Last, and Montgomery (1994) describing a woman with multiple specific phobias (e.g., fear of the dark), failed to find evidence to suggest that EMD produces improvement beyond a control intervention (i.e., imaginal exposure). Meanwhile, this case study clearly demonstrated that exposure in vivo did result in clinically significant improvement.

Several authors (e.g., Acienro, Hersen, van Hasselt, Tremont, & Mueser, 1994; Herbert & Mueser, 1992; Lohr et al., 1992) have pointed out that the evidence for the efficacy of EMD heavily relies on uncontrolled case studies, and that more controlled experiments are necessary to evaluate the therapeutic value of EMD. In recent years, the number of controlled studies evaluating the effects of EMD in PTSD has steadily grown (e.g., Boudewyns, Stwertka, Hyer, Albrecht, & Sperr, 1993; Vaughan et al., 1994; Renfrey & Spates, 1994; Jensen, 1994). As far as specific phobias are concerned, only one controlled study on EMD has been published (Sanderson & Carpenter, 1992). In that study, the efficacy of EMD was compared to imaginal exposure. Phobic subjects (N=58) were asked to concentrate on the most disturbing image related to their fear, and then received an intervention consisting of seven consecutive trials of either EMD or imaginal exposure in a single-session cross-over design. Subjective distress evoked by the image was measured at pre-treatment and after each trial. Interestingly, no superior effects of EMD emerged. Yet, there were some serious restrictions in the set-up of this controlled study. To begin with, it is not clear whether the phobic subjects in the Sanderson and Carpenter study fulfilled the DSM criteria for specific phobia. Secondly, this study exclusively employed self-report measures of fear. Treating two spider phobic patients, Muris and Merckelbach (1995) recently found that EMD leads to a clear reduction of self-reported fear. Yet, the improvement on a behavioural measure appeared
to be less pronounced, and exposure *in vivo* was necessary to eliminate avoidance behaviour. Bearing in mind that avoidance behaviour is a *key symptom* of specific phobias (see e.g., DSM-IV; APA, 1994), a controlled outcome study should at least include a behavioural index of treatment success. Thirdly, Shapiro (1991) emphasized the importance of cognitive restructuring during EMD interventions. To underline this point, she changed the name of EMD into EMDR (Eye Movement Desensitization and Reprocessing). Sanderson and Carpenter employed EMD rather than EMDR, and consequently one could argue that they used a less powerful variant of EMDR. Finally, a minor point is that the Sanderson and Carpenter study compared EMD and imaginal exposure. Note, however, that the treatment of choice for specific phobias is exposure *in vivo* (Marks, 1987). This means that in the Sanderson and Carpenter study, EMD was contrasted with a weak control intervention.

To summarize, then, EMDR has been proposed as an effective treatment for specific phobias. However, so far, no adequate controlled study has been conducted in order to validate this claim. The chief purpose of the present study was to investigate the efficacy of EMDR in the treatment of a specific phobia. Twenty-four spider phobic subjects were randomly assigned to either (1) an EMDR group which received a treatment following the protocol that Shapiro has designed for specific phobias, (2) an imaginal exposure group which was asked to evoke fearful images of spiders, or (3) a waiting list control group who initially received no treatment. Additionally, after EMDR, imaginal exposure, or waiting period, all groups received exposure *in vivo* therapy. Treatment outcome was evaluated with a Behavioural Avoidance Test which was administered at three points of time: before treatment/waiting period, after treatment/waiting period, and after exposure *in vivo*.

In the present study, EMDR was not compared to exposure *in vivo* in a between-subjects design for the following reasons. Firstly, such a comparison would have introduced a fourth condition, and this would have further reduced the sample sizes of the groups. Furthermore, as mentioned earlier, EMDR has been recommended as a treatment for cases in which exposure *in vivo* treatment is difficult to realize. Therefore, an evaluation of EMDR effects should preferably include an imaginal exposure condition. Meanwhile, it would be interesting to make a gross comparison between EMDR and exposure *in vivo*. Consequently, in the present study, EMDR, imaginal exposure and waiting period constituted the between-subject factor, while comparisons with exposure *in vivo* were made in a within-subject fashion.
Method

Subjects

Subjects were 24 female spider phobics with a mean age of 33.40 years (SD = 9.67; range 24–51). They applied for treatment after reading articles about the Spider Phobia Project at Limburg University in regional or national newspapers. In these articles, spider phobic subjects were invited to participate in research in return for “free” treatment. All subjects met the DSM-IV criteria for specific phobia, animal type. Accordingly, the spider phobia interfered with their daily life, and subjects had no other psychiatric complaints. The diagnosis was made by an experienced clinical psychologist. Prior to treatment, the average score on the Spider Phobia Questionnaire (SPQ; Klorman, Weerts, Hastings, Melamed, & Lang, 1974) was 24.50 (SD = 2.69; range 20–29), a score that comes close to the scores that were reported by Frederikson (1983) and Muris, de Jong, Merckelbach, and van Zuuren (1993) for their phobic samples.

Assessment

To evaluate therapy outcome, the following measures of spider phobia were used:

1) A Behavioural Avoidance Test (BAT) was employed to assess actual avoidance of spiders. The BAT procedure was as follows: subjects entered a room in which a table was located, approximately 3 m. in front of them. A closed jar containing a (medium size) living spider was placed on the table. Subjects were asked to approach the spider in a stepwise manner. There were 8 steps, ranging from 1, “walk towards the spider”, to 8, “let the spider walk on your hand (for at least 10 seconds)”.

2) The SPQ is a 31-item self-report instrument that measures fear of spiders. SPQ scores range from 0 (not at all fearful of spiders) to 31 (extremely fearful of spiders).

Following the exposure in vivo intervention, subjects were asked to indicate on a 10-point Likert scale to what extent they thought that EMDR/imaginal exposure and exposure in vivo had been effective in reducing their fear of spiders (anchors: 1 = not at all effective; 10 = extremely effective).

Treatment and procedure

Upon arrival, subjects were randomly assigned to either (1) the EMDR group (n=8), (2) the imaginal exposure group (n=8), or (3) the control group (n=8). The EMDR and the imaginal exposure group underwent a one-hour treatment. The control group initially received no treatment, but just waited for one hour. Next, all groups received exposure in vivo. SPQ was measured at pre-treatment and after the exposure in vivo. BAT data were collected at
three points in time: at pre-treatment, after the EMDR/imaginal exposure treatment/waiting period, and after exposure in vivo. In passing, it should be noted that the therapists were not involved in the assessment procedures.

EMDR treatment largely followed the protocol that Shapiro (1994b) has designed for specific phobias. This treatment consists of one session during which the following aversive experiences are desensitized: (1) the most aversive confrontation with the phobic object; (2) the most recent aversive experience with the phobic object; and (3) a future confrontation with the phobic object. For each experience, the procedure was as follows: first, subjects formulated a negative and a positive cognition related to the aversive experience (e.g., “I am weaker than the spider”; “I am somebody who is able to control the spider”). Next, subjects rated the credibility of the positive cognition (i.e., Validity of Cognition; VOC) on a 7-point Likert scale (1 = “not at all credible”; 7 = “very credible”). Then, subjects described their physical anxiety response during the experience, and rated the level of disturbance on a 10-point Subjective Units of Disturbance Scale (SUDS; 1 = “no disturbance at all”; 10 = “highest disturbance possible”). Finally, subjects were to imagine the negative experience, and to generate the accompanying negative cognition and physical anxiety response. When subjects signalled that they succeeded to do so, the first set of horizontal eye movements was carried out (24 saccades). Following this, subjects were instructed to blank the image and to relax.

After a brief pause, subjects were asked to briefly describe their images, feelings and/or thoughts. As long as the descriptions had a negative content, new sets of eye movements were initiated. When the reported image, thought or feeling had a neutral content, subjects were instructed to re-imagine the negative experience and to rate the level of disturbance on a SUDS. The eye movements procedure was repeated until subjects reported a SUDS score that was (according to the subjects) the lowest possible score. Then, the positive cognition was installed, i.e., subjects re-imagined the negative experience, and simultaneously generated the positive cognition. While doing so, eye movements were initiated again. After each set, subjects rated the credibility of the positive cognition (VOC). This was repeated until (according to the subjects) the highest score was reached. The therapist who carried out the EMDR procedure had attended an EMDR level 1 course.

The imaginal exposure procedure was as follows: subjects were asked to make a hierarchy of five, gradually increasing, aversive experiences with spiders. Each experience was repeatedly imagined during 10 minutes. Subjects were asked to close their eyes, to visualize the scene as vividly as possible, and to give a detailed account of the experience. The therapist
encouraged the subject to focus on threat-relevant stimuli, fear-evoking thoughts, and accompanying feelings of anxiety and distress. Note that the imaginal exposure treatment was conducted in a sub-optimal fashion. That is, subjects were exposed to each aversive experience for only 10 minutes. Normally, imaginal exposure requires prolonged exposure to a variety of phobic cues for anxiety responses to habituate (see e.g., Marks, 1987). The imaginal exposure was conducted in this sub-optimal fashion to keep the exposure time constant across the EMDR and the imaginal exposure treatment conditions.

A 2.5 hours hierarchical exposure in vivo treatment was given along the lines of Öst (1989; see also Öst, Salkovskis, & Hellström, 1991; Hellström & Öst, 1995). In the first 10 minutes, the exposure rationale was given, questions of the subject about the treatment were answered, and the main dimensions of the subject's fear were clarified. The subject was told that she would not be forced to do things against her will. Next, the treatment started. More than 20 spiders of various types and sizes were available to match the specific fears of the subjects, and to guarantee a hierarchical exposure procedure. Exposure exercises ranged from looking at the spider from a distance to letting the spider walk on the arm. The therapist modelled the exercises if necessary.

EMDR and imaginal exposure were given by the same therapist. This therapist had about five years of clinical experience in treating emotional and behavioural problems in children and adults. The therapist was trained in the EMDR procedure by Shapiro and her associates during a Level 1 workshop given in Amsterdam, The Netherlands (October 1994). Another therapist carried out the exposure in vivo treatment. This therapist was a health science student who had received a five hour training course on behavioural treatment of phobic disorders.

Results

Pre-treatment differences

One-way analyses of variance (ANOVA)s showed that there were no significant differences between the groups with respect to age \( F(2,23) = 1.34, p = .29 \) and, most importantly, pre-treatment levels of spider fear \( \text{BAT: } F(2,23) < 1.0; \text{ SPQ: } F(2,23) < 1.0 \).

SUDS and VOC scores (manipulation check for the EMDR treatment)

In the EMDR group, only half of the subjects \( n = 4 \) eventually were exposed to all three aversive experiences. That is to say, in these subjects, EMDR was applied to the complete set of experiences (i.e., most aversive confrontation, most recent confrontation, future confrontation). In the remaining
subjects, only one \( (n=2) \) or two \( (n=2) \) aversive experiences were subjected to the EMDR procedure.

EMDR was followed by a steep reduction in SUDS scores. SUDS scores before and after EMDR were 9.50 \( (SD=0.76) \) and 3.56 \( (SD=2.61) \) for the most aversive confrontation \[ t(7)=7.09, p<.001 \], 8.67 \( (SD=1.97) \) and 4.17 \( (SD=3.43) \) for the most recent confrontation \[ t(5)=3.04, p<.05 \], and 8.75 \( (SD=2.50) \) and 2.25 \( (SD=0.87) \) for the future confrontation \[ t(3)=4.64, p<.01 \]. In agreement with this, VOC scores showed a marked increase from pre- to post-treatment: 1.00 \( (SD=0.00) \) and 4.88 \( (SD=2.28) \) for the most aversive confrontation \[ t(7)=4.81, p<.001 \], 1.83 \( (SD=1.60) \) and 5.08 \( (SD=2.15) \) for the most recent confrontation \[ t(5)=3.57, p<.01 \], and 2.25 \( (SD=1.44) \) and 6.13 \( (SD=1.44) \) for the future confrontation \[ t(3)=5.40, p<.01 \]. Taken together, these results indicate that subjects in the EMDR group rated the aversive experiences as less disturbing, and achieved greater belief in the positive cognitions related to these experiences.

**Effects of treatments**

Table 1 shows BAT data for the three groups measured before treatment, after EMDR/imaginal exposure/waiting period, and after exposure *in vivo*. A 3 \( \times \) 3 (groups x occasions) ANOVA, with the last factor being a repeated measure, was conducted on these data.\(^1\) This ANOVA yielded no main effect of groups \( [F(2,21)<1.0] \) nor an interaction effect of groups with occasions \( [F(2,42)=2.23, p=.08] \). However, there was a significant main effect of occasions \( [F(2,42)=51.65, p<.001] \). Several paired post-hoc \( t \)-tests (with a Bonferroni correction: 0.05/6) were carried out in order to evaluate pre-treatment BAT (1) vs post-EMDR/imaginal exposure/waiting period BAT (2) and post-EMDR/imaginal exposure/waiting period BAT (2) vs post-exposure *in vivo* BAT (3). Results showed that, after exposure *in vivo*, all three groups exhibited significant improvements on the BAT: EMDR-group: \( t(7)=-3.36, p<.01 \); imaginal exposure group: \( t(7)=-4.32, p<.01 \); and control group: \( t(7)=4.52, p<.001 \).

The 3 \( \times \) 2 (groups x occasions) ANOVA performed on the SPQ scores\(^2\) only revealed a significant main effect of occasions \( [F(1,21)=31.64, p<.001] \).

---

1. A 3 \( \times \) 2 (occasions: post-EMDR/imaginal exposure/waiting period; post-exposure *in vivo*) ANCOVA with pre-treatment BAT scores as a covariate was also carried out. It has been suggested that in studies with small sample sizes, this procedure increases the power of the design (Maxwell, Cole, Arvey, & Salas, 1991). This ANCOVA essentially revealed the same pattern of results: there was no main effect of groups \( [F(2,20)=1.77, p=.20] \), nor an interaction of groups with occasions \( [F(2,21)=2.23, p=.13] \). Only a significant main effect of occasions emerged \( [F(1,21)=4.82, p<.001] \).

2. A one way ANCOVA with pre-treatment SPQ scores as a covariate confirmed that there were no significant differences between the three groups \( [F(2,20)=2.74, p=.09] \).
TABLE 1. Mean BAT scores (standard deviations) of the three groups measured before treatment (1), after EMDR/imaginal exposure/waiting period (2), and after exposure in vivo (3)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMDR group</td>
<td>1.50</td>
<td>3.13</td>
<td>* 5.88</td>
</tr>
<tr>
<td>Imaginal exposure group</td>
<td>2.50</td>
<td>3.00</td>
<td>* 5.00</td>
</tr>
<tr>
<td>Control group</td>
<td>1.13</td>
<td>1.38</td>
<td>* 5.63</td>
</tr>
</tbody>
</table>

* significant at \( p<.05/6 \) (i.e., Bonferroni correction)

This effect confirmed that all treatment combinations were effective in reducing subjects’ self-reported spider fear. Pre-treatment and post-treatment SPQs were, respectively, 25.13 (SD=2.59) and 18.00 (SD=8.78) for the EMDR (plus exposure in vivo) group [change score = 7.13; \( t(7)=2.88, p<.05 \)], 23.63 (SD=2.56) and 18.38 (SD=6.00) for the imaginal exposure (plus exposure in vivo) group [change score = 5.25; \( t(7)=3.05, p<.01 \)], and 24.75 (SD=3.01) and 14.50 (SD=8.83) for the waiting list (plus exposure in vivo) group [change score = 10.25; \( t(7)=3.85, p<.01 \)].

Subjects’ judgements concerning the effectiveness of the interventions revealed that EMDR (\( n=8 \)) and imaginal exposure (\( n=8 \)) were considered to be equally effective, means being 6.88 (SD=2.64) and 6.63 (SD=3.02), respectively [\( t(14)<1.0 \)]. Exposure in vivo (\( n=24 \)) was judged as the most effective intervention with an overall mean of 8.29 (SD=2.68). A paired \( t \)-test showed that in the EMDR and imaginal exposure groups, exposure in vivo received significantly higher ratings than the other interventions [\( t(15)=2.21, p<.05 \), two-tailed].

Discussion

The chief results of the present study can be summarized as follows. To begin with, in line with previous studies (e.g., Marquis, 1991; Shapiro, 1989a), EMDR resulted in a sharp decrease in SUDS and a concomitant increase in VOC scores. This confirms the integrity of the present EMDR treatment. Note that in previous studies, changes in SUDS and VOC scores have been interpreted as evidence for the effectiveness of EMDR. However, as Aciero, Hersen et al. (1994) point out, there is a tautological component in this interpretation. That is, during EMDR, eye movements are induced until low SUDS and high VOC scores are attained. Moreover, several authors (Herbert & Mueser, 1992; Lohr et al., 1992) have rightly remarked that subjective indices like SUDS and VOC might be affected by demand
characteristics. Second, as far as approach behaviour was concerned, EMDR did not produce improvements beyond those of (a sub-optimal) imaginal exposure treatment and waiting list control. Finally, the present data suggest that exposure in vivo contributed to a further and significant BAT improvement.

Admittedly, the present study does not allow a direct comparison between EMDR and exposure in vivo. First, exposure in vivo therapy lasted more than twice as long as the EMDR treatment. Second, different therapists were involved in EMDR and exposure in vivo, and this might have mediated non-specific treatment effects. Third, and most importantly, subjects initially received EMDR and then exposure in vivo. Such a design can produce uncontrollable carry-over effects. Nevertheless, it is important to note that even those subjects who responded very well to EMDR (n=4), and of whom all three aversive experiences were successfully desensitized (mean SUDS score after EMDR: 2.18, SD=0.99; mean VOC after EMDR: 6.29, SD=1.11)\(^3\), reached an average BAT level of only 4.0 (SD=2.40) which corresponds with "turn the lid of the jar". It was the exposure in vivo therapy that yielded effects that came close to a clinically significant improvement as defined by Jacobson, Follette, and Revenstorf (1984). Their criterion requires a change of 2 SDs compared to a pre-treatment measure. Applied to the present study, this would mean a post-treatment BAT level of 5.91: 1.71 (pretreatment BAT) + 2 × 2.10 (SD). As a matter of fact, after exposure in vivo, subjects reached a mean BAT score of 5.52 (SD=2.79) which corresponds to the ability to manipulate the phobic object (e.g., "touch the spider with a pencil", "catch the spider with a jar"). Illustrative of the superior effect of exposure in vivo is the finding that, after exposure in vivo, all subjects reached a comparable level of self-reported spider fear and approach behaviour, regardless of the fact of whether they had initially received EMDR, imaginal exposure, or no treatment (i.e., a wait interval).

One could argue that the data obtained in the present study are of limited value because there were no integrity checks on the EMDR intervention. In this connection, several points can be raised. Firstly, a large majority of the studies claiming significant EMDR effects have also failed to offer integrity checks (e.g., Marquis, 1991). Secondly, some advocates have portrayed EMDR as a simple and rapid intervention that can be learned in one or two workshops (see e.g., Cavaliere, 1995). Thirdly, the EMDR therapist in the present study was a senior psychologist who attended an EMDR

---

3. The fact that SUDS and VOC did not reach scores of 1 and 7 respectively was due to the fact that 3 of these 4 subjects were reluctant to give a minimal SUDS/maximal VOC rating to future confrontations with the spider.
workshop presented by Shapiro. Fourthly, the protocol for the EMDR intervention in the present study was checked and approved by an experienced EMDR therapist. Fifthly, as mentioned before, the EMDR intervention resulted in straightforward SUDS and VOC changes. A number of studies have interpreted such changes as *prima facie* evidence for the efficacy of EMDR.

In conclusion, the present data suggest that EMDR was not more effective in treating a specific phobia than imaginal exposure or a wait interval. Keeping in mind that the imaginal exposure was carried out in a sub-optimal fashion, this finding casts doubt on the idea that EMDR might provide a powerful alternative when for practical reasons an exposure *in vivo* procedure cannot be followed. Furthermore, the data illustrate the efficacy of exposure *in vivo* therapy. Previous research has shown that this form of treatment is effective in about 90% of the patients with a specific phobia (see e.g., Öst, 1989). It remains to be seen whether EMDR is able to produce such a robust treatment effect. A future study in which effects of EMDR and exposure *in vivo* are directly compared should make clear whether EMDR has any additional value in the treatment of specific phobias.

References


