

EFFICACY OF EYE MOVEMENT DESENSITIZATION TREATMENT THROUGH THE INTERNET

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ABSTRACT

The effectiveness of an internet based eye movement desensitization (Internet EMD) developed mainly on the third and fourth phases of Shapiro's EMDR protocol as a treatment of current emotional impact of personal distressing memories was examined both in the Internet EMD group (n = 49) and in the delayed Internet EMD group (n = 45) of a non-clinical female university student sample. Significant reduction in distress on the Subjective Units of Disturbance Scale (SUDS) and increased their confidence in positive cognition on the Validity of Cognition Scale (VOC) in both groups after introducing the internet EMD procedure supported the effectiveness of the Internet EMD. The SUDS ratings decreased sharply at the time when the participants started the Internet EMD training in both groups. The VOC ratings also increased greatly at the time when the participants started the Internet EMD training. Internet interventions might be an effective way of delivering EMD addressing university students with PTSD and a variety of complaints who hesitate to obtain treatment through traditional clinic-based services.

Keywords: Eye movement desensitization, Internet, SUDS, VOC, university students.

INTRODUCTION

Eye Movement Desensitization and Reprocessing (EMDR) is a treatment which resolves long-standing traumatic memories within a few treatment sessions (Shapiro, 2001, 2002). Controlled studies and data-based case reports indicated that EMDR is effective in the treatment of posttraumatic stress disorder and anxiety disorders along with a variety of complaints. The changes on multiple measures of anxiety, depression, distress and personality dimensions were reported (Davidson & Parker 2001; Feske & Goldstein, 1997). The EMDR clients are asked to image the traumatic scene, to make negative statements on the scene, and to experience the associated traumatic emotions. While imaging the traumatic scene, the clients are instructed to move their eyes quickly to follow the fingers of the EMDR therapists for 15 to 25 seconds. The therapists move their fingers rapidly side to side across the field of vision of clients. Then the clients report the images, statements, and emotions. These procedures are repeated until the clients no longer report distress related to the scene (Shapiro, 2001, 1996). Various case studies have reported the EMDR procedures effective (Shapiro, 2002).

EMDR is to address the traumatic situations that evoke emotional disturbance and activate psychological symptoms and is to assist the client in developing the skills and behavior patterns for a healthy functioning (Shapiro, 2001). The procedure of EMDR is applied in eight phases. The first phase is for history taking and treatment planning. Phase two is a preparation or stabilization phase. Phase three is the assessment phase, in which the clients identify the memory to be treated. Then clients identify the negative self-statement (cognition) associated with the incident. After identifying the irrational negative cognition,

clients express a desired positive belief and rate how true the positive cognition feels. Phase four is the desensitization phase which concentrates on reducing the clients' disturbance, reprocessing the maladaptively negative cognition, and bringing the incident to adaptive resolution. Phase five is the installation phase which focuses on increasing the strength of the positive cognition replacing the original negative self-statement. Phase six concludes the reprocessing and concentrated on body scan. Phase seven is used for closing the session with proper instructions and phase eight is for reevaluation (Shapiro, 2001).

LITERATURE REVIEW

EMDR was originally introduced as Eye Movement Desensitization (EMD; Shapiro, 1989). EMD was suggested to enhance desensitization and accelerates information processing. An EMD target is the memory that elicits anxiety or other emotional disorder symptoms. EMD treatment of three complex cases of PTSD achieved the positive outcomes in relatively few or a single session (Spates & Burnette, 1995). EMD accelerates information processing and results in the adaptive resolution of distressing memories. Hassard (2003) reported that clinical improvements on his 400 clients of EMD treatments were observed after desensitizing several targeted memories with sufficient sets of eye movements (50 to 100 sets). There were the studies on the effects of the eye-movement component of EMDR. Lee et al. (2008) reported the effectiveness of the eye-movement component of EMDR on personal distressing memories with forty-eight university students. Students in the eye movement condition showed less distress after treatment than students in the eye stationary condition. Vaughan et al. (1994) reported the effects of EMD along with those of image habituation training and muscle relaxation on PTSD patients. Although the results did not demonstrate differences among treatment groups, EMD was superior for intrusive memories immediately after treatment. An experimental study (van den Hout et al., 2012) reported that eye movement during recall reduces memory vividness during future recalls, and the results support for the underlying mechanism of EMD. Reduced vividness was assessed with a behavioral reaction time task and self-reports. In the eye movement condition of this study, the participants were asked to follow the dot on the computer screen that moved from side to side with 1 second per cycle.

The high prevalence of mental health problems among female university students was reported (Bernhardsdóttir & Vilhjálmsón, 2013; Vázquez et al., 2011). Anxiety disorders demonstrated about 20% of lifetime prevalence and had earlier age of onset (19 years) than affective disorders (34 years) (McEvoy et al., 2011). The studies showed higher rates of both depression and anxiety disorders in women (McEvoy et al., 2011; Parker & Hadzi-Pavlovic, 2001). Although early detection and treatment of mental disorders seem to be important, university students hesitate to obtain treatment through traditional clinic-based services due to lack of time (Eisenberg et al., 2007; Eisenberg et al., 2011). One possible approach to increase opportunity to seek psychological help for mental health problems is to use internet-based self-help treatment. Internet-based cognitive behavior therapy (Klein et al., 2010; Spek et al., 2007; Williams et al., 2010) has been reported to be an effective method for depression, anxiety disorders, and PTSD. Furthermore an internet-based cognitive behavior therapy demonstrated significant decreases in anxiety, depression, negative automatic thoughts, and perceived stress in university students (Radhu et al. 2012).

Based on the fact that internet-assisted cognitive behavior therapy has been demonstrated to be effective, the internet-assisted Eye Movement Desensitization (EMD) procedure was developed based on Shapiro's EMDR protocol (Shapiro, 2001) and was demonstrated to be

effective in 305 university students (Nakano, 2013). Two-way repeated measures ANOVAs with the Internet EMD groups and a control group showed that the decreases in the SUDS ratings, anxiety and depression in the Internet EMD training were significantly larger than those in the control group. Hassard (2003) rarely used the installation phase (Phase five) of the procedure in his clinical practice of EMDR since improvement with eye movement desensitization was very good. Cusack & Spates (1999) also reported that the elimination of the installation phase made no difference to outcome. van den Hout et al. (2012) used a computer displayed dot on a screen as the stimulus of eye movement (EM) task and demonstrated that EMDR is effective because memories that are recalled during EM become blurred. Based on the results of these studies, the third and the fourth phases of Shapiro's EMDR protocol were mainly adapted to the internet-assisted EMD procedure (Nakano, 2013).

The purpose of the present study was to evaluate the effectiveness of an internet based eye movement desensitization (Internet EMD) procedure which was developed by Nakano (2013) to eliminate personal distressing memories. The effectiveness of the Internet EMD as a treatment of current emotional impact of the scenes of personal distressing memories was examined both in the Internet EMD group and the delayed Internet EMD group of a non-clinical student sample. Reduced self-reported distress on the Subjective Units of Disturbance Scale (SUDS; Wolpe, 1990) and increased their confidence in a desired positive cognition on the Validity of Cognition Scale (VOC; Shapiro, 1989) in both groups after introducing the internet EMD procedure, would support the effectiveness of the Internet EMD.

METHODOLOGY

Participants

Participants were 94 female students ($M=18.85$ years, $SD=1.07$) who were enrolled in introductory psychology classes in a women's university. The students were asked to volunteer for this study. The participants were randomly assigned to the Internet EMD condition and the delayed Internet EMD condition. Forty-nine participants completed the 20 sessions of the Internet EMD program, and 45 participants completed the 20 sessions of the Internet EMD program right after finishing the 5 sessions of the control program.

Measures

The Subjective Units of Disturbance Scale (SUDS; Wolpe, 1990) and the Validity of Cognition Scale (VOC; Shapiro, 1989) were used for the assessment of the effects of the Internet EMD treatment. The SUDS for current emotional impact of the scenes of personal distressing memories were obtained prior to the first session and at the last part of each session. The SUDS ratings reflect the participants' evaluation of the disturbance, and the participants rated the level of the target memory on an 11-point SUDS (0 = no disturbance at all; 10 = highest disturbance possible). The VOC ratings were also obtained prior to the first session and at the last part of each session and represented the strength of the participants' confidence in a desired positive cognition. The VOC rating is based on how true and how believable the positive cognition feels to the client. The VOC measures are rated on a 7-point scale (1 = not true; 7 = completely true). These ratings were recorded on the computer.

Procedure

Participants were asked to volunteer for this study in introductory psychology classes. The students who decided to participate in this study were given a username and password so they could access and self-register on the website of this study. Both the Internet EMD group and the delayed Internet EMD group participants read the explanatory statement of the Internet EMD program and submitted an online informed consent. A password-protected website provided the platform for the delivery of the Internet EMD intervention and supported the intervention program and resource information on the program. The Internet EMD procedure was composed of the five-session tasks. All participants rated the level of current emotional impact of the scenes of personal distressing memories on an 11-point SUDS and the strength of their confidence in a desired positive cognition on a 7-point VOC prior to the first session and at the last part of each session. These ratings were recorded on the computer, and the participants were able to see the record of their SUDS and VOC ratings at the end of each session.

The participants in the delayed Internet EMD group watched the 25 pictures of natural scenery which were consecutively appeared on the computer screen in five control sessions. The Internet EMD group watched the 25 pictures of natural scenery in the five control sessions consecutive to the end of Internet EMD sessions. All participants gave the SUDS and VOC ratings prior to the first control session and at the last part of each session on the computer screen.

Intervention

The participants of the Internet EMD group and the delayed Internet EMD group were informed about the internet EMD intervention. The Internet EMD intervention (Nakano, 2013) was developed based on Shapiro's EMDR protocol (Shapiro, 2001), and from the first phase to the fourth phase of Shapiro's EMDR protocol were adapted to the internet format. The preparation step of the Internet EMD was the second phase of Shapiro's EMDR protocol. The first step and the second step of the Internet EMD were the third phase and the fourth phase of Shapiro's EMDR protocol. Three steps and the sessions of the Internet EMD intervention (Nakano, 2013) are summarized below.

The preparation step was used to establish an imaginal safe place where participants can quickly recover their emotional stability. Participants wrote the place on computer screen. Then their eyes followed the ball moving side to side with 1 second per cycle for approximately 25 seconds on the computer screen (a set of eye movements), while they concentrated on the image of the safe place. Participants could come back to the safe place exercise whenever they felt uncomfortable in any session. The first step is for identifying a disturbing incident. The participants were provided the explanation about the Internet EMD procedure in order to help the participants learn from the past negative experiences, desensitize present triggers of the past disturbing insights, and restore the incidents into memories in healthy adaptive forms. The participants were instructed to focus on the incident with its associated distressing cognitions and feelings, and to write the incident and the current irrational negative belief about themselves on computer screen. After writing the disturbing incident and the current irrational negative belief, they were asked to click the button on the computer screen with the instructions to focus on the negative beliefs and feelings. Right after clicking the button, the screen of eye movements appears. They were instructed to follow the ball moving side to side with 1 second per cycle for approximately 25

seconds on the computer screen (a set of eye movements). The participants maintained the internal focus during a set of eye movements and then were instructed to let go of the disturbing image and take a deep breath. The second step is for desensitizing and focusing on the new insights. The participants were instructed to write the new cognition and emotion about the disturbing incident which they wrote on computer screen at the first step. They were also asked to write their thoughts and beliefs about themselves. The new cognition and emotion became the focus for the next set of eye movements. This procedure of eye movements was for desensitizing the disturbing incident and identifying new positive cognitions over the incident and for reprocessing cognitions and feelings over the target incidents.

An Internet EMD session consisted of three sets of the first and second steps, and the last part of each session, participants rated the level of disturbance on the SUDS and of confidence on VOC. These ratings were recorded on the computer, and the participants were able to see the record of their SUDS and VOC ratings at the end of each session. The starting and finishing time of the sessions of each participant were recorded on the computer in order to verify adherence to the treatment.

Research design

The design of the study (Table 1) comprised two between-subjects conditions and six within-subject conditions (six assessment times: T1 ~ T6). Two groups were Internet EMD group and delayed Internet EMD group. The six assessment times for the Internet EMD group were pretreatment assessment (T1), assessment after five sessions (T2), assessment after 10 sessions (T3) assessment after 15 sessions (T4) post-treatment assessment (T5) and assessment after control sessions (T6) The six assessment times for the delayed Internet EMD group were assessment before a first control session (T1) pretreatment assessment (T2), assessment after five sessions (T3), assessment after 10 sessions (T4) assessment after 15 sessions (T5) and post-treatment assessment (T6).

Table 1 Study Design

Treatment group	Measurement time					
	T1	T2	T3	T4	T5	T6
Internet EMD	pre-T	after 5 Ss	after 10 Ss	after 15 Ss	post-T	after CSs
Delayed Internet EMD	before CSs	pre-T	after 5 Ss	after 10 Ss	after 15 Ss	post-T

Note. T = time of measurement, pre-T = pretreatment, after 5 Ss = after five sessions, after 10 Ss = after 10 sessions, after 15 Ss = after 15 sessions, post-T = psot-treatment, CSs = control sessions

RESULTS

Pre-rating scores on the SUDS averaged 6.74 for the EMD group and 6.95 for the delayed EMD group and were suggestive of moderately high distress across groups. A one-way analysis of variance (ANOVA) on the ratings of the SUDS at pretreatment revealed no significant difference ($F [1, 94] = .55, p = .46$) between the EMD group and the delayed EMD group. VOC levels averaged 1.03 for the EMD group and 0.98 for the delayed EMD group and suggested moderately low validity of cognition across groups. A one-way ANOVA on the ratings of VOC at pretreatment also revealed no significant difference ($F [1, 94] = .61, p = .44$) between groups.

The treatment effects of the Internet EMD training were analyzed in the two groups (EMD group and delayed EMD group) of participants. One-way repeated measures analyses of variance (ANOVA) were conducted for each of the dependent measures (SUDS and VOC scores). The results of these analyses are presented in Table 2, 3 and Figure 1, 2. A one-way repeated measures ANOVA with time of assessment (six-assessment times: T1 ~ T6) as independent variables was conducted on the SDUS scores of the EMD group. There were overall significant reductions in the SUDS ratings across times of assessment, $F(5, 240) = 165.14, p < .001$. The Bonferroni test for the comparison of six assessment times indicated that there were significant differences ($p < .05$) between EMD pretreatment assessment (T1) ratings and other ratings. There also were significant differences ($p < .05$) between EMD post-treatment assessment (T5) ratings and ratings after the control sessions (T6), and other ratings.

A one-way repeated measures ANOVA with time of assessment (six-assessment times: T1 ~ T6) as independent variables was conducted on the SDUS scores of the delayed EMD group. There were significant differences for time of assessment, $F(5, 220) = 211.48, p < .001$. Bonferroni test indicated that there were significant differences ($p < .05$) between ratings before first control session (T1) and EMD pretreatment assessment (T2) ratings, and other ratings. There also were significant differences ($p < .05$) between ratings of assessment after 10 sessions (T4), ratings of assessment after 15 sessions (T5) and post-treatment assessment (T6) ratings, and other ratings. There were significant decreases in mean SUDS ratings from T1 to T2 and from T4 to T5 in the EMD group. In the delayed EMD group, there were significant decreases in mean SUDS ratings from T2 to T3 and from T3 to T4. The results indicated that SDUS ratings decreased at the time when the participants started the Internet EMD training.

Table 2 Means and Standard Deviations for SUDS

Treatment group	Measurement time					
	T1	T2	T3	T4	T5	T6
Internet EMD	6.74 (1.91)	2.81 (1.47)	2.33 (1.20)	1.94 (1.29)	1.43 (1.28)	1.37 (1.25)
Delayed Internet EMD	6.95 (1.97)	6.73 (1.91)	2.74 (1.48)	1.95 (1.30)	1.64 (1.25)	1.53 (1.32)

Note. T = time of measurement, pre-T = pretreatment, after 5 Ss = after five sessions, after 10 Ss = after 10 sessions, after 15 Ss = after 15 sessions, post-T = post-treatment, CSs = control sessions

A one-way repeated measures ANOVA with time of assessment (six-assessment periods: T1 ~ T6) as independent variables was conducted on the VOC scores of the EMD group. There were overall significant positive changes in VOC ratings across times of assessment, $F(5, 240) = 144.67, p < .001$. Bonferroni test for the comparison of six assessment times indicated that there were significant differences ($p < .05$) between EMD pretreatment assessment (T1) ratings and other ratings. There also were significant differences ($p < .05$) between ratings of assessment after 15 EMD sessions (T4), EMD post-treatment assessment (T5) ratings, and ratings after the control sessions (T6), and other ratings.

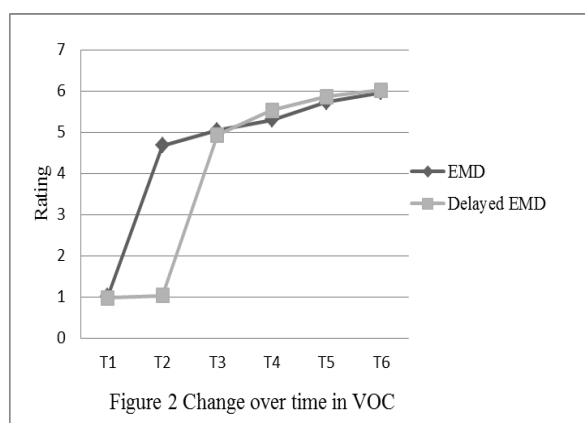
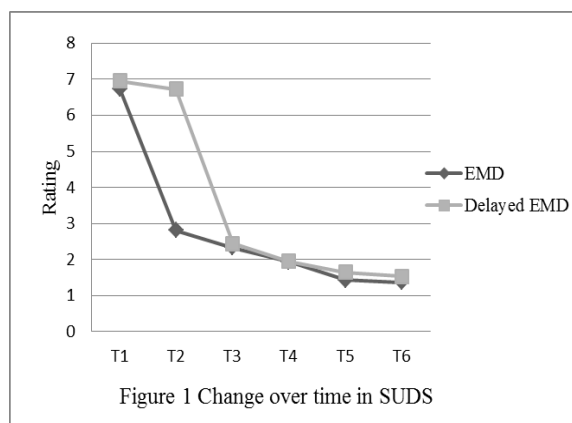
A one-way repeated measures ANOVA with time of assessment (six-assessment periods: T1 ~ T6) as independent variables was conducted on the VOC scores of the delayed EMD group. There were significant differences for time of assessment, $F(5, 220) = 179.21, p < .001$. Bonferroni test indicated that there were significant differences ($p < .05$) between ratings

before first control session (T1) and EMD pretreatment assessment (T2) ratings, and other ratings. There also were significant differences ($p < .05$) between ratings of assessment after 15 sessions (T5) and post-treatment assessment (T6) ratings, and other ratings. There were no statistical significant difference between ratings of assessment after five sessions (T3) and assessment after 10 sessions (T4). There were significant increases in mean VOC ratings from T1 to T2 and from T3 to T4 in the EMD group. In the delayed EMD group, there were significant increases in mean VOC ratings from T2 to T3 and from T4 to T5. The results indicated that VOC ratings increased at the time when the participants started the internet EMD training.

Table 3 Means and Standard Deviations for VOC

Treatment group	Measurement time					
	T1	T2	T3	T4	T5	T6
Internet EMD	1.03 (1.17)	4.68 (2.71)	5.04 (1.94)	5.47 (1.86)	5.73 (1.78)	5.96 (1.92)
Delayed Internet EMD	0.98 (1.01)	1.04 (1.14)	4.93 (2.61)	5.23 (1.95)	5.86 (1.89)	6.02 (1.94)

Note. T = time of measurement, pre-T = pretreatment, after 5 Ss = after five sessions, after 10 Ss = after 10 sessions, after 15 Ss = after 15 sessions, post-T = post-treatment, CSs = control sessions



DISCUSSION

This study analyzed the effectiveness of the Internet EMD procedure developed mainly on the third and fourth phases of Shapiro’s EMDR protocol by Nakano (2013) in comparison

between Internet EMD group and delayed Internet EMD group. The results of this study indicated that Internet EMD procedure had significant effects on participants' ratings of the level of the disturbance of the target memory on the Subjective Units of Disturbance Scale (SUDS; Wolpe, 1990) and the level of a desired positive cognition on the Validity of Cognition Scale (VOC; Shapiro, 1989) in both groups after introducing the Internet EMD procedure. Although there were overall significant reductions in the SUDS ratings across times of assessment both in Internet EMD group and delayed Internet EMD group, SUDS ratings decreased sharply at the time when the participants started the Internet EMD training. The results of this study indicated that participants felt calm and their anxiety levels decreased right after they experienced the five sessions of Internet EMD. There were also overall significant positive changes in VOC ratings across times of assessment both in Internet EMD group and delayed Internet EMD group. VOC ratings increased greatly at the time when the participants started the Internet EMD training. These results indicated that positive thoughts and beliefs of participants increased right after they experienced the five sessions of Internet EMD. The decrease in the SUDS and the positive change in VOC were supported even if Internet EMD procedure was used. The pattern of decrease in the SUDS scores and the positive change in VOC scores in this study with respect to the Internet EMD procedure are consistent with previous research. University students hesitate to obtain treatment through traditional clinic-based services, due to lack of time, financial constraints, and the stigma associated with mental illness (e.g., Eisenberg et al., 2011). Internet EMD procedure might lead to an effective and accessible mode of treatment delivery of self-directed intervention and to therapeutic change.

It must be remembered, however, that the participants of this study were not posttraumatic stress disorder clients. Eye movements might bring different effects to the desensitization of more traumatic memories. Differences in the nature of the target problems must be considered. Furthermore, this study was conducted on a sample of female university students. The findings of this study are limited to a non-clinical female student population and differential responses to Internet EMD program might have occurred to a clinical population. This study is also limited by that this Internet EMD program does not have installation phase in which the focus is on increasing the strength of the positive cognition and the strong confidence about self. Because of excluding the installation phase, this program was named the Internet EMD. Originally EMDR was introduced as the technique of EMD involved only one session (Shapiro, 1989). In Internet EMD program of this study, the participants focus on the incident associated distressing cognitions and feelings which elicit the current irrational negative beliefs about self. While attending to the sets of bilateral stimulation of eye movements, distressing cognitions and negative emotions become diffused, and then positive ones tend to become stronger and more salient. Phases from the installation to the reevaluation (the fifth phase to the eighth phase) might be essential components of the EMDR procedure for strengthening of the positive cognition. Although the results of this study supported the effectiveness of this Internet EMD program for reducing current emotional impact of the scenes of personal distressing incidents and increasing confidence in a desired positive cognition, long-term advantages of this Internet EMD program are needed to be examined in further studies.

Lastly, the intervention was delivered through Internet so that participants could vary considerably in their use of the treatment material. Possibly, the frequency, and the duration, spent on the material may have affected post intervention responses. How participants in the Internet EMD selected their disturbing memories, desensitized the memories, defined the positive cognitions, and adapted the new cognitions to the distressing memories might have

affected post intervention ratings. It will be important for future studies to assess how the participants used Internet EMD material in order to identify the specific factors most strongly related to overall levels of improvement. The studies on Internet treatment programs of PTSD (e.g., Lange et al., 2003; Knaevelsrud & Maercker, 2007) reported high improvement of trauma-related symptoms and general psychopathology. A study (Hirai & Clum, 2005) reported that the participants experiencing symptoms associated with traumatic events in an Internet CBT self-help program achieved significant reduction in avoidance behavior, anxiety, and depression compared with the waitlist participants. These previous studies indicated that trauma-related problems could be effectively treated through Internet. This study was to investigate the treatment effect of Internet-based EMD program. Despite of the limitations mentioned above, the results of this study suggest that an Internet-based EMD can lead to possible therapeutic change without the need of therapists. Future studies will be needed to assess how the participants used the Internet EMD material.

CONCLUSION

The findings of this study demonstrate that the internet-based distress reduction procedure called Internet EMD based mainly on the third and the fourth phases of Shapiro's EMDR protocol developed by Nakano (2013) was associated with significant improvements in the level of the disturbance of the target memory on the SUDS and the level of a desired positive cognition on VOC both in Internet EMD group and delayed Internet EMD group after introducing the Internet EMD procedure. University students hesitate to obtain treatment through traditional clinic-based services, due to lack of time, financial constraints, and the stigma related to mental illness. This study provides support for the effectiveness of an Internet-based EMD intervention addressing university students with posttraumatic stress disorder and anxiety disorders along with a variety of complaints.

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