

Full Length Research Paper

Evaluation of the eye movement desensitization procedure through the Internet for resolving distressing memories

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The internet-based Eye Movement Desensitization (EMD) procedure based mainly on the third and fourth phases of the EMDR protocol was developed. After completing pre-intervention assessments, 305 female university students were randomly assigned to the Internet EMD condition or to a control condition. Treatment effects of the Internet EMD program were analyzed in two groups of the Internet EMD condition (high and low SUDS rating groups) and a control group. Two-way repeated measures ANOVA with the three groups, and time of assessment (pretest vs. posttest) as independent variables were conducted on the scores of the Japanese version of the HSCL along with the SUDS ratings. There were significant main effects for time of assessment and groups. There were also significant interactions between groups and time. The interaction effects indicated that the decrease in the SUDS ratings as well as anxiety and depression in the Internet EMD training for the high SUDS rating group is significantly larger than those in the low SUDS rating group and in the control group.

Key words: Eye movement desensitization, Internet, Japanese version of the HSCL, university students.

INTRODUCTION

Eye Movement Desensitization and Reprocessing (EMDR) is a treatment for a wide variety of problems, particularly posttraumatic stress disorder and anxiety disorders (Shapiro, 2001, 2002). Controlled studies along with data-based case reports indicated that EMDR is efficacious in the treatment of a variety of complaints. Participants of the studies have reported the changes on multiple measures of anxiety, depression, distress and personality dimensions (Davidson and Parker, 2001; Feske and Goldstein, 1997). The clients of EMDR are asked to image the traumatic scene, to make negative statements on the scene, and to experience the associated traumatic emotions. Although these interventions procedures resemble imaginal exposure or cognitive behavioral therapy, the EMDR therapists move their fingers rapidly side to side across the field of vision of

clients, and instruct clients to move their eyes quickly to follow the fingers for 15 to 25 s while attending to one or more of the elements of the traumatic memory. Then the clients report the images, statements, and emotions. The procedures are repeated until the previous negative statements have been replaced by positive self-statements and, the clients no longer report distress related to the scene (Shapiro, 2001, 1996). Related traumatic memories or issues of self-esteem may emerge during treatment. Despite the procedure had met with skepticism, various case studies have reported EMDR to be effective (Shapiro, 2002).

Shapiro (2001) developed an EMDR procedure which is applied in eight phases. EMDR is to address the traumatic situations that evoke emotional disturbance by processing triggers and activating psychological

symptoms. EMDR is also used to assist the client in developing the skills and behavior patterns for a healthy functioning (Shapiro, 2001). The first phase entails history taking and treatment planning. Phase two is a preparation or stabilization phase. During phase three which is the assessment phase, processing of the traumatic incident begins. In this phase, the clients identify the memory to be treated. The next step for clients is to identify the negative self-statement (cognition) associated with the incident. After identification of 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. The goal of the phase is to reprocess the maladaptive negative cognition and bring the incident to adaptive resolution. Phase five is used for installation. The focus of the phase is on increasing the strength of the positive cognition that the client has identified as the replacement for 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).

EMDR was originally introduced as Eye Movement Desensitization (EMD; Shapiro, 1989). EMD is suggested to enhance desensitization and accelerates information processing. EMD resembles imaginal exposure methods, supplemented by a procedure based on repeated sets of eye movements, which accelerate the desensitization. An EMD target is the memory that acts as a trigger for anxiety or other emotional disorder symptoms. Spates and Burnette (1995) reported that the positive outcomes following EMD treatment of three complex cases of PTSD were achieved in relatively few or a single session and were stable over time. EMD accelerates information processing and results in the adaptive resolution of distressing memories. Hassard (2003) conducted a retrospective analysis on his 400 clients of EMD treatments and reported that clinical improvement was observed after several targets were desensitized with EMD. He indicated that sufficient sets of eye movements (50 to 100 sets) are required to desensitize the targeted memory. There were also the controlled studies which reported the effects of EMD/EMDR. Lee et al. (2008) studied the effectiveness of components of EMDR on personal distressing memories with forty-eight university students. Students in the eye movement condition reported less distress after treatment than students in the eye stationary condition. The results of this study indicated that the eye movement component of EMDR rather than the suggestions made by therapists facilitated reductions in distress. The effects of a standard EMD protocol with eye movements, a moving audio stimulus in place of the eye movements, and a protocol with eyes resting on the hands in place of the eye movement in comparison with a no-treatment control condition were analyzed on forty

college students suffering from speech-related anxiety (Foley and Spates, 1995). The alternative procedures as well as EMD had significant effects on public speaking anxiety, and EMD was comparable in limited effectiveness to the other procedures. The effects of the eye-movement component of EMDR in the treatment of fear of public speaking were also studied with seventy-one female students (Carrigan and Levis, 1999). The finding of the study, however, failed to report that the eye-movement component of EMDR substantially reduced public-speaking anxiety relative to control conditions. The study (Vaughan et al., 1994) on PTSD patients reported the effects of EMD along with those of image habituation training and muscle relaxation. All treatment groups improved significantly compared with a waiting list group. Despite a failure to demonstrate differences among treatment groups, EMD was superior for intrusive memories immediately after treatment. A laboratory study (van den Hout et al., 2012) also reported that eye movement during recall reduces memory vividness during future recalls, and the results support the underlying mechanism of EMD. Reduced vividness was assessed with a behavioral reaction time task as well as with 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 s per cycle.

The high prevalence of depression, anxiety and psychosomatic symptoms among university students was reported (Bayram and Bilgel, 2008; Taliaferro et al., 2009). The methods of adequate stress reduction are needed for university students. Female students were reported to experience more psychological distress (McLean et al., 2007) and perceived more academic stress in comparison to male students (Singh and Upadhyay, 2008). Anxiety disorders showed about 20% of lifetime prevalence and had earlier age of onset (19 years) than affective disorders (34 years) (McEvoy et al., 2011). National community studies consistently identify higher rates of both depression and anxiety disorders in women (McEvoy et al., 2011; Parker and Hadzi-Pavlovic, 2001). Early detection and treatment of mental disorders seem to be important. University students hesitate to obtain treatment through traditional clinic-based services, on the ground of lack of time and the stigma associated with mental illness (Eisenberg et al., 2007, 2011).

One possible approach to increase opportunity to seek psychological help for mental health difficulties is to use internet-based self-help treatment alternative to traditional mental health care. Internet-based cognitive behavior therapy has been shown to be a promising method to disseminate cognitive behavior therapy for depression and anxiety disorders (Spek et al., 2007). An open trial study of internet-based cognitive behavior therapy with posttraumatic stress disorder reported significant improvements on severity ratings. The study also reported good treatment satisfaction, high participant

therapeutic alliance ratings, and far less number of therapy sessions (Klein et al., 2010). Cognitive-behavioral interventions for managing stress are efficacious in self-help stress-management formats. An internet-based CBT self-help intervention was demonstrated to be suitable to deploy and to reduce stress ratings (Williams et al., 2010). Furthermore, an internet-based cognitive behavioral therapy demonstrated significant decreases in maladaptive perfectionism, anxiety, depression, negative automatic thoughts, and perceived stress in university students (Radhu et al., 2012).

The fact that internet-based cognitive behavioral interventions can lead possibly to therapeutic change suggested the potential for internet-based EMD procedure as an effective and accessible mode of treatment delivery of self-directed intervention. The internet-assisted EMD intervention of this study was developed based on Shapiro's EMDR protocol (Shapiro, 2001). The third and the fourth phases of Shapiro's EMDR protocol were mainly adapted to an internet-based format. Hassard (2003) reported that since improvement with eye movement desensitization was very good, he rarely used the installation phase (Phase five) of the procedure in his clinical practice of EMDR. Cusack and 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 a form of stimulation for eye movement (EM) task and demonstrated that EMDR is effective because memories that are recalled during EM become blurred. The purpose of the present study was to evaluate the effectiveness of an internet based eye movement desensitization (Internet EMD) procedure which was designed 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 and related symptoms was examined in a non-clinical student sample. Reduced self-reported distress on the Subjective Units of Disturbance Scale (SUDS; Wolpe, 1990) ratings and psychosomatic symptoms, anxiety, and depression of the Japanese version of The Hopkins Symptom Checklist (HSCL; Derogatis et al., 1974) in the Internet EMD group as compared to the control group would support the effectiveness of the Internet EMD for emotional impact of distressing memories and related psychological symptoms.

MATERIALS AND METHODS

Research design and statistical analyses

The design of the study comprised three between-subjects conditions and two within-subject (pre-post treatment) conditions. The participants were randomly assigned to the treatment or control condition. The participants of the treatment condition were divided into two groups, the high SUDS rating group and the low SUDS rating group according to the median strip procedure, since the EMD treatment might be effective only for people who report high

intensity of the disturbance on SUDS ratings. Treatment of both the EMD condition and control condition lasted for 5 sessions. All statistical analyses were performed using the SPSS version 18.0. A p -value of <0.05 was considered to be statistically significant.

Participants

Participants were 305 female students ($M=18.69$ years, $SD=0.89$) who were enrolled in introductory psychology classes in a women's university. The students were asked to volunteer for this study in each class. Then the participants who were willing to participate in this program completed pre-intervention assessments. Of these, about 25% of the participants (60 students) were randomly assigned to the control condition on the SPSS case selection system based on the data of pre-intervention assessment measures. The rest of the participants (245 students) were assigned to the Internet EMD condition. Of 305 participants, 210 participants ($M=18.76$ years, $SD=0.83$) completed the 5 sessions of the Internet EMD program, and 56 participants ($M=18.44$ years, $SD=0.90$) completed the 5 sessions of the control program. The participants in the control group started the Internet EMD program right after they finished the 5 sessions of control condition and the post-treatment psychological measures.

Measures

The Hopkins Symptom Checklist (HSCL; Derogatis et al., 1974) was administered in a classroom setting at pre-intervention and post-intervention. The HSCL is widely regarded as a reliable and valid measure of neurotic symptoms. The items of the HSCL demonstrated sensitivity to low levels of symptoms in normal populations (Uhlenhuth et al., 1974). It is scored on five underlying symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, anxiety and depression. A series of studies have shown the substantial evidences of the constructs validity and reliability. The Japanese version of the HSCL consists of five symptom dimensions and showed satisfactory reliability and validity (Nakano and Kitamura, 2001). Anxiety, depression, and somatization out of the five symptom dimensions were used to test the Internet EMD treatment effects, because these symptoms had been used often as treatment outcome measures of the research related to EMDR (Wilson et al., 1995). The paper and pencil items of somatization, anxiety, and depression subscales were administered to participants. These HSCL items were used to represent the variables of psychological symptoms related to current emotional impact of the scenes of personal distressing memories of the participants.

Subjective Units of Disturbance Scale (SUDS; Wolpe, 1990) ratings 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 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). These ratings were recorded on the computer. The SUDS ratings, obtained prior to the first session and at the end of last session, were used as the variables of two within-subject (pre-post treatment) conditions.

Procedure

Participants were informed about this program and were asked to volunteer for this study in introductory psychology classes. The students who decided to participate in this study completed the pre-assessment measures. The participants who completed the measures were given a username and password so they could

access and self-register on the website of this study. The participants in the treatment group were given the website information of the Internet EMD program, and the participants in the control group were given that of control procedure. Each participant read an explanatory statement and submitted an online informed consent. A password-protected website provided the platform for the delivery of the Internet EMD intervention and the control treatment. The website supports the intervention program and resource information on the program. Equipment (computer, webcams and internet access) was provided at the university to all participants so that the participants who did not have this equipment were able to conduct assignments at the university. Both the participants of the Internet EMD procedure and those of the control procedure had the five-session tasks. All participants rated the level of current emotional impact of the scenes of personal distressing memories on an 11-point Subjective Units of Disturbance Scale 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 ratings at the end of each session. The participants in the control group watched the 25 pictures of natural scenery which consecutively appeared on the computer screen in a session in order to minimize the influence of watching a computer display to the results of this study and to rate the level of current emotional impact of the scenes of personal distressing memories on an 11-point SUDS prior to the first session and at the last part of each session on the computer screen. All participants completed a post-treatment questionnaire after they completed the five-session tasks. The participants in the control group started the Internet EMD program right after they finished the 5 sessions of control condition, the last SUDS rating and the post-treatment questionnaire. The data were collected from November 2010 to September 2011.

Along with obtaining informed consent for participation and providing information about this study through internet, the participants were able to communicate with the administrator of this study through internet communication system whenever they need face to face clinical consultations under ethical considerations. This communication system was introduced for the participants' psychological well-being since the participants of the Internet EMD condition were exposed to the scenes of personal distressing memories by themselves. No participants used this service during the intervention period.

Intervention

The Internet EMD intervention was developed based on Shapiro's EMDR protocol (Shapiro, 2001), and the phases from the first to the fourth of Shapiro's EMDR protocol was adapted to an internet-based format. The participants of the Internet EMD intervention first completed the pre-intervention questionnaire. 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 are described below.

Preparation Step: Developing a safe place. Safe place exercise is very helpful to reassure participants that they can quickly recover their emotional stability during any disturbance. In this exercise, participants wrote the place where they feel safe on computer screen. This was followed by a set of eye movements, in which their eyes followed the ball moving side to side with 1 s per cycle for approximately 25 s on the computer screen, while they concentrate on the image of the safe place. Participants could come back to the safe place exercise whenever they felt uncomfortable with the Internet EMD intervention in each session. This exercise trained participants to handle the disturbing feelings and reduce distress with a coping strategy during the sessions.

First Step: Identifying a disturbing incident. At the beginning of the first step the participants were given the information on the Internet EMD procedure which is 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 asked to focus on the incident with its associated distressing cognitions and feelings. Then they were instructed to write the disturbing incident and the current irrational negative belief about themselves elicited by the image of the incident on computer screen.

The instructions: "When a disturbing event occurs, it can get locked in the brain with the original picture, thoughts, and feelings. Imagine past annoying incidents, painful memories, unpleasant and problematic incidents, stressful personal relationships, shameful experiences in your childhood, etc. Then identify the negative cognition about yourself. "I am not good enough", "I am not lovable", "I cannot get what I want", "I am worthless", "I cannot handle it", "I am shameful", "I deserve to be miserable", "I am helpless", "I am a failure", "I have to please everyone", and "I cannot succeed". When the incident and the negative cognition have been decided, write down them in the parenthesis".

After writing the disturbing incident and the current irrational negative belief, they were instructed to click the button on the computer screen with the instructions to focus on the negative beliefs and feelings and then to "let whatever happens to happen". Right after clicking the button, the screen of eye movements appears. They were instructed to follow the ball moving side to side with 1 s per cycle for approximately 25 s on the computer screen. 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.

Second Step: Desensitizing and focusing on the new insights. The new cognition and emotion about the disturbing incident became the focus for the next set of eye movements. 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.

The instructions: Take a breath, and let it go. What do you notice now? When you think about the annoying incident and the negative thought, what do you get now? When you bring up the annoying incident, how would you like to think about the incident, and what would you like to believe about yourself now? Identify the positive thought about the incident or yourself. For example, "I am fine and OK", "I am lovable", "I can get what I want", "I am worthy", "I can handle it", "I am honorable", "I deserve to be happy", "I am helpless", "I am strong", "I can handle it", "I can be myself", and "I can succeed".

When the positive thoughts have been decided, write down them in the parenthesis. Concentrate on the positive thought and yourself and follow the ball. The eye movements may help to reprocess your thoughts and feelings. It is you that will be changing yourself and are the one in control.

This part was also followed by a set of eye movements during which the participants maintained the internal focus on their new insights. This procedure was for desensitizing the disturbing incident and identifying new positive cognitions over the incident. The focus for this set of eye movements was reprocessing cognitions and feelings over the target incidents.

The first and second steps were designed for the participants to access the disturbing memories without distress and to promote the expression and consolidation of their cognitive insights. These insights were characterized by self-acceptance and new positive realistic self-perceptions. A 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 an 11-point Units of Disturbance Scale (SUDS; 0 = no disturbance at all; 10 = highest disturbance possible). These ratings were recorded on the computer, and the participants were able to see the record of their SUDS ratings at the end of each session. Along with the SUDS ratings, the starting and finishing time of the sessions of each participant were recorded on the computer in order to verify adherence to the treatment.

RESULTS

The treatment effects of the Internet EMD training were analyzed in the three groups of participants. The three groups were the high SUDS rating group, the low SUDS rating group and the control group. Comparisons between the groups at pretest and posttest were made with repeated measures analyses of variance (ANOVAs) using the SUDS ratings and three subscales' scores of the Japanese version of the HSCL (somatization, anxiety, and depression) as dependent variables and the three groups (two SUDS rating groups and a control group) as between-subjects factors. The reliability analyses of the present study on the pre-test scores of the Japanese version of the HSCL showed the acceptable reliability. An estimate of internal consistency (Cronbach's alpha) revealed alpha coefficients of 0.92, 0.91 and 0.90 for somatization, anxiety, and depression, respectively.

Two-way repeated measures ANOVA with the three groups (two EMD groups and a control group) and time of assessment (pretest vs. posttest) as independent variables was conducted on the scores of somatization. There was no significant main effect for time of assessment, $F(1, 292) = 3.63$; $p = .06$. There was no significant interaction between groups and time, $F(2, 292) = 2.86$; $p = .06$. There was a significant main effect for groups, $F(2, 292) = 65.53$; $p < .001$. The post hoc Bonferroni test indicated that all three groups significantly differed on the scores of somatization.

Two-way repeated measures ANOVA with the three groups (two EMD groups and a control group) and time of assessment (pretest vs. posttest) as independent variables was also conducted on the scores of anxiety. There was a significant main effect for time of assessment, $F(1, 292) = 7.65$, $p < .01$. There was a significant interaction between groups and time of assessment, $F(2, 292) = 6.30$, $p < .01$. To explore the nature of this interaction, separate ANOVAs were conducted for the variables. The results revealed that the posttest scores in the high SUDS rating group were significantly lower than the pretest scores ($F = 5.55$, $p < .01$). The interaction effect indicated that the decrease of anxiety in the Internet EMD training for the high SUDS rating group is significantly larger than in the Internet EMD training for the low SUDS rating group and in the control condition. There was a significant main effect for groups, $F(2, 292) = 86.76$, $p < .001$. The post hoc Bonferroni test indicated that all three groups significantly differed on the scores of anxiety.

Two-way repeated measures ANOVA with the three

groups (two SUDS rating groups and a control group) and time of assessment (pretest vs. posttest) as independent variables was also conducted on the scores of depression. There was a significant main effect for time of assessment, $F(1, 292) = 22.96$, $p < .001$. There was a significant interaction between groups and time of assessment, $F(2, 292) = 15.18$, $p < .001$. To explore the nature of this interaction, separate ANOVAs were conducted for the variables. The results revealed that the posttest scores in the high SUDS rating group were significantly lower than the pretest scores ($F = 19.21$, $p < .001$). The interaction effect indicated that the decrease of depression in the Internet EMD training for the high SUDS rating group is significantly larger than in the Internet EMD training for the low SUDS rating group and in the control condition. There was a significant main effect for groups, $F(2, 292) = 82.02$, $p < .001$. The post hoc Bonferroni test indicated that all three groups significantly differed on the scores of depression. The mean scores of three subscales of the Japanese version of the HSCL of the three groups and the results of separate ANOVAs are shown in Table 1.

Two-way repeated measures ANOVA with the three groups (two SUDS rating groups and a control group) and time of assessment (pretest vs. posttest) as independent variables was also conducted on the SUDS ratings for current emotional impact of the scenes of personal distressing memories as a dependent variable. There was a significant main effect for time of assessment, $F(1, 292) = 27.03$, $p < .001$. There was a significant interaction between groups and time, $F(2, 292) = 9.16$, $p < .001$. The interaction effect indicated that the decrease of the SUDS ratings in the Internet EMD training for the high SUDS rating group is significantly larger than in the Internet EMD training for the low SUDS rating group and in the control condition. There was a significant main effect for groups, $F(2, 292) = 25.62$, $p < .001$. The post hoc Bonferroni test indicated that all three groups significantly differed on the SUDS ratings. The mean SUDS ratings of the three groups and the results of separate ANOVAs are also shown in Table 1.

DISCUSSION

The purpose of this study was to analyze the effectiveness of the Internet EMD procedure developed in this study in comparison with a control condition. Participants were randomized to the Internet EMD intervention or the control condition of watching natural pictures between pre- and post-intervention measurements. The results indicated that the Internet EMD training was effective for the high SUDS rating group which is defined on the pretest ratings for current emotional impact of the scenes of personal distressing memories. The participants with the high SUDS ratings for distressing memories in the Internet EMD group demonstrated decreased scores of anxiety and depression of the Japanese version of the

Table 1. Descriptive data for the Internet EMD and control condition and repeated ANOVA comparisons.

| Variable | Internet EMD | | | | | | | | |
|--------------|------------------------|------------------------|----------|------------------------|------------------------|----------|------------------------|------------------------|----------|
| | High SUDS rate | | | Low SUDS rate | | | Control | | |
| | Pretest | Posttest | <i>F</i> | Pretest | Posttest | <i>F</i> | Pretest | Posttest | <i>F</i> |
| HSCL | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | |
| Somatization | 31.42 (6.87) | 29.42 (8.68) | 3.56 | 20.78 (3.92) | 21.15 (5.98) | 0.68 | 25.03 (7.70) | 24.92 (9.59) | 0.01 |
| Anxiety | 19.35 (4.50) | 17.50 (5.65) | 5.55* | 11.42 (2.73) | 11.84 (3.71) | 0.09 | 14.20 (5.32) | 13.58 (5.53) | 0.61 |
| Depression | 33.19 (5.61) | 28.93 (7.34) | 19.21** | 20.84 (4.38) | 21.07 (5.78) | 0.39 | 25.30 (7.79) | 23.53 (8.34) | 2.69 |
| SUDS | 6.08 (1.01) | 4.91 (1.36) | 53.32** | 3.85 (1.03) | 3.95 (0.64) | 1.20 | 5.06 (1.62) | 4.70 (1.47) | 1.72 |

* $p < 0.05$; ** $p < 0.01$.

HSCL and SUDS ratings for the target memories compared to the low SUDS rating group and the control group. The Internet EMD procedure provides improvements on psychological outcomes for the participants with severer distressing memories. The previous studies (Eisenberg et al., 2007, 2011) suggested that university students hesitate to obtain treatment through traditional clinic-based services, on the ground of lack of time, financial constraints, unawareness of need for help, and the stigma associated with mental illness. The fact that an Internet EMD procedure can lead to therapeutic change suggested the potential for internet-based EMD procedure developed in this study as an effective and accessible mode of treatment delivery of self-directed intervention. The results of this research are encouraging for further studies on the Internet EMD intervention.

One limitation of this study was that this Internet EMD program was developed mainly on the third and fourth phases of Shapiro's EMDR protocol and did not administer the phases from the fifth phase to the eighth phase of Shapiro's original EMDR protocol. By using this Internet EMD program, 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 memories, negative cognition, and emotions become diffused and less valid, and then positive ones tend to become stronger and more salient. However, this Internet 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. The installation phase to the reevaluation phase (the fifth phase to the eighth phase) might be essential

components of the EMDR procedure. It seems that the therapeutic effectiveness of this Internet EMD program needs to be analyzed in the study which compares the effectiveness of the regular EMDR. However, the results of this study supported the effectiveness of this Internet EMD program for reducing the ratings for current emotional impact of the scenes of personal distressing incidents. This program might become a promising self-help treatment alternative to traditional mental health care for increasing opportunity to seek psychological help for mental health difficulties among university students.

Furthermore, this study was conducted on a sample of female university students. Although dropout rates were 13.5% in the Internet EMD group and 6.7% in the control group, studies will need to use various samples to further replicate the effectiveness of this internet-based EMD program. Moreover the pre-post measurements were conducted in a classroom setting. Students in both the Internet EMD group and in the control group may have reported benefits to appear in a desirable way for the investigators.

Finally, intervention was delivered through Internet, so that each participant could use the treatment material considerably in various ways. The studies on Internet-based PTSD treatment programs (Lange et al., 2003; Knaevelsrud and Maercker, 2007) demonstrated that 50 to 80% of participants in the Internet treatment groups improved on trauma-related symptoms and general psychopathology compared with control conditions. Hirai and Clum (2005) found that the participants who were experiencing subclinical symptoms associated with a traumatic event in an Internet-based CBT self-help program achieved significant reduction in avoidance behavior, frequency of intrusive symptoms, anxiety, and depression compared with the waitlist participants.

However, the studies (Litz et al., 2007) indicated that therapist-supported Internet treatment demonstrated larger treatment effect sizes than self-help Internet treatment. Previous studies have shown that trauma-related problems could be effectively treated through Internet. This study is the preliminary one to investigate the treatment effect of Internet-based EMD program. There are the limitations in verifying whether every participant in the Internet EMD select their disturbing memories properly, desensitize the memories sufficiently, define the proper positive cognitions, and adapt the new cognitions to the distressing memories without therapists' help. Despite these limitations, the participants with the high SUDS ratings for distressing memories in the Internet EMD group showed decreased levels of SUDS ratings for distressing memories, anxiety and depression. The evidence suggests 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

In this study, the internet-based distress reduction procedure called the Internet EMD based mainly on the third and the fourth phases of Shapiro's EMDR protocol was developed. The purpose of the present study was to evaluate the effectiveness of the Internet EMD procedure as compared to the control condition. The participants with severer self-reported distress in the Internet EMD group improved on psychological outcomes of anxiety and depression as well as on SUDS ratings. The Internet EMD as a treatment of current emotional impact of the scenes of personal distressing memories and related psychological symptoms was demonstrated to be effective for female university students who reported stronger personal disturbing memories.

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