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Case Report

The study of the group intervention containing EMDR therapy for children and mothers in the field of trauma after a mine explosion in Turkey

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Abstract

Background

On the 13th of May 2014, 301 miners lost their lives in a coal mine explosion in Soma, Turkey. A field study was conducted by volunteers under the roof of the EMDR Humanitarian Assistance Programs: Trauma Recovery (EMDR-HAP-TR) organization.

Objective

All the interventions in this study were aimed to help victims of the disaster. Furthermore, the study aimed to assess the effectiveness of the intervention, specifically the EMDR Group Protocol (EMDR-GP) with Children and Caregivers, which was administered to children and mothers who lost their fathers and husbands in the Soma mine disaster.

Methods

Participants in the study were 25 children and 16 mothers in the intervention group and 25 children and 16 mothers in the control group. The Child's Reaction to Traumatic Events Scale (CROPS) was administered to the children and the Impact of Event Scale-Revised (IES-R) was administered to the mothers. In the intervention groupe, the Subjective Units of Disturbance scale (SUD) was administered both to children and to mothers at different times during the intervention, including before and after desensitization, and at the end of the intervention. CROPS and IES-R were administered before the intervention and 1-year post-intervention. In the control group, CROPS was administered to 25 children and IES-R was administered to 16 mothers. As there was no initial inclusion for a control group due to the field intervention, pre-test measures are not available for the control group.

Results

The SUD ratings and one-year follow-up results on CROPS and IES-R showed that the EMDR-GP reduced all scores for both children and mothers. Compared to the control group, the decrease of CROPS scores in children was found to be significant, while the decrease of IES-R scores in mothers was not. It can be suggested that the EMDR-GP with Children and Caregivers is an effective treatment.

Conclusion

These preliminary findings need to be verified by further studies with a larger number of participants and other populations. Future studies should also include a grief-based scale in situations where there is a risk of traumatic bereavement.

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Keywords

Mining Disaster; Eye movement desensitization and reprocessing (EMDR); EMDR group protocol with children and caregivers; Posttraumatic stress disorder (PTSD)

1. Introduction

Although there is an accident risk in all industries, coal mining is one of the world's most challenging and demanding fields of activity and requires knowledge, experience, expertise, and continuous supervision to prevent the triggering of a sequence of negative events. According to mine blast and accident records in Turkey, the country lost a total of 1 399 mineworkers between 2002 and 2015, including the Soma mine disaster (Bayraktar, Uyguçgil & Konuk, 2018).

The effect of disasters on the development of PTSD symptoms in individuals has been an area of interest to researchers (Garfin & Silver, 2016; Ghazali, Yaman & Ahmad, 2012; Liang, Li, Zhou & Liu, 2021; McFarlane, Policansky & Irwin, 1987; Naeem et al., 2011). Solomon and Heide (2005) underline that not only survivors, but also families and community members, are at risk as a result of disasters. They may affect short-term and long-term functioning and mental health, potentially resulting in psychological, emotional, and social problems (Solomon & Heide, 2005). The impact of a disaster is observed not only in adults, but also in children. In children, the impact may vary according to the developmental age of the child, the nature and severity of the event, the child's perception, and also the time passed after the event (Salmon & Brynat, 2002). The traumatic effects of disasters can differ following the patterns of stable healthy adjustment and resilience of the individuals involved (Bonanno, 2004, 2010) as well as the type of family functioning for the children, including the psychological well-being of the family (Morris-Smith & Silvestre, 2014; Silvestre & Tarquinio, 2021).

The intervention described in this paper was conducted in the field after a mining accident that occurred in Soma, Turkey, on the 13th of May 2014. 486 workers were injured, 432 children were orphaned and 255 women widowed in the mining disaster that shocked the whole country. This means hundreds of people were directly or indirectly affected by the disaster. All the minors who died in this explosion are declared as "martyrs" by the state. The martyr, which is both a religious and a political concept, designates a person who has died for a sacred ideal, the faith and the country.

The Soma case tribunal proceedings lasted for more than 7 years and concluded quite recently (June 6, 2021). Following the tribunal's verdict, 4 people were arrested. The length and complexity of the process provoked protests from families. Despite the conclusion of the case, protests continue. It would be appropriate to view the Soma disaster as a man-made disaster (intentional or accidental) and not a natural disaster.

Considering the importance of family functioning for children, this study aimed to treat not only children who lost their fathers, but also mothers affected by the disaster. The purpose was to evaluate the clinical practice and outcomes of a field intervention. It is important to state that the intervention was performed without the intention of conducting research, and the objective of assessing its results was defined once the intervention had already begun. Therefore, this study has the limits inherent to clinical practice and aims to assess the effectiveness of its action: the administration of the EMDR Group Protocol (EMDR-GP) to children and mothers, who had developed posttraumatic stress symptoms following the disaster.

1.1. EMDR therapy

Eye movement desensitization and reprocessing therapy (EMDR) was created as a psychotherapy treatment for veterans (Shapiro, 1989; 1989ab). Numerous systematic reviews examining the effects of different therapeutic approaches on the symptoms of PTSD have shown the effectiveness of EMDR therapy (Bisson, Roberts, Andrew, Cooper & Lewis, 2013; Khan et al., 2018; P. Novo Navarro et al., 2018; Wilson et al., 2018). EMDR is recommended by international guidelines as an effective treatment by the World Health Organization, (2013), INSERM, the French National Institute of Health and Medical Research (2004), the American Psychiatric Association (2004), the National Institute for Health and Care Excellence (NICE, 2018) and the International Society for Traumatic Stress Studies (ISTSS, 2018).

EMDR is an eight-phased, three-pronged (past, present, future) therapy, guided by the theoretical model of adaptive information processing (AIP). According to the AIP model, the human brain processes daily life events naturally. However, in the case of adverse or traumatic events, this natural processing system may be overwhelmed, resulting in the dysfunctional storage of such memories (Shapiro, 1995, 2001, 2014, 2018). In other words, the integration of the memory of the traumatic experience within adaptive memory networks is impeded. Instead, these memories of adverse life events are stored with associated negative emotions, bodily sensations, and beliefs that may be triggered and reexperienced in present-day life, when encountering reminders of the initial events. EMDR therapy aims to reduce these negative aspects associated with the adverse life events and to allow for an adaptive resolution by processing the traumatic memories (Seligman, 2001; Shapiro & Laliotis, 2011; Solomon & Shapiro, 2008). The processing of targeted memories helps their transfer from episodic and implicit memory to semantic and explicit memory (Shapiro, 2014).

Although the mechanism of action of EMDR is not yet completely clear, different models have attempted to explain it in the literature (R. Landin-Romero, Moreno-Alcazar, Pagani & Amann, 2018; Novo-Navarro et al., 2018). The most studied component of EMDR therapy is the bilateral stimulation that is administered during the desensitization of targeted memories. Eye movements are the most commonly used form of bilateral stimulation, but other stimuli may be used, including tapping (on the individual's knees or hands, for example) and audio stimulation (often with headphones; Servan-Schreiber, Schooler, Dew, Carter & Bartone, 2006; Shapiro, 1994, 1995, 2001, 2014, 2018). Firstly, Wilson, Silver, Covi and Foster (1996) showed that there is a relaxation effect of bilateral stimulation by decrease of heart rate, skin conductance and respiratory rate. Current research shows that eye movements facilitate the recall of memories from episodic memory, reduce negative emotions and provide flexible attention (Sack, Lempa & Lamprecht, 2007; M. 2008). It is also suggested that EMDR stimulates neurobiological mechanisms in the treatment procedure involving bidirectional stimulation, contributes to the activation of episodic memories and accelerates the integration of these memories into cortical semantic memory (Shapiro, 2014; Stickgold, 2002). Landin-Romero et al. (2018) conducted a review of the mechanisms of action of bilateral stimulation in EMDR and included psychological explanations, which refer to classical conditioning and the orienting response, and working memory; psychophysiological explanations, which refer to physiological changes associated with the orienting response, the REM (rapid eye movement) sleep effect, and slow-wave sleep-like effects; and neurobiological explanations, which refer to the hemispheric interconnectivity, neural integration, and thalamic binding, as well as structural and functional brain changes. Calancie and colleagues (2018) identify the following proposed types of mechanisms of action for bilateral stimulation in EMDR: working memory taxation, increased hemispheric interconnectivity, the transfer of the memory from emotional components in the amygdala to cognitive components in the hippocampus, and the decrease in heart rate and electrodermal responses. However, it is important to underline that all these papers emphasize the need for further reaseach on the mechanisms of action in EMDR.

EMDR was originally developed by Francine Shapiro for the purpose of treating traumatic memories in adults with PTSD. However, it is now used with many different types of mental health issues and with children, with the common focus of a trauma perspective. The number of studies showing the effectiveness of EMDR therapy with children is increasing (Manzoni et al., 2021; Moreno-Alcázar et al., 2017; Rodenburg, Benjamin, De Roos, Meijer & Stams, 2009).

EMDR therapy may also be administered in group settings (Adúriz, Bluthgen & Knopfler, 2011; Jarero & Artigas, 2010; Jarero, Artigas & Hartung, 2006; I. Jarero, Artigas, Montero & Lena, 2008; Korkmazlar-Oral & Pamuk, 2000; Korkmazlar et al., 2018; Lehnung, Shapiro, Schreiber & Hofmann, 2017; Maslovaric et al., 2017; Trentini et al., 2018; Yurtsever et al., 2018). EMDR-IGTP (EMDR Integrative Group Treatment Protocol) combines EMDR therapy with a group therapy model and was developped by Jarero et al. (1999) for the treatment of children. Studies have showed its effectiveness (Jarero & Artigas, 2010; I. 2012; Jarero et al., 2006; I. Jarero et al., 2008; Passoni et al., 2018). EMDR-IGTP includes the Butterfly Hug technique, a manner of self-administering bilateral stimulation (Artigas & Jarero, 2014). Although originally developed for children, it may also be applied as a group intervention for adults (Jarero & Artigas, 2010). Maslovaric et al. (2017) used EMDR-IGPT with adult survivors of the Italy earthquake on August 24th, 2016. As a result of this three-session treatment, PTSD symptoms were significantly reduced. Another protocol, the EMDR Group Traumatic Episode Protocol (G-TEP) developed by Elan Shapiro, is an adaptation to a group setting of the Recent Traumatic Episode Protocol (R-TEP; Shapiro, 2012; Shapiro & Laub, 2008), which is used with adults. Studies have shown that EMDR G-TEP effectively reduces PTSD symptoms (Lehnung et al., 2017; Yurtsever et al., 2018). Another EMDR protocol used in a group format is the EMDR Group Protocol (EMDR-GP). It has been shown to be effective with children in different populations and traumas (Korkmazlar & Bozkurt, 2016; 2018; Korkmazlar, Bozkurt & Tan Tunca, 2020; Korkmazlar-Oral & Pamuk, 2002).

According to our research, the first systematic review of EMDR group protocols was carried out by Kaptan, Dursun, Knowles, Husain and Varese (2021). The systematic review examined 22 randomized and non-randomized studies (1 739 participants) that had at least one standardized outcome measure. The authors concluded that despite the small number of randomized controlled trials and the poor methodological quality of the studies, symptoms of PTSD decreased when group EMDR protocols were applied.

2. Method

Since so many people were affected in the Soma mine explosion, it was necessary to reach as many people as possible in the shortest time possible. The EMDR-GP with Children and Caregivers was chosen because it combines group therapy and EMDR therapy, and it was first used with children after the Marmara earthquake in Turkey in 1999 (Korkmazlar-Oral & Pamuk, 2002).

Three weeks after the explosion in Soma, EMDR Humanitarian Assistance Programs: Trauma Recovery (EMDR-HAP-TR) volunteers visited the area, as soon as the search and rescue efforts were completed. EMDR-GP with Children was administered to 41 children aged between 7 and 12 years (Korkmazlar et al., 2020). The positive results of that field study led the Turkish Ministry of Family and Social Policy to invite the EMDR-HAP-TR team back. Eighteen months after the critical incident, more than 15 EMDR therapists, all volunteers, went to the field. The psychologist working in Soma Social Service Center provided information about the population and reported that children were experiencing nightmares, difficulty concentrating, and feelings of anger, anxiety, and fear. Since it is known that it is very important to include families in a holistic approach when working with children (Morris-Smith & Silvestre, 2014), it was decided to include mothers in the study. Because it was not easy to convince parents to participate in the study, the risk that the participants would not return after the first session needed to be considered. Therefore, it was deemed that group therapy was preferable since it involves fewer sessions; the EMDR-GP with Caregivers, which is a version of EMDR-GP with Children adapted for caregivers, was also selected to be used with the mothers.

Furthermore, it is important to have knowledge about a population and its culture before offering a trauma intervention in the field (Houllé, Silès, Tarquinio & Tarquinio, 2017). Since this is a region where psychology services are not widespread or well-known, the group intervention was conducted with the individuals that the Soma psychologist could reach, and who agreed and were able to attend. Each evening, the groups and sessions of the following day were organized. Planning further in advance was not culturally possible for this population. All women who had lost their husbands were invited and those who were available or able to participate attended. Therefore, it was possible to randomize the participants, in line with the concern of providing support. This enabled us to strengthen the methodological consistency of our action.

One year after the intervention, a volunteered therapist team visited the field again and follow-up sessions were conducted with the intervention group. During this period, a control group was formed from both mothers and children. In order not to reject anyone who needed support during the fieldwork, a control group could not be formed at the time of the intervention.

Accordingly, the framework of this research was created within the difficult field conditions during a clinical study.

2.1. Participants

2.1.1. Children

This study included 25 children (12 girls, 13 boys) who were referred by the psychologist working in Soma Social Service Center. According to his observations, the children manifested issues, such as nightmares, anger, inattention, introversion, insomnia, and distress. The ages of children were ranged between 6 and 13. In total, 3 groups were created according to their ages. The mean age of children was 9.00±1.

The control group was randomly generated from children who lost their father in the disaster and 25 children (15 girls and 10 boys) were included. Their ages ranged between 10 and 15, and the mean age was 12.28±1.54.

2.1.2. Caregivers

This study included 16 mothers who were traumatized by the Soma mine diseaster. Most of these women were the mothers of children involved in the group work. In total, 2 groups were conducted with mothers. Age of mothers ranged between 26 and 47 and the mean age was 34.4 ± 5.54.

The control group was randomized from mothers who lost their husbands in the disaster and included 16 mothers.

2.2. Instruments

2.2.1. Subjective units of distress scale (SUD)

SUD is a self-assessment scale from 0 to 10 for measuring the current level of subjective intensity of disturbance or distress. The SUD scale was developed by Joseph Wolpe (1969) and is an integral part of the standard EMDR protocol. On the scale, 0 represents a neutral state (no disturbance) and 10 represents the highest imaginable disturbance for the individual. Smileys have been used to visualize the level of distress when applied to children. The individual makes a subjective assessment of their distress caused by a target. In the assessment phase of the standard EMDR protocol, the SUD represents the disturbance associated with the worst moment of the event. The reduction of the disturbance during the reprocessing of the memory is associated with a decrease in the SUD score.

2.2.2. Child report of post-traumatic symptoms scale

The Child Report of Post-traumatic Symptoms (CROPS) was developed by Greenwald and Rubin (1999) based on post-traumatic symptomology in children. The child is asked to assess the personal validity of various statements endorsing the symptoms, covering the last 7 days. The responses are on a three-point Likert scale of 0 to 2, in which 0 = none, 1 = some, and 2 = lots. CROPS is a 26-question self-assessment scale. It is a screening tool based on a questionnaire format. It can be used with children and adolescents aged between 7 and 17. Each measure takes about 5 min to administer. Cutoff scores have been developed to indicate the likelihood of PTSD. The cutoff score of 19 indicates cause for clinical concern. Since there was no Turkish adaptation of the scale, the team translated it into Turkish, and then the back-translation of a native English speaker was compared to the original version.

2.2.3. The impact of event scale – revised

The Impact of Event Scale – Revised (IES-R) was developed by Weiss & Marmar in, 1997 according to the American Psychiatric Association (1994) PTSD criteria. The scale comprises 22 questions and evaluates the severity of symptoms in the last 7 days between 0 and 4. The IES-R consists of 3 subscales, corresponding to intrusions (questions 1, 2, 3, 6, 9, 14, 16, 20), avoidance (questions 5, 7, 8 11, 12, 13, 17, 22), and hyperarousal (questions 4, 10, 15, 18, 19, 21). In this study, the Turkish adaptation (Çorapçıoğlu, Yargıç, Geyran & Kocabaşoğlu, 2006), whose validity and reliability have been established, was used.

2.3. Procedure

This field study was carried out in two stages. The trauma field was visited 18 months after the disaster, since the psychologist working in Soma Social Service Center had observed trauma symptoms in children and parents. CROPS for children (CROPS-initial) and IES-R for mothers (IES-R-initial) were applied before the intervention. Then, EMDR-GP with Children (Korkmazlar et al., 2020) was applied with 25 children ($F = 12$, $M = 13$) and EMDR-GP with Caregivers was applied with 16 mothers. A manual (unpublished) including EMDR-GP and standard EMDR protocol, information on trauma management as well as scales and other tools has been prepared to ensure a structured and standardized intervention in the field (Korkmazlar, 2014). The group interventions lasted approximately 3 hours.

SUD scores were obtained from both children and mothers at different times during the EMDR-GP; before the desensitization phase (SUD-initial), as in the standard EMDR protocol, when the participants focused on the most disturbing part of the event; at the end of the desensitization phase when processing ended (SUD-after desensitization); and at the very last stage of the intervention (SUD-final). During the group intervention, team members observed participants to identify those who would need subsequent individual attention. Individual EMDR sessions were held for those children and mothers who needed it.

One year after the intervention, we were invited back to Soma, both to help the individuals who had not participated in EMDR therapy the first time and to follow up with the those who had received EMDR-GP. CROPS was applied both to the children who had participated in EMDR-GP (CROPS-follow-up) and to those in the control group. IES-R was applied to the mothers who had received EMDR-GP (IES-R-follow-up) and to those in the control group. Because this was first and foremost a field intervention, there was no inclusion for a control group at the time of the initial EMDR-GP treatment. Indeed, the study project was defined after the intervention had already been initiated. Therefore, pre-test measures are not available for the control group. However, post-test measures of IES-R for mothers in control group and CROPS for children in control group were collected. It is also important to mention that people from families in the control group who needed help were referred to EMDR-GP or individual EMDR therapy after the post-test.

2.3.1. EMDR-GP with children and caregivers

EMDR-GP (Korkmazlar et al., 2020) includes 8 stages of the EMDR standard protocol, but adds a therapeutic story based on Lovett's (1999) approach, which is adapted to the nature of the trauma and age of the victims. The authors recommend that EMDR-GP be conducted with a co-therapist; the administration requires approximately one and a half hours.

EMDR-GP starts with the meeting stage. The therapist introduces him- or herself and describes the purpose of the meeting; the participants meet each other and group rules are explained.

The second stage is the preparation phase, which includes psychological debriefing. Psychological debriefing is very important for a population such as this one, in which, culturally, emotions and thoughts are not expressed. In addition, safe place and resource development exercices are introduced. All of these steps aim to stabilize participants before the trauma work. Self-tapping on the knees or the buttterfly hug method is applied as BLS. Participants apply whatever type of stimulus they prefer.

In the third stage, the assessment stage, the participants are asked to draw the worst moment of the event and SUD ratings are collected for this image. At the same time, they are invited to write down their emotions, body sensations and negative cognition that accompany this moment.

During the desensitization or fourth phase, they are asked to look at the picture they drew while doing BLS and to notice whatever comes up. It is important to draw new material on a different piece of paper so that the previous materials do not interfere with the process. Depending on the need, 4–6 sets are applied; at the end of this desensitization, SUD ratings are collected. There is a break after the desensitization phase.

After the break, in the installation phase, the combination of EMDR and a therapeutic story (Lovett, 1999) is used to reduce the negative effects of the trauma. The therapeutic story, written specifically for the trauma (Korkmazlar, 2014), is read by the therapist. The purpose of the therapeutic story in the installation phase is to contain and process the emotional, physical, sensory and cognitive parts of the trauma in a holistic way.

The sixth phase continues with the body scan. If time is available and appropriate, a relaxation exercise can be administered here. The seventh phase is a very important phase of EMDR-GP as the closing stage. In such short-term trauma studies, a strong closure is recommended as it may be difficult to follow up with the participant and to arrange another session. Exercises performed in the closure phase may vary according to the trauma nature, the population, the time passed after the disaster and age. The Bond of love exercise, inspired by the Magical bond of love exercice (Wesselman et al., 2012), was applied for this particular population. In this exercise, the participants were asked to think of the people, objects or places that they feel love in their hearts, to represent each of them with a heart on a piece of paper and to color them if they wanted to; they also drew lines between the hearts to represent the bonds between them. The picture that they drew and the accompanying positive emotions and body sensations were installed with BLS. Finally, in the reevaluation or eighth phase, the SUD score was noted for the last time.

EMDR-GP with Caregivers is a version of EMDR-GP with Children that has been adapted for adults. The flow and the exercices of EMDR-GP with mothers are the same as EMDR-GP with Children. However, in the first phase of the meeting and presentations, more time and space were given to the mothers. The icebreaker game was not used in adults since it seemed irrelevant in building bonds between participants and therapists in this context. Although all the exercises in the phases of EMDR are the same as for children, the language of the instructions is adapted for adults and has been added to the unpublished manual (Korkmazlar, 2014). The most important language adaptation was made in the therapeutic story. The therapeutic story written for children has been revised for adults as it was written according to the developmental ages and roles of children.

2.4. Data analysis and statistics

The demographic data, CROPS, IES-R, and SUD scores were recorded in Statistics Program for Social Sciences (SPSS), version 24. The frequencies, distributions, minimum, maximum, mean values, and standard deviation were described. Afterwards, the statistical relationship for the children's group was assessed with Student's *t*-test and ANOVA. For the mothers' group, non-parametric tests (Wilcoxon test) were conducted because of the small sample size.

3. Results

The results are presented in two parts: the first concerns the children and the second the mothers.

3.1. Children's results

3.1.1. SUD scores

SUD scores were obtained both from children and mothers before the desensitization phase (SUD-initial); at the end of the desensitization phase when processing ended (SUD-after desensitization); and at the very last stage of the intervention (SUD-final). SUD-initial scores for the most disturbant part of the event were between 2 and 10 with a mean value of 8.88±2.52. SUD-after scores were between 0 and 10, with a mean value of 3.12±3.87. The last SUD ratings were collected at the end of the protocol (SUD-final), which was found between 0 and 10 with a mean value of 1.24±2.73.

The SUD changes across phases were statistically analyzed by a paired samples *t*-test. There was a significant difference between SUD-initial scores ($m = 8.88$, SD=2.52) and SUD-after desensitization scores ($m = 3.12$, SD=3.86) of children in the intervention group ($t(24)=6.753$, $p<0.01$), which shows that there is a statistically significant decrease in the SUD scores. There is also a significant difference between SUD-initial and SUD-final ratings ($m = 1.24$, SD=2.72) for these children ($t(24)=10.994$, $p<0.01$). Additionally, the SUD-final scores were significantly lower than the SUD-after desensitization scores ($t(24)=2.944$; $p = 0.007$).

3.1.2. CROPS scores

The results show that there was a significant difference between CROPS-inital and CROPS-follow-up scores of children ($t(24)=8.409$, $p<0.01$) in a within-group design. CROPS follow-up mean scores ($m = 11.96$, SD=6.70) were signifcantly lower than CROPS-inital scores ($m = 23.96$, SD=3.07). Thus, there was a statistically significant decrease in the CROPS scores.

There was a statistical difference between CROPS follow-up scores of the children's intervention group and control group ($F(1, 24)=10.31$, $p<0.01$) when compared with a between-group design. CROPS follow-up scores of the children's control group ($m = 19.20$, SD=9.06) was signifcantly higher than that of the intervention group ($m = 11.96$, SD=6.71).

3.2. Caregivers' results

3.2.1. SUD scores

SUD-initial scores of mothers who participated in the intervention ranged between 6 and 10 with a mean of 9.56±1.21. After desensitization, SUD scores ranged between 0 and 10 with a mean of 5.38±2.63. SUD-final scores ranged between 2 and 8 with a mean of 4.50±1.93.

A Wilcoxon test used in order to detect the differences between SUD scores in a within-group design. There was a statistically significant decrease in the SUD scores. SUD–final scores ($m = 4.50$, SD=1.93, $p<0.05$) and SUD after desensitization scores ($m = 5.38$, SD=2.63, $p<0.05$) were both signifcantly lower than SUD–initial scores ($m = 9.56$, SD=1.21). Nonetheless, there was no significant difference between SUD–final and SUD-after desensitization scores for mothers.

3.2.2. IES-R scores

According to the Wilcoxon test in a within-group design comparing IES-R and IES-R follow-up scores of mothers who participated in the intervention, the IES-R total in follow-up sessions ($m = 38.88$, SD=12.69) was significantly lower ($Z=-3.517$, $p<0.05$) than the IES-R total scores collected before the intervention ($m = 69.63$, SD=11.01). Also, all the follow-up IES-R subtest scores for mothers, namely intrusions ($m = 13.56$, SD=5.85, $p<0.05$), avoidance ($m = 14.19$, SD=4.65, $p<0.05$), and hyperarousal ($m = 11.13$, SD=5.73 $p<0.05$), were signifcantly lower than respectively the intrusion ($m = 23.13$, SD=2.92), avoidance ($m = 21.50$, SD=6.52), and hyperarousal ($m = 21.56$, SD=3.37) subtest scores collected before the intervention.

A Mann-Whitney U Test was used to compare IES-R follow-up scores of the intervention group and the control group for mothers. The results showed no statistical difference between intrusions ($Z=-1.738$; ns), avoidance ($Z=-0.208$; ns), hyperarousal ($Z = 0.079$; ns), and IES-R total ($Z=-1.358$; ns) follow-up scores of the intervention group and the control group for mothers.

4. Discussion

The main goal of the humanitarian project was to help people. The whole project was conducted on the basis of volunteering under the umbrella of EMDR-HAP-TR. The Soma district's governor's request for help specifically concerned the children, but current litterature shows that to promote children's recovery, it is important to facilitate their families' mental health (Blaustein & Kinniburgh, 2010; Morris-Smith & Silvestre, 2014; Silvestre & Tarquinio, 2021). Therefore, it was important to consider their families, in other words only their mothers for this population, when making treatment plans with children. After observing the positive changes, it was decided to assess the effectiveness of the intervention. In this study, the primary goal is to show the effectiveness of EMDR-GP with Children and Caregivers.

The discussion part is also divided into two sections, children and caregivers.

4.1. For children

As a result of this research, it can be said that the EMDR-GP with Children is effective. According to the results, a significant decrease was observed when the SUD ratings of the children were considered. It is important to underline that SUD ratings for children decreased gradually during the intervention. In a similar study (Korkmazlar et al., 2020), EMDR-GP with Children was applied to 41 children who lost their fathers in a Soma disaster 3 weeks after the disaster and SUD scores were significantly decreased for children in an early intervention. The results obtained are consistent with this study.

In a meta-analysis of randomized controlled trials on the efficacy of EMDR in both children and adults with PTSD, it was shown that the CROPS score of children decreased after EMDR interventions (Moreno-Alcázar et al., 2017). In this study, CROPS was also used in order to measure the effectiveness of the intervention. It was shown that the children's CROPS scores decreased significantly in the 1-year post intervention for children who received help. It is also important to note that when examining the CROPS scores administered one year after the intervention, the scores of the children who received EMDR-GP were significantly lower than the children who did not receive help. Therefore, EMDR-GP can be recommended for use with children when there is a shared trauma where a large number of children are affected, and the therapists need to reach as many children as possible. It is recommended to adapt the content of the EMDR-GP to the nature of the trauma, the developmental age of the group and population, and to write the therapeutic story in accordance with the trauma.

Furthermore, there are other studies in which the group format is integrated with EMDR therapy. In these studies, group EMDR studies with children were also found to be effective. For example, I. Jarero et al. (2008) reviewed a study on the effectiveness of EMDR-IGTP with 16 children who lost their fathers after a similar traumatic event, a mine explosion in Mexico. The results showed that SUD and CRTES (Child's Reaction to Traumatic Events Scale) scores of children decreased significantly. The results of this study with a similar population are consistent with the results of our study. The effectiveness of EMDR-IGTP in which EMDR and group work are integrated, has also been shown in other studies (Adúriz et al., 2011;

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Jarero et al., 2006; I. 2008).

4.2. For mothers

When we assess the results of the mothers, SUD results and IES-R results, including all the subtests of the scale, showed that there was a significant decrease in their scores.

On the one hand, the significant decrease in SUD scores at the end of the intervention compared to the beginning is an indication of the effectiveness of EMDR-GP on the distress experienced by the mothers. On the other hand, the lack of significant difference between SUD scores after desensitization and SUD final, unlike children, may be explained by the complexity of memory networks. Considering that children's memory networks are shorter and therefore reprocessing takes less time (Adler-Tapia & Settle, 2017; Gomez, 2012; Morris-Smith & Silvestre 2014; Tinker & Wilson, 1999), memory being more complex in adults can lead to longer reprocessing times.

When the mothers' IES-R-follow-up scores in the intervention group are examined, a significant decrease was observed not only in the total scores, but also in the scores of the subtests in which the dimensions of intrusion, avoidance and hyperarousal are measured separately. Although there was a significant decrease here, the follow-up results of the mothers in the intervention group ($m = 38.88$, SD=12.69) were above the IES-R cut-off point of 33. Therefore, it would not be wrong to say that they still need psychological suppport. Here we can draw attention to the screening role of EMDR-GP for adults. The meeting with many people in a limited time allows professionals to assess the level of psychological distress of the victims. Thus, people who need individual therapeutic support are not neglected, especially in collective trauma.

Although the intervention group showed a decreasing trend compared to the control group, no significant difference was observed between the scores of the intervention group and the control group for mothers. Soma's local psychologist specifically selected mothers with high levels of traumatic stress reactions and referred them to the intervention group, while the randomized control group consisted of participants who were offered no psychological help. Therefore, the intervention group is a group that we assume to be more affected by the event. This difference between groups may explain why the results were not significant.

Several factors can explain the psychological state of mothers who are affected not only by the loss of their spouse, but also by social, cultural, political and legal factors. Houllé et al. (2017) postulated that it is important to consider social and cultural dimensions as a risk factor when addressing victims of trauma. Therefore, it is necessary to assess the trauma not only from a personal point of view but also from a social point of view on an interpersonal dimension. Consistent with this idea, the impact of family, friends, and society on the development and maintenance of PTSD has been shown in the literature. (Bountress et al., 2020; Dar, Iqbal, Prakash & Paul, 2018; Gibert et al., 2020; Maercker & Hecker, 2016). From this point of view, it may be important to point out that Soma is a region where the collective structure is relatively dominant. The inhabitants of the region know each other and have an active role in each other's lives. When we assess this disaster in detail, we observe that the gift of the martyr title to the deceased miners as well as the financial assistance given to the families affected by the explosion had significant consequences. The lack of such financial support and of the gift of the martyr title for those who lost their lives in other mine explosions led the general population to view these victims negatively. We can thus see a social gap between the victims of the 2014 explosion and the other victims. This political difference in treatment would then have caused a social divide and the isolation of those in mourning, leading to a climate where their grief may be more complex, thus more difficult to oversome.

Other factors that can affect the psychological state of victims are legal and political processes. This fieldwork was carried out 18 months after the disaster. Thus, during the years 2016 and 2017, when the data from this study was obtained, the legal process related to the disaster had not yet been resolved, and there were many negative events leading the victims to defend their rights. Ambiguous situations, such as the change of court during the trial and the release of defendants by the court pending a trial, caused the families of the minors to manifest, which was also very much reported by the media. The absence of someone to take responsibility for the explosion as well as the persisting uncertainties about the case can be seen as a significant factor complicating the grieving process. Thus, the absence of identified responsible parties for the incident and of legal proceedings have caused irritation and anger among the victims. Chae, Huh and Choi (2018), who assessed the grieving processes of parents who had lost their children in a ferry accident, found that complicated grief was associated to injustice, lack of rescue efforts provided by government agencies and incomplete and questionable information.

It is also important to mention the concept of mourning when there is a sudden loss after a major disaster (Tarquinio, Houbre, Fayard & Tarquinio, 2009). When we consider the process within this framework, we can deduce that it is important to address the study not only through a trauma lens, but also through the concept of grief. In this case, victims may be considered to fit the clinical picture of prolonged or complicated grief (Prigerson et al., 2009). Since the EMDR-GP content is adapted for each disaster, it was prepared in consideration of both traumatic and grief-related experiences.

Another point to be mentioned is the importance of early intervention when there is a traumatic event (Shapiro, 2012; Tarquinio, Brennstuhl, Reichenbach, Rydberg & Tarquinio, 2012). When it is not possible, a person's ability to process trauma on their own, in other words resilience, is an important factor for recovery (Bonanno, 2004; Huss, Nuttman-Shwartze & Altman, 2012). Besides, Bonnano et al. (2010) stated that some survivors may need several months to 1 or 2 years to recover. On the other hand, McFarlane (2009) indicated that there can be a delayed onset of traumatic symptoms. Consistently, trauma symptoms persisted in victims and psychological support was needed 18 months after the event, according to the psychologist at the Soma Social Service Center, and this led to the invitation of volunteer therapists,

5. Conclusion

This study was conducted on 25 children and 16 mothers who lost their family member (father or husband) in Soma mine disaster. EMDR-GP with Children and Caregivers was used as an intervention. It was found to be effective in reducing PTSD symptoms and distress in both children and mothers. Therefore, in the case of traumatic events affecting a large number of people, when it is not possible to reach enough people individually, the use of the EMDR/GP with Children and Caregivers may be recommended.

However, according to IES-R results, mothers were found to be still struggling with the impact of event. Our findings supported the literature, which constitutes the strength of the study. However, this project was voluntary-based and done in a small-town context.

5.1. Clinical implications

- It can be argued that EMDR-GP is an appropriate intervention when there is a collective trauma that affects many people, including children and adults, and when therapists need to reach as many people as possible. There are different adaptations of EMDR therapy to the group model for adults and children in the literature (Kaptan et al., 2021).
- It is recommended that the EMDR-GP application be managed by two professionals trained in EMDR.
- When working with children, it is crucial to consider their level of development, which determines how they understand and cope with trauma, and may involve variations in the treatment process. In this regard, grouping children according to their ages in group studies may increase the effectiveness of the intervention.
- In similar field studies, it appears important to approach the event not only from a trauma perspective but also from a grief perspective.
- It is recommended to apply EMDR-GP to different populations in terms of age and issues, in order to assess its effectiveness.

5.2. Limitations

This study is limited by small populations for children and for caregivers, so individual differences within the groups may affect the statistical power. During the project, no treatment was performed with the intention of research; it was done only with the motivation to help. In other words, the research design was based on the clinical practice performed in the difficult conditions of the trauma area, not vice versa as normally done in research studies. The absence of pre-tests of the control groups is also related to this. One of the limitations is that there is no pre-test of the control groups, since we do not want to turn away any victim without help. However, as mentioned before, the intervention group was selected from those who need primary support, based on the observations of the local psychologist. In this case, it can be assumed that these people are more affected by the events. Therefore, it can be speculated that the pretest of the control group was lower than that of the intervention group. For this reason, it can be thought that this group difference, being a confounding variable, does not contradict our hypothesis. However, it is important to consider this variable in future studies.

Another limitation is on the age difference of the children in the control group and the intervention group. The mean age of the children in the control group (12.28±1.54) is higher than the mean age of the children in the intervention group (9.00±1). This difference is due to the fact that the control group consisted of randomized children of families that could be reached in the area, so these children were older than those who had been referred to the intervention group. Therefore, it is recommended that future studies take this into account.

In addition, following such a disaster resulting in the death of many people, it may have been meaningful to apply not only a trauma scale but also a grief-related scale, which was not done in this study. Considering that decisions on many issues must be made quickly in a field study, it appears important for future disaster-related field studies to consider the grief dimension. Further studies are needed with larger numbers of participants from other populations and should be conducted with a research design.

Disclosure of Competing Interest

The authors declare that they have no conflicts of interest concerning this article.

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