Randomized Controlled Trial: Provision of EMDR Protocol for Recent Critical Incidents and Ongoing Traumatic Stress to First Responders

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This randomized controlled trial aimed to evaluate the effectiveness of the Eye Movement Desensitization and Reprocessing Protocol for Recent Critical Incidents and Ongoing Traumatic Stress (EMDR-PRECI) in reducing posttraumatic stress disorder (PTSD), anxiety, and depression symptoms related to the work of first responders on active duty. Participants were randomly assigned to two 60-minute individual treatment sessions (N = 30) or to a no-treatment control condition *(*N = 30). They completed pre-, post-, and follow-up measurements using the Posttraumatic Stress Disorder Checklist for *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5*) (PCL-5) and the Hospital Anxiety and Depression Scale (HADS). Data analysis by repeated measures analysis of variance (ANOVA) showed clear effects of the EMDR-PRECI in reducing PTSD work-related symptoms in the treatment group with symptom reduction maintained at 90-day follow-up with a large effect size (d = 3.99), while participants continued to experience direct exposure to potentially traumatic work-related events during the follow-up period. Data analysis by repeated measures ANOVA revealed a significant interaction between time and group, F (2,116) = 153.83, $p < .001$, $\eta_P^2 = .726$ for PTSD, and for anxiety F (1,58) = 37.40, $p < .005$, ηP2 = .090, but not for depression. A t-test showed a clear decrease for depression symptoms for the treatment group with statistically significant results. The study results suggest that the EMDR-PRECI could be an efficient and effective way to address first responders' work-related PTSD, anxiety and depression symptoms. Future research is recommended to replicate these results and to investigate if symptom improvement also results in the reduction of physical health symptoms and early retirement for PTSD-related reasons among first responders.

Keywords: Eye Movement Desensitization and Reprocessing Protocol for Recent Critical Incidents and Ongoing Traumatic Stress (EMDR-PRECI); posttraumatic stress disorder (PTSD); anxiety; depression; intensive EMDR therapy; first responders

In the context of this article, we use the term "first responders" to refer to a heterogeneous grouping of both paid professionals and volunteers who provide critical services in emergencies (e.g., paramedics, firefighters, staff peer support in large organizations, law enforcement, emergency line operators and dispatchers, search and rescue personnel, emergency medical services, ambulance personnel, emergency room staff).

First responders are directly exposed to ongoing traumatic stress due to repeated potentially traumatic events during their daily work, including the threat of injury to self and others, direct life-threatening situations, the death of and injuries to other people, exposure to gruesome accidents, body handling, multiple casualties, and suicide. Considering this high exposure

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to traumatic events, these occupational groups constitute a high-risk group for the development of posttraumatic stress disorder (PTSD; Berger et al., 2012) and suicide (Stanley, Hom, & Joiner, 2016).

The impact of trauma exposure is cumulative in nature (Brewin, Andrews, & Valentine, 2000), with rates of mental health disorders among emergency service personnel increasing with age and each additional critical incident (Harvey et al., 2016). Evidence has shown that multiple previous trauma was a stronger predictor of the development of PTSD than a single previous trauma (Breslau & Kessler, 2001). The cumulative effects of prior traumas (i.e., first responders exposed to ongoing traumatic stress) may be associated with more severe emotional responses to the next trauma (Berninger et al., 2010). Also, elevated PTSD and depression symptoms have been identified among firefighters as factors associated with increased suicide risk (Boffa et al., 2017; Martin, Tran, & Buser, 2016).

PTSD following exposure to traumatic stressors is a debilitating disorder marked by hyperarousal, avoidance, reexperience, and negative cognition or emotion (American Psychiatric Association [APA], 2013). According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; APA, 2013), Criterion A trauma encompasses duty-related events within professional groups, such as "first responders collecting human remains" or "police officers repeated exposed to details of child abuse" (p. 271). A systematic review of rescue workers across 28 studies found a 10.0% prevalence of PTSD (Berger et al., 2012).

EMDR Therapy

Eye movement desensitization and reprocessing (EMDR) therapy (Shapiro, 2001, 2018) is an eight-phase psychotherapeutic comprehensive approach developed to address past, current, and future aspects of traumatic events. During EMDR sessions, patients focus on elements of the disturbing memory while simultaneously engaging in bilateral stimulation. EMDR therapy is guided by the adaptive information processing (AIP) model (Shapiro, 2001, 2018), which posits that the primary source of psychopathology is memories of adverse life experiences that have been inadequately processed and maladaptively stored in a state-specific form. These memories can be triggered by current internal and external stimuli, thus contributing to present dysfunction.

EMDR Therapy Administered to First Responders

A search for studies investigating the administration of EMDR therapy to first responders retrieved case studies with police officers (Keenan & Royle, 2007; Spates & Burnette, 1995) and firefighters (Kitchiner, 2004), a randomized controlled trial (RCT) of EMDR therapy versus a traditional stress management program with 62 police officers (Wilson, Tinker, Becker, & Logan, 2001), an RCT of a modified EMDR therapy protocol versus supportive counseling with 39 traumatized first responders on active duty (Jarero, Amaya, Givaudan, & Miranda, 2013), and a study that investigated the clinical characteristics and functional magnetic resonance imaging (fMRI) findings of EMDR therapy in seven firefighters with partial PTSD (Chung et al., 2014). The results of this study showed high incidence at pretreatment of partial PTSD in the participants and significant improvement after EMDR treatment.

EMDR Protocol for Recent Critical Incidents and Ongoing Traumatic Stress

This protocol was previously known as the EMDR Protocol for Recent Critical Incidents (Jarero, Artigas, & Luber, 2011). The name was expanded to reflect the protocol design for clinical applications with populations living with ongoing traumatic stress, such as first responders. It is a modification of Shapiro's (2001) Recent Traumatic Events Protocol and was developed in the field to treat recent (even hours after a trauma) or prolonged adverse experiences where related stressful events continue for an extended time and where there is no posttrauma safety period for the traumatic memory consolidation. Shapiro (2018) recommends the EMDR-PRECI "for an extended post-disaster period to address situations in which there is ongoing trauma and therefore no subsequent period of safety" (p. 397).

EMDR-PRECI conceptualizes the adverse experience as an extended event, with a continuum of ongoing external stressful events with similar emotions and physical sensations, interfering with memory consolidation (Jarero & Artigas, 2018) and uses an eight-phase and three-pronged protocol.

During Phase 1 (Patient History), the clinician asks the client to give a brief (no more than 10 minutes) description of the adverse experience in a narrative form from right before the event occurred until the present moment. The clinician does not probe for early client history. During Phase 2 (Preparation), this

protocol specifically suggests using the butterfly hug (Artigas & Jarero, 2014) as a reprocessing alternative for the eye movements in the case of patients with a narrow window of tolerance and uses Jarero and Artigas (2014) postdisaster self-soothing strategies. During Phase 3 (Assessment), clinicians do not obtain a narrative history of the event/trauma episode or use bilateral stimulation (BLS) during the narrative. To encompass the whole ongoing traumatic stress spectrum, the clinician asks the client to run a mental movie of the whole adverse experience from right before the beginning until today, or into the future, and then to identify the worst part/memory. Once the client has processed the worst memory, the clinician asks the client to run the mental movie again, looking for other disturbing parts/memories. Each part/memory is assessed, with the client identifying the most disturbing image (or other distressing sensory information), related negative cognition, emotion, ratings of subjective units of disturbance (SUD), and body sensation location, but no positive cognition (PC) or rating of validity of positive cognition (VOC). During Phase 4 (Desensitization), the client focuses on each disturbing part/memory of the adverse experience, while simultaneously engaging in BLS using eye movements as a first choice and the butterfly hug as an alternative BLS method for clients with a narrow window of tolerance. Each part/memory is processed in turn, using the free-associative processing of the standard EMDR desensitization phase. When all disturbing parts/memories have been processed with Phase 4, and the client identifies no further disturbance, Phase 5 (Global Installation) is applied to the entire cumulative trauma exposure memory network of the extended event with a PC developed for the entire adverse experience. Installation of PC does not utilize frequent checking of VOC but full reprocessing doing BLS while information is moving. A supplemental step suggested by Dr. Francine Shapiro (personal communication, 2010) is conducted in this phase to review the whole sequence while thinking of the PC. Phase 6 (Body Scan) uses standard EMDR procedures. Phase 7 uses Jarero and Artigas (2014) postdisaster self-soothing strategies, and Phase 8 uses standard procedures. EMDR-PRECI uses the three-pronged approach (past–present–future) and specifically asks for posttraumatic growth. For more information see Jarero et al. (2011, pp. 82–94).

Previous EMDR-PRECI Studies

After a 7.2-Magnitude Earthquake. In this RCT using a delayed treatment-controlled design, 18 adults were treated within 30 days following a 7.2 earthquake in North Baja California, Mexico, in 2010 by means of a single (80–130 minute) session of EMDR-PRECI (Jarero et al., 2011). Despite frequently occurring aftershocks, both groups (immediate-treatment group and delayed-treatment control group) showed substantial (30 points) reductions of trauma symptoms on the Impact of Events Scale (IES; Horowitz et al., 1979), effects that were maintained at a 12-week follow-up. No participant developed PTSD during this period.

After a Human Massacre. In this delayed treatment control design, a single EMDR-PRECI (Jarero & Uribe, 2011, 2012) individual session (90–120 minutes) was provided within 8 weeks postevent to 32 first responder forensic personnel who were collecting body parts following a massacre of hundreds of people. Results showed significant improvement for both immediate-treatment ($N = 18$) and waitlist/delayed-treatment ($N = 14$) groups on the IES and Short PTSD Rating Interview (SPRINT; Connor & Davidson, 2001; Vaishnavi, Payne, Connor, & Davidson, 2006). Follow-up scores at 3- and 5-months posttreatment showed that the original treatment results were maintained, with a further significant reduction of self-reported symptoms of posttraumatic stress and PTSD between posttreatment and follow-up. During the follow-up period, the employees continued to work with the recovered corpses and were continually exposed to horrific emotional stressors, with ongoing threats to their safety. This study suggests that EMDR-PRECI was an effective early intervention, reducing traumatic stress for a group of traumatized adults continuing to work under extreme stressors in a human massacre situation. It appears that the treatment may have helped to prevent the development of chronic PTSD and to increase psychological and emotional resilience.

After a Factory Explosion (i.e., a Technological Disaster). In this RCT (Jarero, Uribe, Artigas, & Givaudan, 2015), using a delayed treatment-controlled design, the EMDR-PRECI was administered within 34 days of an explosion in an explosives manufacturing factory in Mexico that killed seven employees. Twenty-five survivors who had posttraumatic stress symptoms related to the critical incident received two 60-minute sessions on consecutive days. Initial scores for both groups were in the severe range for trauma symptoms, as measured by the SPRINT, and decreased to low levels after treatment (from 22 to 2). Treatment effects were maintained 106 days after the explosion, and no participant developed PTSD during this period.

Current Study

The purpose of this study was to evaluate the effectiveness of the EMDR-PRECI in reducing PTSD, depression, and anxiety symptoms related to the work of first responders on active duty. Given that first responders are a population at risk of develop PTSD, anxiety, and depression symptoms, the researchers thought that if treatment was successful, the study would provide an important service to the community.

Method

The research protocol was reviewed and approved by the city of Tehuacán Puebla, México; Red Cross and Fire Fighters Research and Ethics Committee; and the EMDR Mexico International Research Ethics Review Board, to ensure that the research quality of this study partially fulfilled the criteria of the Revised Gold Standard scale (Maxfield & Hyer, 2002) items. These included (a) target symptoms were clearly defined, but without diagnosis, (b) measures were reliable and valid, (c) blind independent evaluators collected posttreatment measures at Times 2 and 3, (d) assessor reliability was checked by the third author (MG), (e) treatment was manualized, (f) blind random assignment was conducted, (g) treatment fidelity was evaluated by three supervisors, (h) no conditions were confounded, (i) multimodal measures were not used, and (j) length of treatment was appropriate for civilian participants with single trauma (five or more sessions). Participation was voluntary, and there were no dropouts throughout the study period.

Design

To measure the effect of EMDR-PRECI on the dependent variables PTSD, Anxiety, and Depression, this study used a randomized control study design, comparing treatment and no-treatment control groups. Symptoms of PTSD were measured in three-time periods: Time 1 pretreatment, Time 2 posttreatment, and Time 3 follow-up. Symptoms of anxiety and depression were measured at Time 1 pretreatment and Time 3 follow-up. The Adverse Childhood Experience (ACE) questionnaire was applied once at the beginning of the study.

Procedure

November 24, 2017 to February 24, 2018. Each participant received an individual history-taking and psychoeducational session, prior to completing the Time 1 measures. During this session, three research assistants collected clinical histories from participants; provided psychoeducation about trauma, PTSD, and EMDR therapy; and answered patients' related questions. At the end of the session, another three research assistants who were not blind to the study but blind to the treatment allocation administered the Time 1 inventories.

March 2 to 10, 2018. Treatment was provided. Each participant received two 1-hour sessions provided in one day.

March 12 to 23, 2018. Time 2 posttreatment assessment was conducted 10–12 days after the second treatment session.

June 2 to 16, 2018. Time 3 follow-up assessment was done 90 days after the end of treatment.

Participants

This study was conducted during 2017 and 2018 in the city of Tehuacán Puebla, Mexico. Potential participants were recruited during informational meetings held at the Red Cross and the local fire department to explain the research project. At that time, all participants were receiving life-skills training through open sessions, which they attended voluntarily. Topics such as self-esteem, self-efficacy, and decision making were commonly approached in those sessions. After the meetings were completed, those who showed interest were scheduled for an intake interview in which a qualified research assistant explored whether the potential participant met the inclusion criteria for this study. A total of 92 potential participants attended the informational meetings, and 80 potential participants attended an intake interview.

Inclusion criteria were (a) 18 years old or older, (b) be a first responder on active duty, (c) exhibit scores on the Posttraumatic Stress Disorder Checklist for *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5*) (PCL-5) of 30 or higher, (d) not be receiving specialized trauma therapy, and (e) not be receiving drug therapy for the PTSD symptoms. Exclusion criteria were (a) ongoing self-harm/suicidal or homicidal ideation, (b) diagnosis of psychotic or bipolar disorder, (c) diagnosis of dissociative disorder, (d) organic mental disorder, (e) substance abuse, and (f) significant cognitive impairment (e.g., severe intellectual disability, dementia).

Of the 80 potential participants who attended the intake interview, 20 did not meet the inclusion/exclusion criteria because they had a PCL-5 score below 30. A total of 60 trained paid professional

first responders (41 males and 19 females) on active duty met the inclusion criteria (36 firefighters, 17 paramedics, and 7 emergency nurses). Participants' age ranged from 20 to 56 years ($M = 33.73$ years). Participants' time working as a first responder at the time of the interview varied from 3 months (September, 2017) to 24 years (January, 1993): 9 participants with 1 year experience, 18 with 5 years, 8 with 10 years, 8 with 15 years, 13 with 20 years, and 4 with 24 years.

Randomization Procedures

Participants were randomly selected to a treatment group or no-treatment control group using a computer-generated random-number list. Two independent assessors blind to treatment conditions conducted the randomization process to avoid allocation influence. There were 30 participants in the treatment group and 30 participants in the no-treatment control group. Participants were contacted by phone to inform them if they belonged to the treatment group or the no-treatment control group. Patients in the no-treatment control group were informed that for ethical reasons, they would receive the treatment after the study was concluded.

Assessment

PTSD Checklist for DSM-5. We used the PCL-5 (Weathers et al., 2013) Spanish version provided directly by the National Center for PTSD (NCPTSD) and adapted, with the NCPTSD approval, for the past week instead of the past month symptoms to conduct research with a high-mobility population. It contains 20 items, including three new PTSD symptoms (compared with the PTSD Checklist for *DSM-IV*): blame, negative emotions, and reckless or self-destructive behavior. Respondents indicate how much they have been bothered by each PTSD symptom over the past week (rather than the past month), using a 5-point scale ranging from 0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, and 4 = extremely. Item scores are summed to yield a continuous measure of PTSD symptom severity for symptom clusters and for the whole disorder. According to the NCPTSD, a PCL-5 cut-point of 33 appears to be a reasonable value to propose until further psychometric work is available. It is important to mention that at the first assessment time, before answering the PCL-5, all participants were asked to focus *specifically* on the worst *work-related* event that currently bothered them the most; then at each subsequent assessment time, they were asked to focus on the same event.

Hospital Anxiety and Depression Scale. The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) has been extensively used to evaluate these psychiatric comorbidities in various clinical settings at all levels of healthcare services and with the general population (Ying Lin & Pakpour, 2016). It is a 14-item self-report scale to measure the anxiety (7 items) and depression (7 items) of patients with both somatic and mental problems using a 4-point Likert scale ranging from 0 to 3. The response descriptors of all items are Yes, definitely (score 3); Yes, sometimes (score 2); No, not much (score 1); No, not at all (score 0). A higher score represents higher levels of anxiety and depression: a domain score of 11 or greater indicates anxiety or depression; 8–10 indicates borderline case; 7 or lower indicates no signs of anxiety or depression.

ACE Questionnaire. The ACE questionnaire is a 10-item self-report measure developed for the ACE study (Felitti et al., 1998) to identify childhood experiences of abuse and neglect. The ACE score can range from "0," meaning no exposure to the 10 categories of child abuse and trauma investigated by the study, to "10," meaning exposure to all 10 categories. The study found the higher the ACE score, the greater the risk of experiencing poor physical and mental health, and negative social consequences later in life. It was administered to test the prediction from Shapiro's AIP model, that individuals with higher ACE scores would have higher scores on the PCL-5 and the HADS.

Assessment Times. Treatment and no-treatment control group participants completed the instruments on an individual basis in the different measurement moments. There was a team of three research assistants who collected clinical histories, signed informed consent forms, provided psychoeducation, and answered patients' questions, and a team of three different research assistants who participated in the data collection at Time 1. All were licensed EMDR clinicians trained by MG in instrument administration, general interview techniques, and ethical research behavior. The Time 2 and 3 assessment was conducted by blind independent assessors with a master's degree in clinical psychology who were not part of the study.

Treatment

In this study, intensive EMDR therapy (Bongaerts, Van Minnen, & De Jongh, 2017; Jarero et al., 2015; Lobenstine & Courtney, 2013) was provided due to participants' workload reasons. This intensive format allowed the participants to complete the full course of treatment in a short period. Participants completed two 1-hour sessions provided in one day.

Therapists. EMDR-PRECI was provided by six licensed EMDR clinicians formally trained in the protocol administration, none of them authors of this study. One was an EMDR-approved consultant, and five were certified EMDR therapists in training. Treatment fidelity was evaluated by three supervisors who observed 50% of sessions, randomly assigned. The supervisors were the two EMDR-PRECI codevelopers and one EMDR-PRECI trainer.

EMDR-PRECI Treatment. Each of the treatment group participants received two 1-hour treatment sessions, which were provided in morning and afternoon of the same day. EMDR-PRECI treatment focused only on the trauma memories related to the work as first responders and did not address any other traumatic events. All participants reprocessed more than one traumatic memory. The average of traumatic memories reprocessed was three. No adverse effects were reported during treatment or at 90-day follow-up.

Results

Data Analysis

Analyses of variance (ANOVA) for repeated measurements were carried out with three time points for PCL-5 and two time points for anxiety and depression. The independent variable was the group assignment (treatment $N = 30$; no-treatment $N = 30$) and the dependent variables were symptom scores for PTSD (PCL-5), anxiety (HADS), and depression (HADS). Results of the beta square variables are presented. In addition, Cohen's d was used to measure the size of the significant effects of the study. Spearman's correlations were obtained separately for all participants combined.

The study group consisted of 31.7% females and 68.3% males. The distribution by group was similar for both groups, for treatment group (30.0% females and 70.0% males) and for control group (33.3% females and 66.7% males).

Mean age for the experimental group was 36.53 (standard deviation [*SD*] = 9.7); the group was composed of 76.66% firefighters, 10.00% emergency nurses, and 13.33% paramedics. On the other hand, the mean age for the no-treatment control group was 30.93 (*SD* = 9.7), with 43.33% of firefighters, 13.33% emergency nurses, and 43.33% paramedics.

Here is a list of the types of trauma to which the participants were exposed. (1) Dealing with an HIV patient who become aggressive and punctured the worker, resulting in positive contamination. (2) Being bullied by her male coworkers. (3)Watching the death of a little boy who had been hit by a car. (4) Picking up a dead body for the first time. (5) Witnessing the patient losing the baby while the worker was pregnant herself. (6) Holding a man who, suffering from respiratory failure, died in the worker's arms. (7) Witnessing a couple and their child lose their lives in a car crash accident. (8) Watching people burn to death and smelling the burned flesh. (9) Providing emergency service where a girl was trapped inside her vehicle and feeling like the victim was the worker's daughter. (10) Answering emergency calls of cases of rape, suicide, and homicide and feeling anxious and powerless. (11) Rescuing a presumed felon, who was being attacked by a mob intending to lynch him, and wanting to run away. (12) Attending a car accident and finding out that the dead victim was the worker's friend. (13) Investigating strange noises from a house, and finding a little girl being held against her will and chained in one of the rooms. (14) Being trapped in the middle of a fire while the worker was thinking of his imminent death. (15) Watching his best friend dying in the fire. (16) Watching incinerated bodies of two young kids being buried under the rubble. (17) Attending a gruesome car wreck in which 22 persons died. (18) Trying to save a man inside a water well full of poisonous gases that could have killed the worker. (19) Attending a pediatric service where a 9-month-old baby died from respiratory failure. (20) Trying to grab the head of a small child and being shocked to see that the skull was split in half. (21) Telling the family that their mother was going to die before they could take her out of the house. (22) Watching five children trapped inside the fire and seeing their bodies charred by the flames. (23) Holding a little girl, who died in the worker's arms with a bible in her hands. (24) Finding the decomposing body of a missing 14-year-old boy. (25) Being called to attend his own father, who died in his arms inside the ambulance. (26) Holding a burned child, who died in the worker's arms. (27) Attending a medical urgency and discovering the patient was

the worker's own brother, who suffered a head contusion. (28) Trying to save a 16-year-old girl from a stroke. (29) Seeing a man stabbed to death by his own wife. (30) Providing emergency services to a 14-year-old girl who had been brutally raped and whose leg had to be amputated.

PTSD Symptoms

For the PCL-5, data analysis by repeated measures ANOVA revealed a significant effect for time, $F(2, 116) = 248.30$ $p < .001$, $\eta P2 = .811$, a significant effect for group, $F(1, 58) = 265.53$, $p < .001$, $\eta P2 = .821$, and a significant interaction between time and group, $F(2, 116) = 153.83$, $p < .001$, $\eta P2 = .726$. In the treatment group, mean PCL-5 scores showed a significant decrease between Time 1 and Time 2, $t(29) = 22.91$, $p < .01$, $d = 4.01$ and a significant decrease between Time 1 to Time 3, $t(29) = 23.54$, $p < .01$, $d = 3.99$. In the control group mean scores showed a significant decrease between Time 1 and Time 3, $t(29) = 3.65$, $p < .01$, $d = .56$. Comparison between groups did not show significant differences at pretreatment. Significant differences between the groups were found at Times 2 and 3, $t(58) = -18.38$, $p < .01$, $d = -4.75$ and $t(58) = -18.76$, $p < .01$, $d = -4.91$,1 and Figure 1.

Anxiety Symptoms

For the HADS anxiety scores, repeated measures of ANOVA showed a significant effect for group $F(1, 58) = 10.41$, $p < .05$, $\eta P2 = .152$ and a significant interaction effect between time and group $F(1, 58) = 37.40$, $p < .005$, $\eta P2 = .090$. Significant differences between the pre- and follow-up measurements were found for the treatment group, $t(29) = 2.68$, $p < .01$, $d = .47$. No significant differences were observed in the no-treatment control group. Comparison between groups did not show significant differences between groups for Time 1; by Time 3 significant differences among the groups were found: $t(58) = -5.74$, $p < .01$, $d = -1.48$. See Table 1 and Figure 2.

Depression Symptoms

For the HADS depression scores, the results of the repeated measures ANOVA did not show significant effects for time nor for the interaction between time and group. See Table 1 and Figure 3. However, a visual examination of Figure 3 showed a clear decrease for the treatment group. A t test was conducted comparing Time 1 and Time 3 scores for the treatment group, with statistically significant results, $t(29) = 2.44$, $p < .05$, $d = .41$.

ACE Scale

Scores on the ACE scale for the 60 participants varied from 0 to 9 with an average of $M = 1.75$ and $SD = 2.29$ and with similar means for each group, $M = 1.60$, $SD = 1.99$, for treatment group and $M = 1.90$, $SD = 2.59$, for control group. Analysis of the 60 cases together at pretreatment showed significant correlations between ACE scores and depression scores ($r = .30$, $p < .05$), and between the ACE scores and anxiety scores ($r = .33$, $p < .01$). No correlation was found for the ACE scores and PTSD scores ($r = .170$, $p = .19$).

TABLE 1. Mean Scores and Standard Deviations for Treatment and No-treatment Group on Pretest, Posttest, and Follow-up Measurements

	Time 1		Time 2		Time 3	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Posttraumatic Stress (PCL-5)						
Treatment group	39.20	8.02	3.30	3.98	3.53	3.95
No-treatment group	38.27	6.22	32.70	7.13	35.30	8.59
Anxiety						
Treatment group	4.53	2.88			2.90	1.90
No-treatment group	5.33	4.18			5.93	2.18
Depression						
Treatment group	2.63	2.18			1.60	1.22
No-treatment group	3.03	3.09			3.10	2.07

PCL-5, Posttraumatic Stress Disorder Checklist for *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition.

Discussion

The study group consisted of 60 participants (firefighters, emergency nurses, and paramedics), 31.7% females and 68.3% males. The distribution by group was similar for both groups. Participant's age ranged from 20 to 56 years ($M = 33.73$ years). There were no dropouts. No adverse effects were reported during treatment or at 90-day follow-up. Treatment fidelity was fulfilled by therapists' strict observance to all steps of the scripted protocol while they were assessed by the three supervisors during the treatment.

The treatment group participants received a total of two treatment hours to reprocess their exposure to a specific work-related trauma memory. Results showed a significant decrease in PTSD symptoms measured on the PCL-5, between pre- and postmeasures in comparison with the control group participants, with treatment effect maintained at the 90-day follow-up, with participants directly exposed to potentially traumatic work-related events during this time. There were significant differences in the treatment group between Time 1 and Time 3 measurements on the PCL-5 with a large effect size ($d = 3.99$).

It is interesting to note that there was also a significant difference for the control group's Time 1–Time 3 comparison, but with a much smaller effect size ($d = .56$) than that found in the treatment group ($d = 3.99$). See Figure 1. It is unclear why members of the control group showed a decrease in posttraumatic stress. Some possibilities include the effect of therapist attention, or the effects of the previous life-skills training. Further research is needed to clarify this phenomenon. The results of this study suggest that the EMDR-PRECI could be an efficient and effective way to address first responders' work-related PTSD, anxiety, and depression symptoms.

The random distribution was maintained with a third of women participating in each group; therefore, differences found in the treatment effects for both groups cannot be attributed to the gender variable.

With regard to anxiety and depression symptoms, it is interesting to note that the mean pretreatment HADS scores in both groups indicated no signs of anxiety or depression. An explanation of this phenomenon could be found in Alman et al. (2017), who concluded that cumulative exposure to work-related traumatic events in first responders is specifically associated with PTSD, but not with depression. Even so, the results of this study indicated that the treatment significantly decreased both anxiety and depression symptoms. Future replication of these effects are recommended. Measuring the variables of anxiety and depression with more than one instrument and/or using multimodal measures could also help to confirm whether there are changes associated with the treatment.

The Adaptive Information Processing Model and the ACE Scale

The ACE score was low in both groups ($M = 1.75$, $SD = 2.29$), indicating that most participants reported few ACEs. The significant correlation between ACE scores and the depression and anxiety scores is in accordance with Felitti et al. (1998), who found that a higher ACE score was a risk factor for mental health problems, and with Shapiro's (2001) AIP theory. However, the correlation between the ACE scores and the PCL-5 was not significant, indicating no relationship between PTSD symptoms and number of ACE events in our sample. Our findings suggest that our participants' PTSD symptoms were primarily related

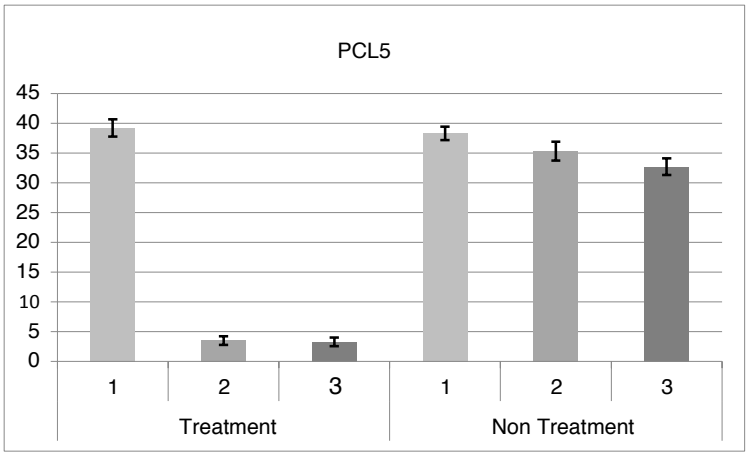

FIGURE 1. Mean scores and standard error for PCL-5 by time and group. PCL-5, Posttraumatic Stress Disorder Checklist for *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition.

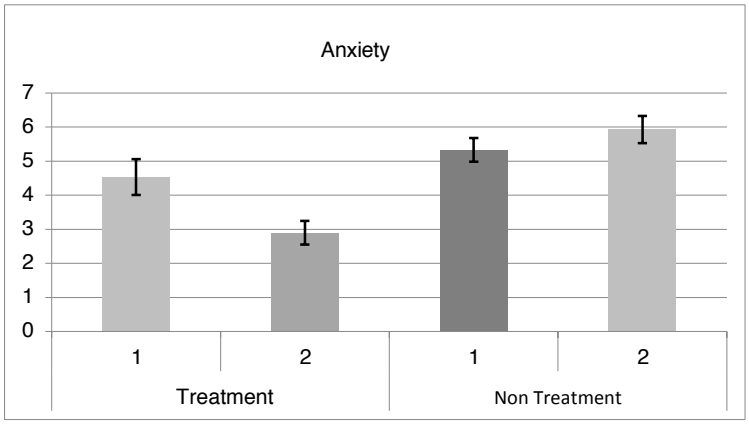

FIGURE 2. Mean scores and standard error for anxiety by time and group.

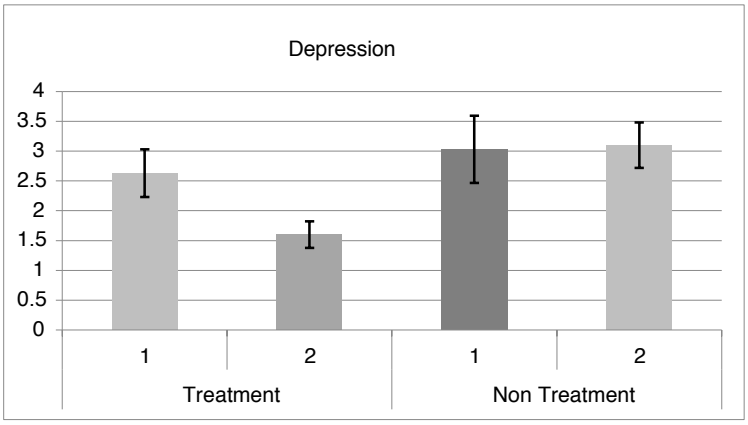

FIGURE 3. Mean scores and standard error for depression by time and group.

to their experiences as first responders, and that their childhood experiences may not have created the same risk for PTSD symptoms as they did for depression and anxiety symptoms. Our results are partially supportive of Shapiro's AIP model, which predicts that unprocessed past events are related to current symptoms. Further examination of these results is beyond the scope of this study, and future research is recommended.

Importance of Interventions for First Responders

Adler-Tapia (2018) asserted that every day, first responders experience acute stress and trauma through direct and/or indirect exposure. She argued that cumulative traumatic stress exposure is undeniable, leading to ongoing distress and subthreshold PTSD (S-PTSD) symptoms, which lead in turn to PTSD and delayed-onset PTSD. Similarly, Gilman (2018) stated that S-PTSD (e.g., flashbacks and hypervigilance) can last for years, diminishing the quality of life and decreasing the first responders' ability to access their training and skill sets in everyday work situations (Gilman, 2018).

The community relies on the first responders' services. PTSD can create a substantial burden of physical (e.g., musculoskeletal pain, cardiorespiratory symptoms, gastrointestinal health, generalized physical complaints) and mental health problems (Pacella, Hruska, & Delahanty, 2013) impeding their ability to respond. It is essential that PTSD be ameliorated to ensure that emergency service personnel can continue to fulfill their important role in society. It is possible that treatment with the EMDR-PRECI could ameliorate this burden.

Limitations

Prior to the commencement of this study, participants engaged in a coping skill development program. Involvement in that program may be the cause of the significant improvement of anxiety in the no-treatment control participants. It is not known to what extent the effects in the EMDR-PRECI condition can be attributed to that program.

Another limitation is the use of a no-treatment control, rather than an active treatment condition. This condition controlled for the passage of time, and clinical attention during assessment periods. However, it did not control for nonspecific treatment effects. Therefore, it cannot be determined if the positive outcome in the EMDR-PRECI group was due to the unique effects of that treatment, or to nonspecific effects such as therapist alliance, exposure to the memory, and expectation of improvement.

Finally, there is some uncertainty regarding the decreased depressive symptoms in the EMDR-PRECI participants. This effect was not apparent in the ANOVA, but was significant in the post hoc analysis.

Future Research

Future research is recommended to replicate these results and to further investigate this intervention. A randomized clinical trial is recommended, comparing EMDR-PRECI to another efficacious trauma-focused intervention. It is also recommended that an RCT be conducted using participants with diagnosed PTSD and/or major depressive disorder. We also suggest that the studies measure changes in physical health symptoms to see if these are reduced as a result of treatment. Finally, long-term studies should determine if treatment reduces rates of disability and early retirement for PTSD-related reasons among first responders.

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