

## EARLY EMDR INTERVENTION FOLLOWING INTENSE ROCKET ATTACKS ON A TOWN: A RANDOMISED CLINICAL TRIAL

Elan Shapiro, Brurit Laub, Ornit Rosenblat

### Abstract

**Objective:** The aim of the study is to investigate the efficacy of EMDR R-TEP interventions with residents suffering from post-traumatic symptoms.

**Method:** The study employed a waitlist/delayed treatment control group design and participants were randomly allocated to either immediate or waitlist/delayed treatment conditions. The measures used included the PCL-5 post-trauma checklist for DSM-5; the PHQ-9 depression scale; the Subjective Unit of Disturbance (SUD) scale and the Brief Resilience Coping Scale (BRCS). The clinical staff of the Resilience Center (HOSEN) offered EMDR therapy treatment using the Recent Traumatic Episode Protocol (R-TEP) for 25 trauma-stricken residents referred to their center. The study began within three months after the 2014 round of hostilities. Three 90 minute sessions were given first to the intervention group and a month later to the delayed treatment control group. The follow-up measures were taken six months later.

**Results:** The immediate treatment group had significantly improved scores on post-trauma and depression measures compared to the waitlist/delayed treatment group, who showed no improvement prior to their treatment. There were significant interactions between group and time for PCL-5, PHQ-9 and SUD. Post hoc testing of the interaction revealed that within group A, participants exhibited a significant decrease in PCL-5, PHQ-9 and SUD scores (one-tailed  $p$ :  $<0.001$ ,  $0.006$ ,  $0.03$ ). The results in resilience scores over time showed an increasing trend in group A that failed to reach significance. Repeated measures analysis of group B revealed a borderline statistically significant difference in resilience scores over time.

**Conclusions:** This study provides further evidence, supporting the efficacy of Early EMDR Intervention for reducing post-traumatic stress and depression symptoms among civilian victims of hostility. The evidence for resilience was indecisive and requires further research.

**Key words:** EMDR, early EMDR intervention, recent traumatic episode protocol (R-TEP), man-made disaster mental health, PTSD, post-traumatic stress, post-traumatic depression, resilience

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**Declaration of interest:** none

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### Introduction

For over fourteen years, the town of Sderot in the south of Israel and its surrounding areas have been facing sporadic, and at times massive, rocket attacks. This situation has exposed a large number of children and adults to repeated and unpredictable stressors, with many who suffer from post-traumatic stress syndromes. At times of escalation of belligerence there is a significant increase of referral to the city's Resilience Center (HOSEN).

Operation "Protective Edge" began on 8.7.14 and ended on 26.8.14. During this operation, there were over 4,000 rockets fired on the area from Gaza. Sderot's population was under severe security threat for about sixty days. Alarms were heard frequently, resulting in an inability to maintain routine and ongoing fear and anxiety. This situation was in addition to more than a decade of constant threat.

### *Early psychological interventions following traumatic events*

Providing evidence for the effectiveness of Early Psychological Intervention is challenging since conducting quality research in emergency situations has inherent difficulties. "The sense of urgency to help after major events such as disasters makes research very difficult to carry out in these circumstances and is often perceived as showing intellectual indifference rather than a desire to assist" (Yehuda et al. 2015 p. 11).

The authoritative Cochrane reviews of multiple session controlled studies, for early psychological interventions following traumatic events, defined early psychological intervention as commencing within three months after the traumatic event, with the goal being prevention or treatment of post-traumatic stress disorder (PTSD), or ongoing distress, acute stress disorder, or other trauma-related disorders (Bisson & Andrew 2007;

Roberts et al. 2008, 2009, 2010).

The World Health Organization, in line with DSM-5, defines it as interventions within one month of the trauma event (WHO 2013). An updated Cochrane review is in preparation, which is expected to be published in 2018. The new DSM-5 criteria that no longer have the three-month Acute Posttraumatic Stress Disorder (PTSD) diagnosis and only consider the first month of Acute Stress Disorder raise questions about the arbitrary nature of the timing for early intervention. In response to queries about this situation Dr. Roberts suggests that *“there is reasonable consensus in the traumatic stress field that a 3-month window is sensible as a timeframe for defining an intervention seeking to prevent disorder or ameliorate early reactions/ symptoms as ‘early intervention’.* Although as we have discussed with many life changing traumas this window is less meaningful” (personal communication 2017).

The last Cochrane review released in 2010, which contained publications dated up to July 2008, is now over nine years old. Fifteen studies were identified then, including randomized controlled trials of any psychological intervention or treatment designed to reduce acute traumatic stress symptoms, with the exception of single-session interventions. The authors concluded that many issues and dilemmas remain and despite extensive research preventing PTSD remains a major health challenge. *“Further well-designed randomised controlled trials of TF-CBT and other psychological treatments, including eye movement desensitization and reprocessing, within the first three months of traumatic events are required”* (Roberts et al. Cochrane Review 2010, p. 32). EMDR was not included in these Cochrane Reviews, as there had not been any EEI randomized controlled trials (RCTs) published yet at that time that met their criteria. A number of Early EMDR Intervention studies, including several RCTs have subsequently been published.

EMDR intervention has several advantages: It is brief, does not require homework, and can be applied on successive days. According to the Adaptive Information Processing (AIP) model (Shapiro 1995, 2001) it is suggested that early EMDR intervention (EEI) may prevent the development of pathology by reducing the accumulation of dysfunctionally stored trauma memories and enhancing linking to adaptive memory networks, facilitating the integration of the traumatic experiences and strengthening resilience. Other authors similarly concur about the impact of accumulative stressors suggesting that the development of PTSD can be significantly influenced by factors occurring after the acute response, increasing the rates of PTSD over time (Bryant 2011; Shalev 2002; McFarlane 2010a, 2010b, 2011). There are many good reasons to consider intervening early: to reduce or prevent distress; suffering; debilitating psychological disorders; extensive risk of physical illness and long-term cost to society. More modest benefits can also be found by avoiding the development of secondary complications from sub-clinical symptoms that impact the quality of life such as sleep dysregulation, concentration difficulties, somatic complaints, impaired functioning and relationships.

### *Early EMDR Intervention*

EMDR therapy is an evidence-based treatment for PTSD. More than twenty randomized controlled studies have been conducted on the efficacy of EMDR for the treatment of trauma. Many national and international mental health organizations have endorsed EMDR

therapy as one of the treatments of choice for PTSD, including the World Health Organization (2013), NICE Guidelines (2005) and American Psychiatric Association (2004).

There are several EEI protocols reported in the literature (see Luber 2013 and the EMDR Research Foundation 2014). Francine Shapiro (1995, 2001) proposed the first recent traumatic event protocol as an application of the standard EMDR protocol, regarding the traumatic event as a fragmented experience that has not yet consolidated, therefore requiring a multi-target adapted EMDR protocol. Shapiro later also reintroduced her original Eye Movement Desensitization (EMD) protocol for use in emergency situations (Shapiro 2004). A modification of Shapiro’s Recent Event protocol known as the EMDR protocol for recent critical incidents (PRECI), was later introduced by Jarero et al. (2011).

### *The EMDR Recent Traumatic Episode Protocol (R-TEP)*

The EMDR R-TEP, first published in 2008 (Shapiro & Laub 2008, 2014), is a structured, comprehensive, and integrative recent trauma-focused protocol for Early EMDR Intervention (EEI). It includes an adaptation of the EMD and Recent Event protocols, together with other specific procedures and additional measures for containment and safety. Acute interventions generally involve normal people who have been exposed to abnormal situations. The EMDR R-TEP therefore has guidelines proposing an initial therapy contract that applies current trauma focused intervention strategies. It offers a mental health screening check, not only for the purpose of treating traumatic distress but also for preventing post-trauma complications and the accumulation of trauma memories. EMDR R-TEP is a brief intervention, offering rapid treatment effects, usually within two to four sessions. A minimum of two sessions is required because follow-up is considered essential for good practice. The intervention can be on consecutive days because no homework is required, an advantage for high distress and for field teams. The EMDR R-TEP protocol introduced an emphasis focusing on the trauma *episode* rather than on only the initial trauma *event*. The original critical incident, together with its traumatic aftermath, is viewed as an ongoing *traumatic episode* continuum because the experiences are not yet consolidated, integrated or adaptively processed. The episode comprises various traumatic events or experiences from the original onset incident until the present day with multiple potential targets of disturbance. These target fragments are referred to as points of disturbance (PoDs). The EMDR R-TEP protocol is guided by a theoretical conceptualization of the nature of the memory consolidation process of the adaptive information processing (AIP) system after recent trauma (Shapiro 1995, 2001; Laub & Weiner 2011; Shapiro & Laub 2008, 2009, 2014; Tofani & Wheeler 2011; Laub et al. 2017). The successful adaptive resolution of the current trauma episode may also promote adaptive links backward to past traumatic memory networks and forward to future expectations, as well as strengthening self-affirmation, coping and resilience.

A recent publication by Jarero and Artigas (2018) has proposed expanding the clinical and research horizons of the early EMDR interventions contending that *“The arbitrary first three months early intervention frame (which is not based on empirical research) could*

now be extended to include ongoing traumatic stress situations with no post-trauma safety period for memory consolidation. Therefore, in our understanding, EMDR early intervention could be conceptualized, for clinical practice purposes, as those interventions provided within a continuum of care context (stepped progression of mental health care provided in an increasingly intensified manner) during the first 3 months after the adverse experience, or later in case of ongoing traumatic stress situations with no post-trauma safety period for memory consolidation” (p. 5).

### Studies evaluating EMDR early interventions

Trauma therapy in post disaster contexts still has many unanswered questions such as who to treat, when and if to intervene. Despite the various difficulties in conducting research in these circumstances, there is a growing body of evidence for the effective use of EMDR to treat PTSD following natural and man-made disasters and critical incidents (Grainger et al. 1997; Silver et al. 2005; Colelli & Patterson 2008; Shapiro & Laub 2008, 2009, 2013, 2015; Gelbach 2008; Maxfield 2008; Jarero & Uribe 2011; Shapiro 2012; Tarquinio et al. 2012; Brennstuhl et al. 2013; Jarero et al. 2011, Jarero & Uribe 2011, Jarero et al. 2013a, 2013b, 2015a, 2015b, 2016; Natha & Daiches 2014; Buydens et al. 2014; Acaturk et al. 2015, 2016; Saltinia et al. 2017; Castelli Gattinara et al. 2017).

A review of EMDR interventions following natural disasters identified 8 studies with evidence for the effectiveness and efficacy of EMDR for treating anxiety, depression, and other psychological distress (Natha & Daiches 2014). Despite limitations in methodology and research design, characteristic of such situations, which prevent implementing some of the standards of the Revised Gold Standard research criteria (such as blind evaluators, using measures other than self-report measures, and obtaining data relating to previous mental health problems and psychotherapy (Maxfield & Hyer 2002), they concluded that all the studies reviewed demonstrated statistical and clinical significance in reducing psychological distress in survivors of natural disasters. The timing of interventions varied from two weeks to three and a half years although most were unknown, so these studies were not necessarily early interventions. However, one of the studies was a single session, delayed treatment control, early intervention study that used the EMDR PRECI protocol with eighteen adults following an earthquake in Mexico, obtaining significant reductions in IES scores (Jarero et al. 2011). There are a few controlled studies on the effectiveness of early EMDR intervention protocols to treat acute post-trauma symptoms in man-made disasters. Jarero et al. (2011) and Jarero & Uribe (2011, 2012) conducted a single session controlled study using the EMDR-PRECI protocol with Mexican forensic personnel who were working with bodies recovered from mass graves. Results showed significant improvement for the immediate treatment group and the waitlist/delayed treatment group using PTSD rating measures. Shapiro & Laub (2015) reported a waitlist delayed treatment randomized controlled study with survivors of a fatal rocket attack. Employing the EMDR R-TEP protocol they showed a significant reduction in post-traumatic symptoms. Other studies include Acaturk et al. (2016), who conducted a parallel group randomized controlled trial in a refugee camp with 59 Syrian refugees with PTSD symptoms, obtaining significant relative reductions in PTSD and depression measures, after an

average of four EMDR R-TEP sessions. Saltinia et al. (2017) used a control group analogue in their study in which they treated an impressive 529 victims using EMDR R-TEP within three months of the northern Italian earthquake in 2012. Along with reducing PTSD symptoms, it proved useful for individuals experiencing psychological distress only and for those who could not be classified as having either PTSD or subthreshold PTSD (Fernandez 2013).

A pioneering application of the R-TEP protocol for very early intervention has been reported in a comparative controlled study at the University Hospital of Bordeaux, France. Intervening in the Emergency Room (ER) within twelve hours of an accident or injury was found to significantly reduce PTSD and Post Concussion-Like Syndrome (PCLS) at three months (Guillaume et al. submitted for publication 2017). A larger multi-center study is currently in progress in France. A study in the Israeli military compared the effectiveness of intensive EMDR therapy, using the R-TEP, delivered on five consecutive days, with standard EMDR therapy, delivered in weekly sessions, for war veterans with PTSD. Results showed comparable treatment gains overall for both therapies, but faster improvement for the intensive therapy (Chaikin & Ören submitted 2017). Other studies employing EMDR R-TEP in process include: with rape victims in Denmark, with accident victims in Hungary and with refugees and terror victims in Turkey.

It is also noted that there have been a number of promising studies that have been conducted with group EMDR early interventions, using the Integrative Group Treatment Protocol (IGTP) (Jarero & Artigas 2010, 2012; Jarero et al. 2013, 2015b, 2016, 2017; Allon 2015) and the more recent EMDR Group Traumatic Episode Protocol (G-TEP) (Lehnung et al. 2017, Yurtsever et al. submitted 2017, Roberts submitted 2017).

### Aims and Hypotheses

The aim of this study was to investigate the efficacy of EMDR R-TEP interventions with residents suffering from post-traumatic symptoms.

It was hypothesized:

- 1- there would be significant reduction in the post-traumatic and depression measures between the treated intervention group A and the waitlist control group B (at time 2 [T2] as compared with their baseline measures at time 1 [T1]), using the Post-traumatic Checklist PCL-5 and the PHQ-9 depression inventory psychometric scales.
- 2- that there would be significant reductions in the post-traumatic and depression measures at post-intervention (times 2 [T2] and 3 [T3]) and follow-up times (time 4 [T4]) compared to the pre-intervention baseline measures (time 1 [T1]).
- 3- that focusing only on the recent trauma episode would increase resilience (adapting well in the face of adversity or trauma) as measured by the Brief Resilience Coping Scale (BRCS).

### Method

#### Study population

The study began in the autumn of 2014. The interventions were carried out by clinical staff of HOSEN who were trained in EMDR and in the specialized R-TEP protocol by the originators, who also gave further supervision. The sample comprised twenty-



five residents of the town, exposed to the intensive rocket attacks, who asked for psychological treatment after the two-month long flare-up of hostilities.

### Design

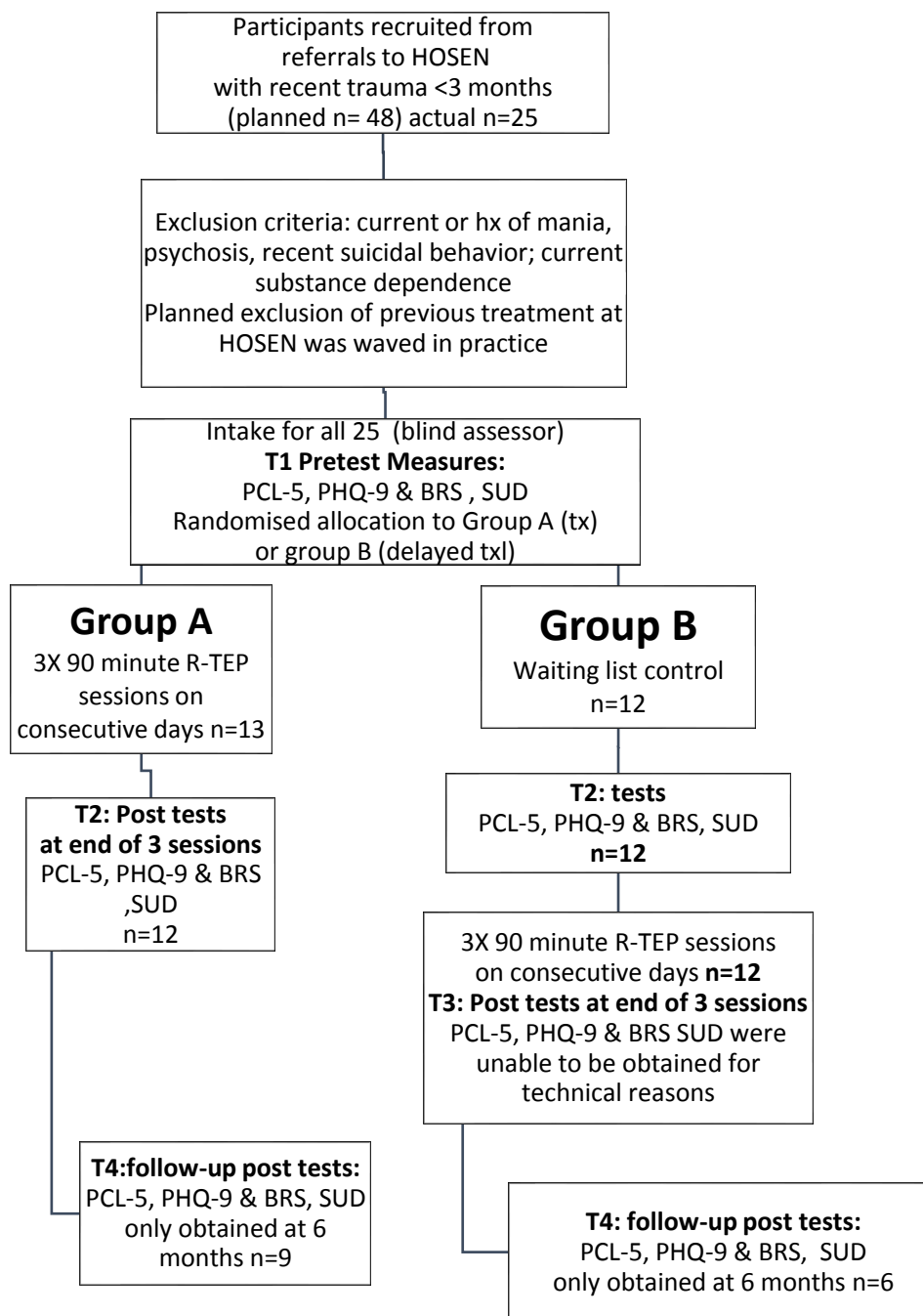
The study employed a waitlist/delayed treatment control group design (see **figure 1**)

### Measures

The measures used included the PCL-5 measure of Post-traumatic symptoms derived from the *Diagnostic*

*and Statistical Manual of Mental Disorders*, Fifth Edition (American Psychiatric Association 2013). It is a twenty-item self-report measure that assesses the twenty *DSM-5* symptoms of Post-Traumatic Stress Disorder (PTSD). The PCL-5 has a number of uses including: monitoring symptom change before and after treatment, screening for PTSD, making a provisional PTSD diagnosis (U.S Department of Veteran Affairs, National Center for PTSD). Responses are rated from 0 (not at all) to 4 (extremely) with a maximum of 80. There are now 4 clusters of symptoms: the three previous - hyperarousal, intrusion, avoidance and the new negative change in cognitions or mood cluster. "A provisional PTSD diagnosis can be made by treating each item rated as 2

**Figure 1.** Delayed Treatment Control Study Design



PCL-5 = PTSD Check list; PHQ-9 = Brief Depression Scale; BRCS= Brief Resilience Coping Scale; SUD=Subjective Unit of Disturbance

= “Moderately” or higher as a symptom endorsed, then following the DSM-5 diagnostic rule which requires at least: 1 B item (questions 1-5), 1 C item (questions 6-7), 2 D items (questions 8-14), 2 E items (questions 15-20). Preliminary validation work is sufficient to make initial cut-point score suggestions, but this information may be subject to change. A PCL-5 cut-point score of 33 appears to be a reasonable value to propose until further psychometric work is available”. (U.S Department of Veteran Affairs, National Center for PTSD). The PHQ-9 is a brief self-report depression scale that scores each of the nine DSM-IV criteria as 0 (not at all) up to 3 (nearly every day), with a maximum score of 27. It has been validated for use in primary care settings.

The PHQ-9 brief depression scale is a reliable and valid measure of depression severity (Kroenke et al. 2001). It also facilitates criteria-based diagnoses of depressive disorders. Scores of 5, 10, 15, and 20 indicate mild, moderate, moderately severe, and severe depression, respectively.

The Subjective Unit of Disturbance (SUD) scale (F. Shapiro 1995) measures the subjectively felt distress from 0 (not at all) to 10 (the highest the person knows). It is used in the assessment (phase 3) and in the Desensitization (phase 4) of EMDR therapy to indicate the changes in the felt emotional disturbance during the processing.

As this town has over a decade long history of sporadic rocket attacks, with intermittent more intense flare-ups, it was decided to also collect data on resilience. There is as yet no “gold standard” for Resilience scales (Windle et al. 2011). It was therefore decided to use the briefest resilience scale we could find for rapid administration, the Brief Resilience Coping Scale (BRCS), (Sinclair & Wallston 2004). The possible score range on the BRCS is from 4 (low resilience) to 20 (high resilience). According to the authors of the BRCS, scores can be interpreted as follows: BRCS score 4-13 = Low resilient copers; 14-16 = Medium resilient copers; 17-20 = High resilient copers.

### Exclusion criteria

Current or history of mania, psychosis, recent suicidal behavior; current substance dependence. The planned exclusion of previous treatment at HOSEN was waived in practice to obtain a larger sample.

### Statistical methods

Independent sample t-tests or chi-square tests in the case of categorical data were performed to test for statistically significant demographic and baseline psychological measures in the two groups. Repeated measures ANOVA were performed to test differences in the clinical measures between the two groups at time two (in which group A was treated and B was not treated, i.e., was the treatment group A received effective). In order to assess group by time interactions paired t-tests or McNemar’s test for categorical data were performed for each group. Since we were only interested in a reduction of severity, one tailed tests were used. Similarly, repeated measures ANOVA were performed after time four. In addition, a repeated measures ANOVA was performed for each treatment group to give insight into treatment timing.

### Procedure

After gaining informed consent to participate in the study, participants were divided randomly with names picked from a drum to construct the composition of the two groups with each person receiving a code number to conceal identities. There were thirteen participants in the first treatment group and twelve in the waitlist/delayed treatment group. The study began within two to three months of the 2014 round of hostilities with the first baseline measures (T1) taken from both groups. After completion of three 90 minute sessions each, for all members of the intervention group, measures were taken again for both groups (T2). The control group was then similarly treated with three 90 minute sessions each, but unfortunately for technical reasons no valid post treatment measures were able to be obtained for this group (T3). The follow-up measures were taken six months later (T4). It is noted that there were difficulties in obtaining access to the participants for follow-up that resulted in incomplete data from three subjects in the intervention group and six in the control group.

**Table 1** presents the baseline data (T1) within each group. The study comprised twenty-five participants, thirteen in group A and twelve in group B. There were no statistically significant demographic or clinical differences in the two groups at baseline. The mean PCL-5 and PHQ-9 scores for both groups were clinically

**Table 1.** Baseline data at inclusion T1. Data are mean (SD; range) or N (%)

	Group A (N=13)	Group B (N=12)	t/ $\chi^2$	P
<b>Demographic</b>				
Age	41.7 (12.6; 20-65)	36.2 (9.5; 21-55)	1.21	0.24
Gender			0.29	>0.99
Female	11 (84.6)	11 (91.7)		
Male	2 (15.4)	1 (8.3)		
Marital status			1.10	0.58
Married	11 (84.6)	8 (66.7)		
Single	1 (7.7)	2 (16.7)		
Divorced	1 (7.7)	2 (16.7)		
No. of children	3.7 (1.8; 1-6)	2.6 (0.9; 1-4)	1.45	0.18
<b>Clinical measures</b>				
PCL-5	46.4 (16.9; 5-69)	38.8 (15.5; 12-65)	1.18	0.25
PHQ-9	12.5 (6.8; 0-24)	11.2 (5.3; 5-20)	0.52	0.60
Resilience	15.0 (2.6; 12-19)	14.3 (3.2; 8-19)	0.57	0.57
SUD	7.0 (2.3; 2-10)	6.7 (3.0; 1-10)	0.27	0.79

significant (above 33 and above 10 respectively) and was corroborated with the SUD scores (above 6). One female patient from group A dropped out of the study (age 41).

Results

Table 2 presents the change in test scores from T1 to T 2 within each group and table 3 presents repeated measures analysis for this time period.

There were significant interactions between group and time for PCL-5, PHQ-9 and SUD and a significant

the treatment group A in table 4, therefore show large effect sizes for PCL-5, PHQ-9 and SUD and medium effect sizes for resilience.

Table 4 presents the clinical scores of the treatment group over time. Of the thirteen participants who began treatment in group A, twelve were examined at T2 (92.3%) and ten (76.9%) at T4 (Median time 6.5 months; range 5.7-7.2). The dropouts were all female. Except for PHQ-9, at T1, the baseline clinical measures of the participants who dropped out were not statistically significantly different from the baseline measurements of those who were examined at T4. It is noted that the dropouts had lower PHQ-9 score (5.3±4.7) than those

Table 2. Pre-post scores of participants who were retested at T 2. Data are mean (SD) or N (%)

	Group A					Group B				
	T1	T2	difference	t <sup>1</sup>	p*	T1	T2	difference	t <sup>1</sup>	p
PCL-5	49.8 (11.9)	29.8 (18.9)	20.0 (16.9)	4.11	.002	38.8 (15.5)	42.7 (14.4)	-3.9 (6.9)	-1.97	.08
PHQ-9	13.5 (6.0)	9.2 (6.8)	4.2 (5.0)	2.95	.01	11.2 (5.3)	13.6 (6.8)	-2.4 (4.7)	-1.79	.10
SUD	7.2 (2.4)	4.8 (3.8)	2.4 (4.0)	2.11	.06	6.7 (3.0)	7.0 (2.7)	-0.3 (2.4)	-0.41	.66
Resilience	14.8 (2.5)	15.2 (3.1)	-0.5 (3.6)	-0.49	.64	14.3 (3.2)	13.2 (4.2)	1.2 (4.8)	0.85	.41
<b>Subscale</b>										
1	3.8 (1.3)	3.8 (1.5)	0.1 (1.8)	0.16	.87	3.8 (1.0)	3.5 (1.4)	0.2 (1.1)	0.82	.43
2	3.3 (1.6)	4.0 (0.9)	-0.7 (1.7)	-1.34	.21	3.2 (1.2)	3.0 (1.0)	0.2 (1.5)	0.58	.57
3	3.4 (1.0)	3.7 (1.2)	-0.2 (1.4)	-0.61	.56	3.3 (1.4)	3.3 (1.6)	0.0 (2.0)	0.00	>.99
4	4.2 (0.9)	3.8 (1.3)	0.3 (1.0)	1.18	.27	4.0 (1.2)	3.3 (1.2)	0.7 (1.7)	1.34	.21
	N (%)	N (%)		χ <sup>2</sup>	p	N (%)	N (%)		χ <sup>2</sup>	p
Intrusion	12 (100.0)	10 (83.3)		0.50	.48	11 (91.7)	11 (91.7)		0.00	>.99
Avoidance	12 (100.0)	9 (75.0)		1.33	.25	8 (66.7)	10 (83.3)		4.80	.50
Cog/Emot	11 (91.7)	7 (58.3)		1.53	.12	9 (75.0)	10 (83.3)		0.80	>.99
Arousal	12 (100.0)	9 (75.0)		1.33	.25	11 (91.7)	11 (91.7)		0.00	>.99

\* 2 tailed p <sup>1</sup>paired t-test

Table 3. Repeated measures analysis of participants who were retested at T2

	Group F(1,22)	Partial eta squared	Time F(1,22)	Partial eta	Group*Time F(1,22)	Partial eta squared
PCL-5	0.02	0.00	9.35**	0.30	20.67***	0.48
PHQ-9	0.18	0.01	0.86	0.04	11.39**	0.31
SUD	0.76	0.03	2.60	0.11	4.22*	0.16
Resilience	1.39	0.06	1.33	0.01	0.94	0.04
<b>Subscale</b>						
1	0.14	0.01	0.31	0.01	0.08	0.00
2	2.12	0.09	0.40	0.02	1.95	0.08
3	0.29	0.01	0.12	0.01	0.12	0.01
4	0.81	0.04	3.05	0.12	0.35	0.02

\*p<.05 \*\*p<.01 \*\*\*p<.001

time effect for PCL-5 scale. Overall participants PCL-5 score significantly decreased from T1 to T2. Post hoc testing of the interaction revealed that within group A, participants exhibited a significant decrease in PCL-5, PHQ-10 and SUD scores (one-tailed p: <.001, .006, .03). On the other hand, participants in group B exhibited no significant decrease in these scores (p>.10). Note that there were no significant main effects or interactions for the resilience measure.

Partial etas in tables 3-6 are a measure of effect size. These are the (somewhat) acceptable guidelines: 0.01 (small), 0.10 (medium) and 0.25 (large). Repeated measures analysis of participants who were retested at T 2 in table 3 and the clinical scores over time for

followed up (14.6±2.7; p<.03) suggesting a possible connection to lower levels of depression. With a proposed cut point of 33 for PCL-5 scores indicative of PTSD, the intervention group reduced from 85% with PTSD at pre-test to 33% at follow-up 6 months later.

Repeated measures analysis revealed a significant difference in PCL-5 scores over time (F(2,16)=14.47; p<.001) with scores at T2 and T4 significantly lower than those at T1 (Bonferroni post hoc p<.02, p<.003, respectively). There was no significant difference in PCL-5 scores between T2 and T4 (Bonferroni post hoc p>.90). In addition there was a significant difference in PHQ-9 scores over time (F(2,18)=11.42; p<.001) with scores at T2 and T4 statistically significantly lower than those at T1 (Bonferroni post hoc: p<.05, p<.003).

**Table 4.** Treatment group A clinical scores over time (N=10)

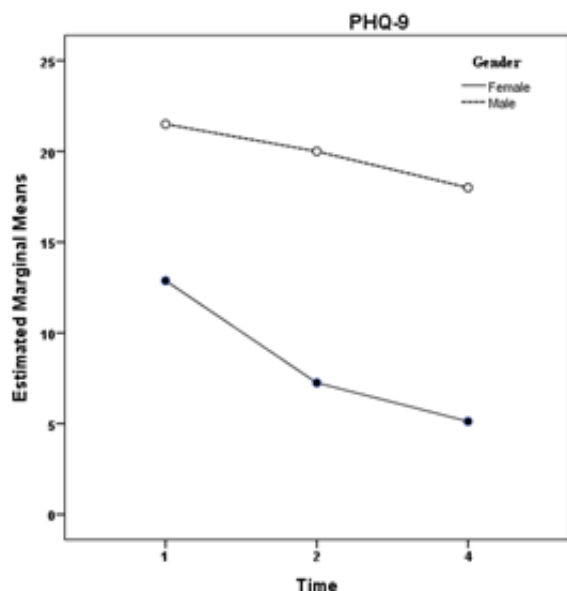
	T1	T2	T4	Repeated measures F	P	Partial eta squared
PCL-5 *	50.5±12.4	28.6±21.9	23.1±14.9	F(2,16)=14.47	.001	0.64
PHQ-9	14.6±5.9	9.8±7.3	7.7±7.4	F(2,18)=11.42	.001	0.56
SUD-1	7.2±2.4	4.2±3.8	4.7±3.8	F(2,18)=3.11	.07	0.26
Resilience	14.6±2.7	15.5±3.8	15.8±2.6	F(2,18)=0.70	.51	0.07
1	3.6±1.3	3.9±1.6	4.0±0.8	F(2,18)=0.31	.74	0.03
2	3.3±1.8	4.2±0.8	3.6±1.1	F(2,18)=1.79	.20	0.16
3	3.4±1.1	3.6±1.3	4.0±1.2	F(2,18)=1.25	.31	0.12
4	4.3±1.0	3.8±1.4	4.2±0.8	F(2,18)=0.90	.42	0.09

\* N=9

There was an observed trend for lower SUD scores that however failed to reach significance. The resilience scores for this group, although tending to increase over time, the difference was not significant.

Participants age and follow-up time were not correlated with the clinical scores. However, there were gender differences in PHQ with males having significantly higher scores than females at every time point (see figure 2). As there were only two males, one

**Figure 2.** PHQ-9 scores by gender over time



can be confident in drawing conclusions only from the female population. Repetition of the repeated analysis of PHQ-9 for only females revealed a significant difference (F(2,6)=9.60; p<.01) with scores at T1 significantly higher than those at T2 and T4 (Bonferroni post hoc, p<.03, p<.008).

*Treatment group B follow-up*

Of the twelve participants who began treatment B, all twelve were examined at T2 (100%) but only six (50%) at T4 (Median follow up time 5.6 months; range 4.3-6.4). Five of the six dropouts were female. Except for PHQ-9, at T1, the dropouts did not have statistically significantly different clinical scores from those examined at T4. However, the dropouts had significantly higher PHQ-9 score (14.8±5.1) than those followed (7.5±2.1; p<.02). The PHQ-9 score-dropouts had significantly lower scores for group A and higher for group B creating difference in baseline among all successfully followed. As the data were obtained at six-months follow-up from only six members of group B, it needs to be interpreted with caution.

Repeated measures analysis of group B revealed a borderline statistically significant difference in Resilience scores over time (F(2,10)=3.75; p<.06) with scores at T4 significantly higher than those at T2 (Bonferroni post hoc p<.03). This was also evident in sub score 2 of the resilience scale (Regardless of what happens to me, I believe I can control my reaction to it), (F(2,8)=4.85, p<0.04) with scores at T4 significantly higher than those at T2 (Bonferroni post hoc p<0.03).

There was no statistically significant change in the other measures over time. However, these results should also be treated with caution because of the incomplete post-test measures with this group.

Comparison of the two groups over time: there was a statistically significant difference in follow up time between groups A and B (6.5 vs. 5.4 months, p<.01) and the analysis was adjusted for follow up time. Repeated measures analysis with three time periods as the within measure (1,2,4), and the treatment group (A/B) as the between subject variable (table 6 and figure 3) revealed that there was no statistically significant difference in clinical scores between treatment group A and B but there was a statistically significant interaction between group and time for PCL-5, PHQ-9 and the total and

**Table 5.** Treatment group B clinical scores over time (N=6)

	T1	T2	T4	Repeated measures F	P	Partial Eta squared
PCL-5	32.0±6.3	38.2 ±4.2	30.8±18.8	F(2,10)=0.67	.53	0.12
PHQ-9 *	7.4 ±2.3	11.8 ±6.1	11.4 ±2.5	F(2,8)=2.24	.16	0.36
SUD-1 *	5.9 ±1.7	7.0 ±1.9	5.2 ±3.4	F(2,8)=0.88	.45	0.18
Resilience	13.8 ±3.8	11.5 ±4.9	17.8 ±4.0	F(2,10)=3.75	.06	0.43
1*	3.4 ±0.9	2.8 ±1.6	4.2 ±0.8	F(2,4)=2.55	.18	0.39
2*	3.8 ±1.3	2.6 ±1.1	4.4 ±0.9	F(2,8)=4.85	.04	0.55
3*	3.3 ±1.5	3.3 ±1.9	4.6 ±0.9	F(2,8)=1.06	.39	0.21
4*	3.7 ±1.5	2.8 ±1.2	3.8 ±1.1	F(2,8)=0.58	.58	0.13

\*N=5



subscale 2 resilience score.

Post hoc analysis of the group by time interaction revealed significant difference in PCL-5 and PHQ-9 scores over time in group A (see above group A analysis) and no difference in resilience scores. On the other hand there was no statistically significant difference in PCL-5 ( $F(2,10)=0.67, p>0.53, \text{partial } \eta^2=0.12$ ) and PHQ-9 ( $F(2,8)=2.24, p>0.17, \text{partial } \eta^2=0.36$ ) scores over time in group B, a borderline statistically significant difference in resilience score ( $F(2,10)=3.75, p<0.06, \text{partial } \eta^2=0.43$ ) and significant difference in resilience sub score 2. ( $F(2,8)=4.85, p<0.04, \text{partial } \eta^2=0.55$ ). It should be noted that among participants who were successfully followed, baseline PCL-5 and PHQ-9 scores were statistically significant different ( $t(14)=3.36, p<.005, t(12)=3.44, p<.005$ , respectively) with PCL-5 and PHQ-9 scores significantly higher in group A ( $50.5\pm 12.4, 14.6\pm 5.9$ ) than in group B ( $32.0\pm 6.3, 7.5\pm 2.1$ ). Except for the resilience sub-score 2 ( $4.2\pm 0.8$  vs.  $2.5\pm 1.0, t(14)=3.70, p<.002$ ) there were no statistically significant differences in scores between the two groups at any other time point ( $p>.05$ ).

In **table 6**, the group and time effect sizes were small; the time\*group interaction was medium to large, except for the resilience subscales.

### Discussion

This study began within three months after the intensive hostilities ended and investigated the efficacy of early eye movement desensitization and reprocessing (EMDR) intervention with residents left with post-

between the treated intervention group A and the waitlist control group B. The results at T2 post-treatment of the immediate treatment group were significantly reduced scores on post-trauma and depression measures, compared to the waitlist/delayed treatment group, who showed no reduction prior to their treatment, thereby confirming the first hypothesis. The second hypothesis, that there would be significant reductions in psychometric scores at post intervention and follow-up times compared to the pre-intervention baseline measures was confirmed from the data obtained from group A. However, although the control group received the same three sessions at delayed treatment, we were unable to assess the replication findings with this group as their post test scores were not obtained according to the initial study design, and only from six members of this group who were accessible at a six-months follow-up. The third hypothesis proposed focusing only on the most recent trauma episode would increase resilience. Both groups exhibited initial low-medium mean resilience coping scores (about 14). The results in resilience scores over time showed an increasing trend in group A that failed to reach significance. Repeated measures analysis of group B revealed a borderline statistically significant difference in resilience scores over time, initially decreasing during the waiting period, but increasing sharply after treatment. These results once again should be treated with caution however, because of the incomplete post-test measures with this group, although this may possibly offer some explanation for the attrition from this group.

Overall, this study provides further evidence,

**Table 6.** Repeated measures analysis with 3 time periods as the within measure (1,2,4), and the treatment group (A/B) as the between subject variable. Adjustment was made for follow-up time

	Group F(1,12)	Partial eta squared	Time F(2,24)	Partial eta squared	Group*Time F(2,26)	Partial eta squared
PCL-5	0.08	0.007	1.46	0.108	5.80**	0.326
PHQ-9	0.34	0.027	1.15	0.087	8.39**	0.411
SUD	0.32	0.026	0.13	0.011	1.45	0.108
Resilience	0.13	0.010	0.99	0.001	3.28*	0.202
<b>Subscale</b>						
1	0.62	0.049	0.16	0.013	1.03	0.079
2	0.12	0.000	0.07	0.006	5.03*	0.294
3	0.12	0.009	1.20	0.091	0.50	0.040
4	3.69	0.22	0.13	0.010	0.30	0.024

\* $p<.05$

\*\* $p<.01$

traumatic symptoms following the intensive rocket attacks on their town during hostilities in the summer of 2014. The residents were under severe security threats during a two-month period. The research employed a waitlist/delayed treatment control group design and participants were randomly allocated to either immediate or waitlist/delayed treatment conditions. Self-report measures of post-trauma and depression were obtained as well as a measure of resilience. The clinical staff of the Resilience Center (HOSEN) offered EMDR therapy treatment using the Recent Traumatic Episode Protocol (R-TEP) for twenty-five participants referred to their center.

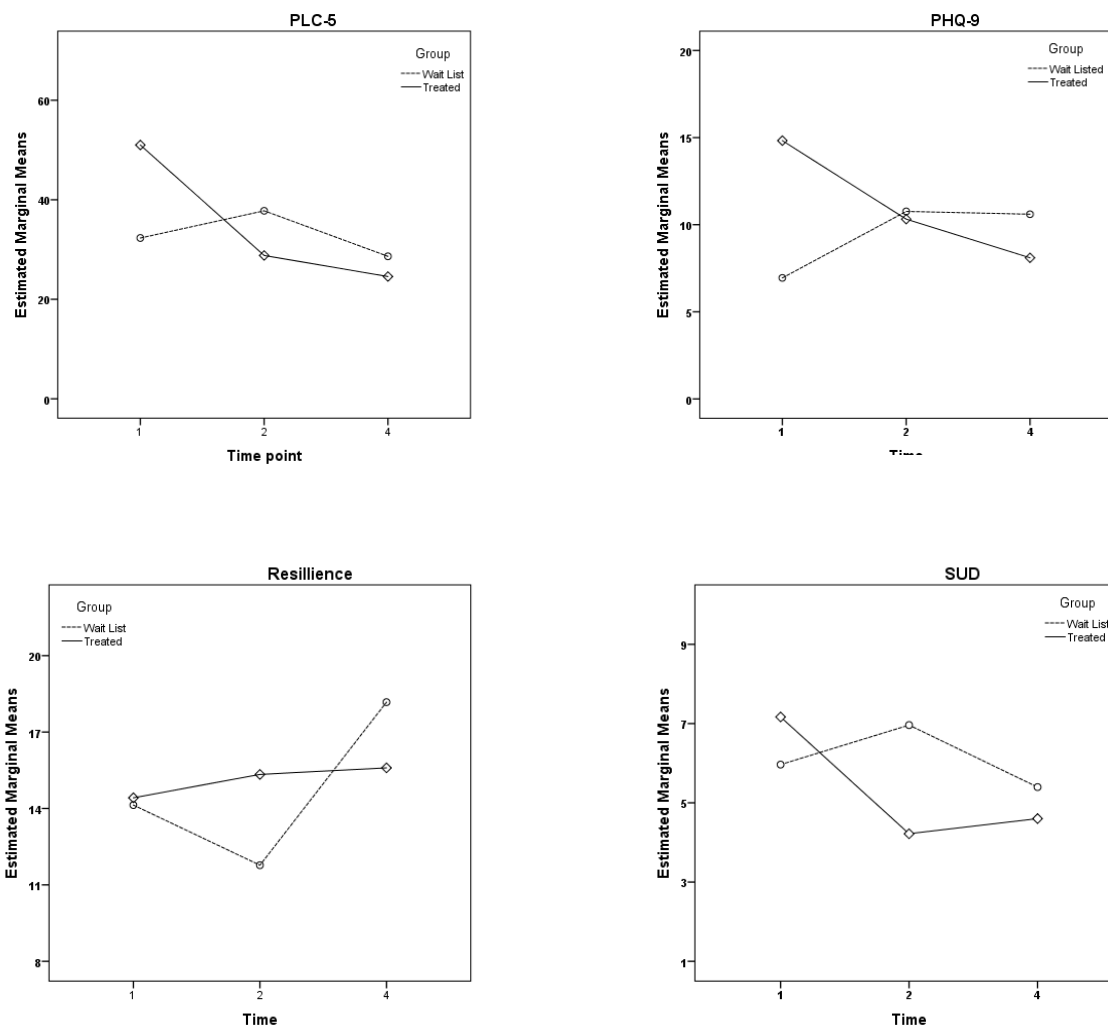
It was hypothesized that there would be significant reduction in the post-traumatic and depression measures

supporting the efficacy of Early EMDR Intervention employing the R-TEP protocol for reducing post-traumatic stress and reducing depressive symptoms among civilian victims of hostility. The evidence for resilience was indecisive and requires further research. The mixed results regarding resilience may reflect a lack of sensitivity of the four item BRCS brief resilience coping scale that we employed and suggests exploring the use of more sophisticated measures in future.

When Francine Shapiro changed the name of her discovery from EMD to EMDR it was because she and others found that EMDR was achieving clinical results that went beyond only desensitization and symptom removal. There appears to be a reprocessing of the original memory that also resulted in outcomes of self-affirmation and other evidence of personal growth. This



Figure 3. Graphs showing the changes in the psychological measures over time



distinctive quality of outcome clinically observed in EMDR Therapy could be described as a “Value Added Treatment” (VAT) aspect which potentially sets EMDR apart from symptom removal treatments. This needs to be further researched. Early EMDR Intervention similarly has a broader vision than only treating ASD or distress. It also aims for prevention. This is an area of great potential value. A distinction may also be made between resilience as coping well with adversity, the ability to “bounce back” and restoring equilibrium, as contrasted with Post Traumatic Growth (PTG) referring to a change going beyond an ability to resist and not be damaged by traumatic stress, observing a movement beyond pre-trauma levels of adaptation. (Tedeschi & Calhoun 2004, Garlington 2011). EEI studies should give more attention to researching resilience and PTG. Windle et al. (2011) in their review of resilience measurement scales pointed to difficulties and concluded that “We found no current ‘gold standard’ amongst 15 measures of resilience. A number of the scales are in the early stages of development, and all require further validation work”. And that “Overall, the CD-RISC (25 items), the RSA (37 items) and the Brief Resilience Scale

[6 items] received the highest ratings, although when considering all quality criteria, the quality of these questionnaires might be considered as only moderate” (p. 15). Another approach to this subject could be to utilize qualitative analysis tools (e.g. Edmond 1999)

### Limitations

Whereas this study succeeded in randomizing the allocation to groups, concealing selection and blinding outcome assessment and obtaining full data for the waiting list control parts of the study (T1 & T2), there were incomplete data from post testing (T3) and follow-up (T4) of group B that prevented us from obtaining the replication information. The follow-up data measures (T4) were also obtained later than originally planned and from only 77% of group A and 50% of group B.

It is acknowledged that conducting research in acute emergency situations is fraught with difficulties and inevitably requires some compromise with gold standard guidelines. “... relevant information about what to do in the aftermath of trauma is scant, and concerns have been raised that scientific research or

programme evaluation in emergency settings might interfere with the provision of care” (Yehuda et al. 2015, p. 11). There also may be cultural difficulties with conducting research in these circumstances where it may be seen as disrespectful.

The planned exclusion of previous treatment at HOSEN was waved in practice to obtain a larger sample. Local circumstances also created unexpected difficulties in accessing some participants and/or extended the length of time in obtaining some of the follow-up data mainly from group B, which increased the effects of individual differences and intervening influences, such as the sporadic additional rocket attacks and security threats that occurred during the interim. The original design planned for follow-up after three months but in practice this was only achieved at about six months. Other limitations were the reliance on self-report measures and the four-item resilience scale employed that appears to have lacked sensitivity.

As always there is a need for further studies with larger trials and additional variables, such as timing of intervention and number of sessions. There is also a need for trialing other resilience and post-traumatic growth measures to examine the provision of resilience protection in ongoing situations. Additional qualitative research tools should be explored.

## Conclusion

This study provides further evidence, supporting the efficacy of Early EMDR Intervention and the R-TEP protocol for reducing post-traumatic stress and reducing depressive symptoms among civilian victims of hostility. The evidence for resilience was indecisive and requires further research.

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