

1 **Title**

2 The EMDR Recent Birth Trauma Protocol: a pilot randomized clinical trial after traumatic
3 childbirth.

4

5 **Running title**

6 EMDR for childbirth trauma

7

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13 **Disclosure statement**

14 IF is the president of EMDR Europe Association and EMDR Italy Association. VC, MCC, SR and

15 SC have been invited speakers in national and/or international EMDR conferences. The other

16 authors declare that the research was conducted in the absence of any commercial or financial

17 relationships that could be construed as a potential conflict of interest.

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8 **Abstract**

9 **Objective:** This pilot study investigated the effectiveness of brief EMDR intervention as compared
10 to treatment-as-usual (TAU) in women with post-partum PTSD symptoms.

11 **Design:** A pilot randomized controlled trial was conducted to evaluate possible differences between
12 one EMDR session (n=19) and one TAU session (n=18) delivered in a maternity ward in the
13 aftermath of childbirth.

14 **Main Outcome Measures:** The primary outcome measure was the rate of remission of post-partum
15 post-traumatic stress symptoms (i.e. IES-R score <23) in both groups at 6-weeks (T1) and 12-weeks
16 post-partum (T2). Secondary outcome measures were mother-to-infant bonding, post-partum
17 depressive symptoms, presence of flashbacks and level of distress.

18 **Results:** Most of the women improved their post-partum post-traumatic stress symptoms after only
19 one treatment session. EMDR resulted more effective than TAU in reducing the proportion of
20 women with post-partum post-traumatic stress symptoms at six-weeks post-partum (78.9% EMDR
21 vs. 39.9% TAU; $p=.020$). Moreover, women treated with EMDR experienced less flashbacks and
22 distress as compared to TAU. No significant difference was found between treatments on mother-
23 to-infant bonding and post-partum depressive symptoms.

1 **Conclusions:** These findings, although preliminary, suggest that a brief EMDR intervention could
2 be a viable and promising tool in the early treatment of post-traumatic stress related to traumatic
3 childbirth.

4

5 **Keywords:** childbirth trauma; traumatic childbirth; post-partum PTSD; EMDR; trauma-focused
6 intervention.

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1 **Introduction**

2 While many women view their experiences of giving birth as very positive, childbirth can
3 sometimes be experienced as a traumatic event, for the presence of both objective (e.g. obstetric
4 complications) and subjective (e.g. perceived loss of control, intense fear and pain during labor, or
5 lack of support) factors occurring during delivery (Ayers, Bond, Bertullies, & Wijma, 2016; Cirino
6 & Knapp, 2019; Garthus-Niegel, von Soest, Vollrath, & Eberhard-Gran, 2013; Grekin & O’Hara,
7 2014; Hollander et al., 2017; Soet, Brack, & DiIorio, 2003). If childbirth is experienced as
8 traumatic, it could have a subsequent negative impact on women’s health and relationships (Elmir,
9 Schmied, Wilkes, & Jackson, 2010; Fenech & Thomson, 2014; Garthus-Niegel, Horsch, Handtke,
10 et al., 2018), on the development of the mother-infant bond (Garthus-Niegel, Horsch, Ayers, et al.,
11 2018; Parfitt & Ayers, 2009), and even on child outcomes (Cook, Ayers, & Horsch, 2018; Garthus-
12 Niegel, Ayers, Martini, Soest, & Eberhard-Gran, 2017). Moreover, a traumatic childbirth could
13 contribute to postpartum adjustment problems and to the onset or worsening of psychological
14 disorders, such as Post-traumatic Stress Disorder (PTSD) (Alcorn, O’Donovan, Patrick, Creedy, &
15 Devilly, 2010; Harris & Ayers, 2012; Khoramroudi, 2018; Schwab, Marth, & Bergant, 2012).
16 PTSD is a Trauma- and Stressor-Related Disorder occurring after exposure to life threatening
17 episodes and is characterized by intense reliving of the traumatic event through intrusive memories,
18 avoidance of reminders of the traumatic event, negative alterations in cognition and mood,
19 hypervigilance toward potential threats in the environment, and in some cases persistent or recurrent
20 depersonalization symptoms (American Psychiatric Association, 2013).

21 Since the 1990’s there has been a growing interest in investigating post-traumatic stress reactions
22 following childbirth (Alcorn et al., 2010; S. Ayers et al., 2016; S. Ayers & Pickering, 2001;
23 Noyman-Veksler, Herishanu-Gilutz, Kofman, Holchberg, & Shahar, 2015; Yildiz, Ayers, &
24 Phillips, 2017). Research indicates that around 30-40% of women reported a stressful birthing event
25 and traumatic symptoms (Alcorn et al., 2010; Beck, 2004; Boorman, Devilly, Gamble, Creedy, &

1 Fenwick, 2014; Creedy, Shochet, & Horsfall, 2000; Soet et al., 2003), that can result in a full
2 diagnosis of post-partum PTSD (PP-PTSD) in 3-4% of women in community samples and 15.7-
3 18.9% in high-risk samples (Grekin & O'Hara, 2014; Yildiz et al., 2017). Several studies have also
4 shown a high comorbidity of PP-PTSD with post-partum depression, with a mean prevalence of
5 17.7% (Yildiz et al., 2017).

6 To date, research has mainly focused on the proportion of women affected, on the risk factors for
7 the development of PP-PTSD (for a review see Ayers et al., 2016), and on its impact on women
8 (Ayers, Eagle, & Waring, 2006; Beck, 2004; Peeler, Stedmon, Chung, & Skirton, 2018). In
9 contrast, there has been relatively little research aimed at investigating the feasibility and
10 effectiveness of brief and early interventions for treating post-partum post-traumatic stress
11 symptoms (PP-PTSS) and for preventing the onset of a full-blown PP-PTSD (Lapp, Agbokou,
12 Peretti, & Ferreri, 2010). Early detection and treatment of PP-PTSS can promote a faster recovery,
13 which has positive consequences on both women's psychological well-being and children's
14 development, by fostering a better mother-child bonding and the possibility of initiating
15 breastfeeding (Cook et al., 2018; Garthus-Niegel et al., 2017; Garthus-Niegel, Horsch, Ayers, et al.,
16 2018). Many studies investigated the efficacy of debriefing or counseling interventions (Gamble,
17 Creedy, Webster, & Moyle, 2002; Rowan, Bick, & Bastos, 2007), but a Cochrane meta-analysis
18 showed that there is no evidence to support routine debriefing for women who perceive giving birth
19 as traumatic (Bastos, Furuta, Small, McKenzie-McHarg, & Bick, 2015). Very recently two
20 systematic reviews (de Graaff, Honig, van Pampus, & Stramrood, 2018; Furuta et al., 2018) on
21 psychological interventions to prevent and treat childbirth-related post-traumatic symptoms and
22 PTSD, draw partial conclusions, mainly due to the limited number and high heterogeneity of the
23 included studies. The first one showed that interventions to prevent PTSD or PTSD symptoms in
24 postpartum women were not proven to be effective, with the exception of expressive writing tasks
25 (de Graaff et al., 2018). The second one concluded that trauma-focused psychological interventions

1 are effective in reducing PTSD symptoms in the early postnatal period in the short and medium
2 term (Furuta et al., 2018). However, both reviews recognized the need for further studies with larger
3 samples, clear interventions and less bias in order to draw firmer conclusions.

4 Eye Movement Desensitization and Reprocessing therapy (EMDR) is considered one of the elective
5 trauma-focused psychological treatments for PTSD, according to several meta-analyses and clinical
6 guidelines (Bisson & Andrew, 2007; Bisson, Roberts, Andrew, Cooper, & Lewis, 2013; Chen et al.,
7 2014; International Society for Traumatic Stress Studies (ISTSS), 2018; National Institute for
8 Health and Care Excellence (NICE), 2018; Seidler & Wagner, 2006; World Health Organization
9 (WHO), 2013), and its neurobiological effects are also supported by neuroimaging findings
10 (Boukezzi et al., 2017; Pagani et al., 2012). EMDR is a standardized, eight-phase psychological
11 treatment (Shapiro, 2001), involving the use of alternate bilateral physical stimulation (eye
12 movements, taps or tones) while focusing on a targeted traumatic memory, that seems to promote
13 the reprocessing and integration of the dysfunctionally stored information related to a traumatic
14 event as an adaptive contextualized memory (Landin-Romero, Moreno-Alcazar, Pagani, & Amann,
15 2018; Marco Pagani, Amann, Landin-Romero, & Carletto, 2017).

16 Although NICE guidelines on antenatal and postnatal mental health recommend that EMDR (or
17 alternatively trauma-focused Cognitive Behavioral Therapy) should be offered to women who
18 suffer from PTSD resulting from a traumatic birth (National Collaborating Centre for Mental Health
19 (UK), 2014), only two case studies investigated its effectiveness for the treatment of PP-PTSD
20 (Sandström, Wiberg, Wikman, Willman, & Högberg, 2008; Stramrood et al., 2012), showing
21 promising results. Those studies included seven women whom suffered from PTSS following the
22 birth of their first child that were treated with EMDR during their next pregnancy, showing a
23 reduction of PTSS and more confidence about their upcoming delivery. The application of EMDR
24 for addressing mother-to-child bonding difficulties related to trauma issues was investigated by two
25 case studies (Madrid, Skolek, & Shapiro, 2006; Okawara & Paulsen, 2018)), and a specific EMDR

1 protocol for the early treatment of PTSS after a traumatic childbirth that can be used in the
2 maternity ward has been recently published (EMDR Recent Birth Trauma Protocol; Cattaneo,
3 Chiorino, Roveraro, Salerno, & Fernandez, 2019).
4 Therefore, the main purpose of this pilot study was to investigate the feasibility and effectiveness of
5 this specific Early EMDR Intervention (EEI) in reducing post-traumatic stress symptoms following
6 traumatic childbirth as compared to a routine psychological intervention (TAU) in the context of a
7 maternity ward. Furthermore, this study aimed to evaluate possible differences between these two
8 treatments (EMDR vs. TAU) in promoting the mother-to-infant relationship and in reducing post-
9 partum depressive symptoms at six- and twelve-weeks post-partum.

10

11 **Materials and methods**

12 *Design*

13 The present pilot randomized clinical trial was designed to evaluate the effectiveness of a brief
14 EMDR intervention as compared with TAU in women with PP-PTSS related to a recent traumatic
15 childbirth.

16

17 *Setting*

18 The participants were recruited during their hospitalization after giving birth in the maternity ward
19 of Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico of Milan, Italy, from June 2015
20 to January 2018.

21 The study was approved by the Medical Ethics Committee of Fondazione IRCCS Ca' Granda,
22 Ospedale Maggiore Policlinico (Milan, Italy). Informed written consent was obtained from all the
23 participants.

24

25 *Participants*

1 The subjects of the study were women with PP-PTSS related to a recent traumatic childbirth.
2 Inclusion criteria were: (1) having experienced a traumatic childbirth in the previous hours or at
3 most three days before (both objective and subjective traumatic childbirth-related experiences were
4 considered); (2) a score ≥ 24 on the Impact of Event Scale-Revised (IES-R); (3) age ≥ 18 years old;
5 (4) fluent Italian language; (5) legal capacity to consent to the treatment.

6 Exclusion criteria were as follows: (1) having a baby hospitalized in Special Care Baby Unit or
7 Neonatal Intensive Care Unit (NICU) or with a serious, unstable medical condition; (2) having
8 experienced a stillbirth or a perinatal death; (3) presence of other psychiatric disorders such as
9 psychosis, bipolar disorder, major depressive disorder, personality disorders, alcohol or drug abuse,
10 or a previous PTSD diagnosis; (4) presence of intellectual disability.

11

12 *Recruitment and measures*

13 The recruitment of participants was carried out by clinical psychologists who work in the maternity
14 ward. Participants were screened using the IES-R during a clinical visit. The research protocol was
15 proposed to those women with a score on IES-R greater than or equal to 24 who also met the
16 inclusion criteria, with an explanation of the aims of the study. They were also told that if they
17 participated in the study they would be randomly assigned to one of two treatment conditions, both
18 employing the same timing and assessment tools, for the period of the study. If they agreed they
19 signed the informed consent, were randomized, and then asked to proceed with the psychological
20 assessment.

21 Then the psychological assessment was conducted by psychologists, independent of the research
22 protocol and blinded to treatment group, using the same timing and tools in both groups. The
23 assessment was performed in-person at baseline before the treatment (T0), and by telephone at six
24 weeks (T1) and twelve weeks post-partum (T2).

25 The following psychological self-report questionnaires were administered:

1 *Impact of Event Scale—Revised (IES-R)*. The IES-R (Weiss & Marmar, 1997) is a 22- item self-
2 report questionnaire consisting of three subscales (eight items relate to intrusions, eight items
3 evaluate avoidance, and six items assess hyperarousal). The scale assesses subjective distress
4 caused by traumatic events. A score ≥ 33 represents the best cut-off for a probable diagnosis of
5 PTSD, while a score ≥ 24 indicated clinically meaningful PTSS (Asukai et al., 2002; Creamer, Bell,
6 & Failla, 2003). In the present study we chose to consider the lower cut-off (i.e. ≥ 24) in order to
7 consider also sub-threshold PTSS. Participants completed the IES-R at T0, T1 and T2.

8 *Mother-to-Infant Bonding Scale (MIBS)* (Taylor, Atkins, Kumar, Adams, & Glover, 2005). The
9 MIBS is a self-reporting scale designed to assess maternal bonding with their baby during the
10 postpartum period. It consists of eight adjectives (loving, resentful, neutral or felt nothing, joyful,
11 dislike, protective, disappointed and aggressive), each followed by a four-point Likert scale ranging
12 from “very much” (0) to “not at all” (5). Possible scores on the MIBS range between 0 and 24, with
13 high scores indicating a problematic mother-to-infant bond. Participants completed the MIBS at T0,
14 T1 and T2.

15 *Peritraumatic Dissociative Experiences Questionnaire (PDEQ)* (Marmar, Weiss, & Metzler, 1997).
16 The PDEQ is 10-item self-report questionnaire that assesses dissociative experiences that occurred
17 during a traumatic event and in the minutes and hours that follow. The total score ranges 10-50,
18 with higher scores indicating increased dissociation. A score above 15 is indicative of significant
19 dissociation. Participants completed the PDEQ only at T0.

20 *Edinburgh Postnatal Depression Scale (EPDS)* (Cox, Holden, & Sagovsky, 1987). The EPDS is a
21 self-reporting questionnaire designed to assess pregnancy and postpartum depression; it is
22 composed of 10 items scored on a four-point Likert scale. Higher scores reflect a greater level of
23 depression severity. Participants completed the EPDS only at T1 and T2.

24 Participants were also asked to complete a brief anamnesis sheet at T0, conceived to register socio-
25 demographic and medical data. Moreover, information about the presence of flashbacks related to

1 the traumatic childbirth and the level of distress related both to the past and a possible future
2 childbirth were also collected at T1 and T2.

3

4 *Randomization*

5 Patients were randomly assigned into the two intervention groups with a 1:1 ratio (20 in the EMDR
6 and 20 in the TAU group), using a block-wise randomization sequence (block size of 4 and 6). To
7 ensure allocation concealment, the sequence was determined by an independent researcher blind to
8 the initial assessment, using a random number generator (www.randomizer.org). To ensure the
9 blinding of the clinical psychologists performing the assessments, the study coordinator
10 communicated the treatment assignment to each patient.

11

12 *Treatments*

13 Both groups received one 90-minute long treatment session, which took place in the patient's room
14 within the maternity ward in a period ranging from one day and three days after the childbirth, in
15 any case before the discharge from the hospital. The newborn and/or the partner could be present
16 during the session.

17

18 Treatment as Usual

19 The TAU group received the standard psychological supportive therapy delivered in the maternity
20 ward, which consists of a supportive psychological consultation session about the patient's central
21 themes related to the traumatic childbirth (e.g. focus on emotions experienced during childbirth and
22 on current difficulties related to caregiving, breastfeeding and psycho-physical recovery).

23 TAU was performed by four psychotherapists at MSc level or higher, with a minimum of 3 years'
24 experience in the perinatal context. They received supervision by an experienced colleague for the
25 entire duration of the study.

1

2 Eye Movement Desensitization and Reprocessing

3 The EMDR treatment followed the EMDR Recent Birth Trauma Protocol (Cattaneo et al., 2019);
4 that is, a development of the Recent Traumatic Episode Protocol (R-TEP) (Shapiro & Laub, 2009)
5 with a specific focus on acute childbirth trauma. The EMDR treatment steps of the EMDR Birth
6 Trauma Protocol were as follows:

- 7 1) Establishing a basic working alliance;
- 8 2) Brief information gathering (brief trauma history, brief pregnancy and personal history);
- 9 3) Strengthening the motivation for treatment through positive and achievable therapeutic goals;
- 10 4) Preparation: stabilization (e.g. grounding technique);
- 11 5) Delivery experience narrative with continuous tapping (using tactile bilateral stimulation);
- 12 6) Desensitization and reprocessing of traumatic childbirth trauma (using eye movements
- 13 stimulation);
- 14 7) Desensitizing triggers of triggering behavior.

15 When possible (mainly related to time issues) the following steps were also carried out:

- 16 8) Future template: the near future physical recovery, taking care of the baby and breastfeeding;
- 17 9) Installing resources to cope with the triggering factors;
- 18 10) Narrative to the baby.

19 EMDR was provided by three practitioners with a minimum of three years of experience in the
20 perinatal setting. They received supervision from a certified senior EMDR supervisor for the entire
21 duration of the study.

22

23 *Statistical Analyses*

24 Data were processed and analyzed using the Statistical Package for Social Sciences (SPSS version
25 22.0; Chicago, IL, USA).

1 Both parametric and nonparametric tests were used, in accordance with Shapiro–Wilk as a test for
2 normality. Baseline group differences were assessed using Student’s *t*-test or Mann–Whitney *U* test
3 to compare the two groups for continuous measures and Fisher’s Exact Test for categorical
4 measures.

5 The primary outcome of the study was the rate of PTSS remission at T1 in both groups, as
6 measured by an IES-R score <23. Based on the IES-R score, patients were classified as either
7 asymptomatic or symptomatic (IES-R score <23/≥24, respectively), and the difference between the
8 EMDR and TAU groups at T1 and T2 was analyzed using Fisher’s Exact Test. Cramer’s V was
9 used to calculate the effect size for the primary outcome.

10 Moreover, a GLM repeated measures ANOVA (RM-ANOVA) was used to analyze the effects of
11 time and the interaction between time and groups (EMDR vs. TAU) for IES-R and MIBS levels
12 across the three assessment points (T0, T1 and T2). Pairwise comparison between groups were
13 made by simple contrast and are reported as means difference with the Sidak correction 95%
14 confidence interval (95%CI) for multiple comparisons.

15 A secondary outcome of the study was to compare the efficacy of both treatments on associated
16 symptoms and other clinical characteristics. Mann–Whitney *U* test and Fisher’s Exact Test were
17 used to compare the two groups respectively for continuous and categorical measures at T1 and T2.
18 All tests were two-sided and a $p < 0.05$ was considered statistically significant throughout all
19 analyses.

20
21

22 **Results**

23 A total of 47 women who experienced a traumatic childbirth were screened with IES-R; forty-one
24 of them presented an IES-R score above the cut-off (87.2%). One woman declined to participate to
25 the study (reason given for refusal was the perceived unnecessary of the intervention; refusal rate:
26 2.4%). Therefore, a total of 40 women were enrolled in the study: 20 were assigned to EMDR and

1 20 to TAU. All women received the treatments but three of them (one in the EMDR group and two
2 in the TAU group) were lost to T1 and T2 assessments. Therefore, a total of 37 patients (19 in the
3 EMDR group and 18 in the TAU group) completed all the assessments and were included in the
4 statistical analysis.

5 Table 1 and Table 2 present respectively the socio-demographic and clinical characteristics of
6 women at baseline. There were no significant differences between the two groups at baseline (T0),
7 except for age, with younger women in the TAU group (Table 1) and for the type of delivery, with
8 more spontaneous vaginal deliveries in the EMDR group (Table 2).

9 First, for our primary outcome measure we examined the proportion of patients who were
10 considered asymptomatic (i.e., IES-R score <23) at 6-weeks (T1) and at 12-weeks (T2) post-partum
11 assessments.

12 At T1 we found that 15 out of 19 patients (78.9%) in the EMDR group and 7 out of 18 patients
13 (38.9%) in the TAU group were asymptomatic, with a significant difference between the two
14 groups ($p=.020$; Cramer's $V = 0.408$).

15 At T2 we found that 17 out of 19 (89.5%) in the EMDR group and 12 out of 18 patients (66.7%) in
16 the TAU group were asymptomatic, but no significant difference between the two groups was found
17 ($p=.124$).

18 Then we evaluated whether the different psychotherapy treatments (EMDR or TAU) administered
19 to the patients had a different impact on post-traumatic symptoms and on mother-to-infant bonding
20 (i.e. the only variables measured at all three assessment points). A repeated-measures ANOVA was
21 performed on the T0, T1 and T2 clinical scores (IES-R, MIBS), comparing group and time effects
22 and interactions between group and time.

23 The RM-MANOVA yielded a significant pre–post main effect ($F(4, 32) = 25.995, p < .001; \eta^2_p =$
24 $.765$), while no significant interaction between the pre–post measures and the treatment
25 condition was found ($F(4, 32) = 1.107, p=.370; \eta^2_p = .122$).

1 Significant time effects were found across both groups for both IES-R and MIBS, indicating that the
2 mean participant scores improved from T0 to T1 and T2.

3 No group-by-time interaction was found for both IES-R and MIBS scores. Planned post hoc
4 analyses of simple effects of pre–post were conducted by GLM pairwise comparisons using the
5 Sidak adjustment for multiple comparisons.

6 As regards IES-R, there was no significant difference between groups at baseline, but there was a
7 significant difference between groups at T1 and T2, showing that both groups had an improvement
8 in post-traumatic symptoms, but the EMDR group scored significantly lower compared to the TAU
9 group at T1 and T2 (Table 3). In the case of MIBS, there were no significant differences between
10 groups at all three assessment points (T0, T1 and T2), indicating that the improvement on mother-
11 to-infant bonding was similar for both treatment groups (Table 3).

12 Moreover, for our secondary outcome we examined whether EMDR and TAU had a different
13 impact on post-partum depressive symptoms and other clinical characteristics at T1 and T2 (Table
14 4). No significant difference between the treatment groups was found with respect to the presence
15 of clinically significant postpartum depressive symptoms at T1 and T2. Participants in the TAU
16 group showed a greater presence of flashbacks compared to the EMDR group only at T2, while a
17 significant difference between groups was found for subjective distress for recent and future
18 delivery at both T1 and T2, with participants treated with TAU showing higher distress levels than
19 those treated with EMDR.

20

21 **Discussion**

22 To the best of our knowledge, this is the first study to investigate the feasibility and effectiveness of
23 using the EMDR Recent Birth Trauma protocol in women with PP-PTSS by comparing it with an
24 active control intervention (TAU).

1 The most significant result emerging from this pilot study is that the majority of women were able
2 to improve their psychological condition after only one treatment session. In fact, most of the
3 women showed a significant reduction of PTSS and an improvement on mother-infant bonding,
4 regardless of the type of early treatment received.

5 EMDR appears to be more effective than TAU in reducing the proportion of women who displays
6 PP-PTSS after six-weeks. This difference was no longer present at the 3-month follow-up, although
7 in the EMDR group there was a greater reduction of these symptoms than in TAU group. This result
8 is in accordance with guidelines that indicate that trauma-focused therapies, such as EMDR and TF-
9 CBT, are more effective than non-trauma focused intervention (Bisson & Andrew, 2007;
10 International Society for Traumatic Stress Studies (ISTSS), 2018; National Institute for Health and
11 Care Excellence (NICE), 2018), also having a faster effect (Nijdam, Gersons, Reitsma, De Jongh, &
12 Olf, 2012). Furthermore, the speed of treatment effect should be taken into great account, as
13 traumatic symptoms could affect not only the psychological health of the woman but also the
14 mother-to-infant bonding, which is going to be consolidated in the post-partum period (Susan Ayers
15 et al., 2006; Okawara & Paulsen, 2018; Parfitt & Ayers, 2009). Therefore, those women who more
16 rapidly recovered from their post-traumatic symptoms will be more prone to attune to their babies
17 and to initiate breastfeeding, with considerable consequences on children's development (Garthus-
18 Niegel, Horsch, Handtke, et al., 2018; Chiorino, Roveraro, Cattaneo, Salerno, & Fernandez, 2019).
19 In this study, both women treated with EMDR or TAU showed an improvement in mother-infant
20 bonding. This result could suggest the importance of an early intervention in the aftermath of
21 traumatic experiences, independently from the specific kind of treatment, in order to prevent
22 potential adverse effects both in the short and in the long term (de Graaff et al., 2018).

23 Moreover, EMDR showed to be able to greater reduce the presence of flashbacks related to the birth
24 trauma at the three-month follow-up, as compared to TAU. Flashbacks are distressing and intrusive
25 image-based, sensory-perceptual memories related to the trauma experience, and are considered as

1 the hallmark symptom of PTSD. Previous studies highlighted the effect of EMDR in reducing
2 flashbacks and vivid memories (Raboni, Tufik, & Suchecki, 2006; Taylor, 2003). Our results
3 suggest that even a single session of EMDR seems to be effective in alleviating these symptoms and
4 in preventing the build-up of symptoms in the early aftermath of trauma.

5 Furthermore, lower levels of distress related to both the recent and a possible future delivery were
6 observed in women treated with EMDR as compared to those treated with TAU. Previous research
7 has shown that a previous traumatic childbirth experience could represent a risk factor for
8 developing a pathological fear of childbirth (Garthus-Niegel et al., 2013; Hofberg & Ward, 2003).
9 Therefore, EMDR could represent a viable and effective interventions also to prevent this condition
10 (Baas, Stramrood, Dijkman, de Jongh, & van Pampus, 2017). Lastly, no difference between
11 EMDR and TAU groups in the proportion of women with clinically significant post-partum
12 depressive symptoms at both follow-ups was detected. Previous research has indicated that post-
13 partum depression is related to an intertwine of multiple risk factors (Falah-Hassani, Shiri, &
14 Dennis, 2016; Ghaedrahmati, Kazemi, Kheirabadi, Ebrahimi, & Bahrami, 2017), of which birth
15 trauma is only one of them.

16 This study had several limitations. No sample size calculation was applied to determine the number
17 of women to be included. Moreover, the number of patients treated with EMDR and TAU included
18 in the study was not large, therefore it could be possible that other significant differences between
19 the two interventions were not detected. Another limitation is that there was no placebo or waiting
20 list group, in order to control for the effect of time. This limit has an ethical reason, as after
21 detecting significant psychological symptoms it would have been unethical not to treat these women
22 or not to treat them as soon as possible, while the traumatic childbirth was a recent event. Moreover,
23 another limit was represented by the lack of instruments capable to detect the possible onset of a
24 full-blown PTSD at the three-month follow-up (i.e. clinical interview). Considering these
25 limitations, no definitive evidence for EMDR or TAU efficacy in women with PP-PTSS could be

1 drawn from the results of this pilot study. Future randomized controlled studies with larger samples
2 and more instruments should better investigate these aspects, also trying to identify possible
3 predictors for response to treatment.

4 This study also has some strengths. The results of the study suggest that a single session of the
5 EMDR Recent Birth Trauma could represent a viable and well-accepted treatment for secondary
6 prevention of PP-PTSS. These results also represent an advancement in the research on the
7 application of early EMDR interventions in the field of emergency, which so far were investigated
8 in relation to man-made and natural disasters (Acarturk et al., 2015; Maslovaric et al., 2017;
9 Shapiro, 2012; Trentini et al., 2018; Yurtsever et al., 2018). Moreover, to the best of our knowledge
10 this is the first study evaluating the clinical impact of a brief and early EMDR intervention focused
11 on birth trauma, which could be delivered in the immediate aftermath of the traumatic experience.
12 Further studies could evaluate the usefulness of the application of this EMDR protocol in different
13 contexts or with different populations, by lengthening the treatment sessions even after the
14 discharge of the woman from the maternity hospital (i.e. outpatient setting) or applying it with
15 women who have experienced a stillbirth, a live-birth or who have a newborn admitted in NICU.

16 In conclusion, the findings of this pilot study, even if preliminary, suggest the importance of an
17 immediate detection of PP-PTSS, in order to promptly refer those women to an early intervention,
18 preferably a trauma-focused one. The presence of a clinical psychologist in the maternity ward, who
19 could deliver timely and effective treatments before the discharge from the hospital, would be
20 highly recommended. An early EMDR intervention could be an ideal candidate to alleviate the
21 distress associated with a traumatic childbirth, thus fostering resilience skills and protecting the
22 construction of the maternal bonding, with huge consequences for both women and their children's
23 future psychological health.

24

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1 **Table 1. Demographic data of participants at baseline**

	EMDR (N=19) Mean(SD)/Median(IQR)	TAU (N=18) Mean(SD)/Median(IQR)	<i>p</i>
Age (years)	36.47 (3.89)	32.11 (6.25)	.015 ^a
	n(%)	n(%)	
Nationality			.660 ^b
Italian	17 (89.5)	15 (83.3)	
Foreigner	2 (10.5)	3 (16.7)	
Level of education			.053 ^b
Low secondary school	1 (5.3)	3 (16.7)	
High secondary school	3 (15.8)	8 (44.4)	
Degree	15 (79.9)	7 (38.9)	
Employment status			.640 ^b
Unemployed	3 (15.8)	4 (22.2)	
Employed	11 (57.9)	12 (66.7)	
Other	5 (26.3)	2 (11.1)	
Marital status			.406 ^b
Single	0 (0)	1 (5.6)	
Married	12 (63.2)	8 (44.4)	
Cohabiting	7 (36.8)	9 (50)	

2 EMDR: Eye Movement Desensitization and Reprocessing group; TAU: Therapy As Usual group.

3 ^aPearson's independent samples t-test.

4 ^bFisher's exact test.

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1 **Table 2. Clinical data of participants at baseline**

	EMDR (N=19) Median(IQR)	TAU (N=18) Median(IQR)	<i>p</i>
Previous traumatic experiences	2 (2)	2 (2.5)	.313 ^c
PDEQ	9 (16)	10.5 (6)	.879 ^c
	n(%)	n(%)	
Pregnancy			.124 ^b
Planned	17 (89.5)	12 (66.7)	
Unexpected	2 (10.5)	6 (33.3)	
Number of pregnancies			.775 ^b
First	14 (73.6)	12 (66.7)	
Second	3 (15.8)	5 (27.7)	
Third	1 (5.3)	0 (0)	
Fourth or more	1 (5.3)	1 (5.6)	
Risk of pregnancy			1.000 ^b
Low	15 (79.9)	15 (83.3)	
High	4 (21.1)	3 (16.7)	
Previous pregnancies at risk			1.000 ^b
No	18 (94.7)	18 (100)	
Yes	1 (5.3)	0 (0)	
Previous spontaneous miscarriages			.340 ^b
No	15 (79.9)	17 (94.4)	
Yes	4 (21.1)	1 (5.6)	
Previous termination of pregnancy			1.000 ^b
No	17 (89.5)	16 (88.9)	
Yes	2 (10.5)	2 (11.1)	
Type of delivery			.027 ^b
Vaginal	11 (57.9)	4 (22.2)	
Caesarean section	8 (42.1)	11 (61.1)	
Forceps/Vacuum	0 (0)	3 (16.7)	
Type of feeding			.230 ^b
Breastfeeding or mixed	19 (100)	16 (88.9)	
Artificial	0 (0)	2 (11.1)	

2 EMDR: Eye Movement Desensitization and Reprocessing group; TAU: Therapy As Usual group;

3 PDEQ: Peritraumatic Dissociative Experiences Questionnaire.

4 ^bFisher's exact test.

5 ^cMann-Whitney U test.

Table 3. Comparison between T0, T1 and T2 of clinical variables for the two treatment groups (EMDR and TAU).

	T0				T1				T2			
	EMDR (N=19)	TAU (N=18)	MD (95%CI)	<i>p</i>	EMDR (N=19)	TAU (N=18)	MD (95%CI)	<i>p</i>	EMDR (N=19)	TAU (N=18)	MD (95%CI)	<i>p</i>
IES-R	35.79 (8.80)	36.11 (9.47)	-.322 (-6.422; 5.778)	.915	16.47 (13.26)	25.22 (11.52)	-8.749 (-17.062;-.435)	.040	9.58 (8.90)	17.56 (12.32)	-7.977 (-15.121; -.832)	.030
MIBS	1.63 (2.27)	2.39 (2.81)	-.757 (-2.457; .942)	.372	0.79 (1.08)	1.11 (1.23)	-.322 (-1.095; .452)	.404	0.42 (.77)	0.78 (1.40)	-.357 (-1.103; .390)	.339

Data are mean (SD).

EMDR: Eye Movement Desensitization and Reprocessing group; TAU: Therapy As Usual group; IES-R: Impact of Event Scale-Revised; MIBS: Mother-to-Infant Bonding Scale.

MD: Mean Difference.

Table 4. Comparison of EMDR and TAU groups at post-treatment (T1) and follow-up (T2)

	T1			T2		
	EMDR (N=19)	TAU (N=18)		EMDR (N=19)	TAU (N=18)	
	n (%)	n (%)	<i>P</i>	n (%)	n (%)	<i>p</i>
EPDS score above cut-off (≥9)	6 (31.6)	6 (33.3)	1.000 ^b	3 (15.8)	3 (16.7)	1.000 ^b
Presence of flashbacks	2 (10.5)	3 (16.7)	.660 ^b	1 (5.3)	6 (33.3)	.042 ^b
	Median (IQR)	Median (IQR)	<i>P</i>	Median (IQR)	Median (IQR)	<i>p</i>
Distress about recent delivery	1 (3)	6.5 (4)	.000 ^c	1 (2)	7 (6.3)	.000 ^c
Distress about future delivery	6 (4)	8.5 (3.3)	.004 ^c	1 (4)	7 (3.8)	.006 ^c

EMDR: Eye Movement Desensitization and Reprocessing group; TAU: Therapy As Usual group; EPDS: Edinburgh Postnatal Depression Scale.

^bFisher's exact test.

^cMann-Whitney U test.