TRAUMATIC EXPERIENCES AND EMDR IN CHILDHOOD AND ADOLESCENCE. A REVIEW OF THE SCIENTIFIC LITERATURE ON EFFICACY STUDIES

Anna Rita Verardo, Emanuela Cioccolanti

Abstract

Objective: The aim of this review is to examine the efficacy of EMDR treatment on children and adolescents with post traumatic stress disorder symptoms through comparison with other established trauma treatment or no treatment control groups.

Method: It was conducted a literature search concerning the effects of EMDR treatment on symptomatologic pictures derived by Post-Traumatic Stress Disorder diagnosis in children and adolescents by analysing digital databases like PsycINFO, MEDLINE, Google Scholar and Cochrane Library and with a traditional research method, targeting revisions and articles.

Results: Results show efficacy of EMDR especially according to the number of sessions. Fewer EMDR sessions are associated with the best outcomes.

Conclusions: These findings support the use of EMDR for treating symptoms of PTSD in children, although further replication and comparison are required.

Key words: EMDR, PTSD post traumatic stress disorder, children, adolescence, efficacy

Declaration of interest: none

Anna Rita Verardo 1, Emanuela Cioccolanti 2

[1] EMDR Italy Association, Bovisio Masciago (MI) Italy
[2] EMDR Italy Association, Bovisio Masciago (MI) Italy

Corresponding author
Anna Rita Verardo
annaritaverardo@me.com
info@feelsafe.it

Introduction

Scientific literature offers numerous studies documenting the effects of precocious traumas on the development of the individual and his neurobiological and psychological functioning (De Bellis and Zisk 2014, Rincón-Cortés and Sullivan 2014, Liotti and Farina 2011). The syndrome best representing this picture is the Post-Traumatic Stress Disorder (PTSD), which often enriches and best defines in a clinical diagnosis the nature of the other possible developmental disorders, like externalizing and internalizing disorders: Conduct Disorders, Attention Deficit Hyperactivity Disorders, Anxiety Disorders, Speech Disorders, Specific Developmental Disorders, Depressive Disorders and chronic diseases.

PTSD was listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM III) in 1980 (APA,1980) and only in the revised version in 1987 (DSM-III-R) has the manual for the first time mentioned the appearance of this kind of disorder in children.

In the DSM-IV-TR (APA 2000) the diagnostic criteria of PTSD defined for adults do not correspond to what we observe in children and adolescents in clinical practice. Even more if we refer to very early age, for children have very limited linguistic capacities and react to stress in a quite different fashion compared to adults. For the same reason the Post-Traumatic Stress Disorder appear to be underestimated in growing children for it is co-opted by other diagnosis, like Hyperactivity, Depression, Bipolar Disorder, Personality Disorder or Anxiety Disorder.

Furthermore, starting from the DSM-IV-TR, unlike DSM III and ICD-10 (World Health Organization 1992) events not originated from situations outside the common experience have been recognized as traumatic, although they result to be traumatic at a subjective level. A child, for example, can develop a Post-Traumatic Stress Disorder not only in response to natural disasters or events generated by human beings (witnessed violence, physical or sexual abuse, accidents, traumatic death), but also following repeated experiences of threat to his/her own personal emotional safety, like strong parental conflicts, grave difficulties of the caregiver with the emotional attunement or as a result of major life changes (Verardo 2010).

PTSD in infancy, childhood and adolescence

In order to talk about PTSD we have to take into account the triad of symptoms considered by DSM IV:

1. *Re-experiencing* of the trauma through intrusions in form of memories, flashbacks and nocturnal nightmares.
2. *Avoidance* of situations that can remind the person of the traumatic event, emotional flattening, withdrawal, reduction of interests.
3. *Hyperarousal*, which manifests itself with the difficulty to monitor the physiologic arousal in the

Submitted April 2017, Accepted July 2017

presence of external stimuli, with a pronounced irascibility, sudden bursts of anger, hypervigilance and alert responses, disturbed sleep and troubles with memory and concentration.

The set of symptoms is surely representative of a good part of the symptomatology that can be observed in individuals victims of traumatic events, but being those criteria thought for an adult sample, it overlooks some forms of symptoms equally found in the post-traumatic disorder, particularly in infants, like *somatisation* and *affective adjustment* disorders.

Thus it follows that the diagnostic criteria provided are not fully reflected in infancy, childhood and adolescence, during which the reactions to the event can be aggravated by risk factors or protection factors.

Specifically, to talk about PTSD in infancy, childhood and adolescence, it isn't necessary the appearance of at least three symptoms of dulling and avoidance, as requested for the diagnosis of the adult, because a child can be unable to verbalize such feelings, or he can experience an alternation of hyperarousal and avoidance.

The critical observations on this issue have been dealt with by Sheeringa and colleagues (1995), who have re-defined in a systematic way the PTSD criteria in childhood, based on the level of development and ability of verbalization (Nicolais et al. 2005).

In early infancy a variety of symptoms can be observed: strangers' phobia, separation anxiety, sleep disorders, co-sleeping, somatisations such as for example abdominal pain, regression to prior development stages or to already overcome habits.

School-age children might not manifest flashbacks or difficulty in remembering aspects of the trauma, as it happens to adults, but they might place the traumatic events in the wrong order.

Such specific experience of trauma in growing children requested a modification of diagnostic criteria for the PTSD, necessary to assess the presence of such disorder even in very young individuals (Sheeringa et al. 1995).

To be able to talk about PTSD diagnosis in very young children it is necessary to detect at least one of the following symptoms in the re-experiencing of the trauma:

- Traumatic play;
- Repetitive play;
- Recurrent memories;
- Nightmares;
- Episodes with objective characteristics of flashback or dissociation;
- Distress when exposed to situations recalling the event.

It is also required even just one among the following symptoms of dulling and avoidance:

- impoverishment of play;
- social avoidance;
- limited range of loved persons;
- loss of development stages previously achieved.

Ultimately, it is required the presence of at least one hyperarousal symptom among the following:

- night terrors;
- difficulty in going to bed or getting sleep, not related to fear of nightmares or fear of the dark;
- night-time awakenings, not associated to nightmares or nocturnal terrors;
- reduced concentration capacity;
- hypervigilance;
- exaggerated response to apparently neutral stimuli.

Sheeringa (2003) has furthermore added to these diagnostic criteria an additional class of symptoms for which it is necessary the presence of at least one among the following:

- the arising of aggressiveness;
- the arising of separation anxiety;
- fear of going to the bathroom alone;
- emergence of fear of the dark;
- the arising of fears for things or situations not strictly correlated to the traumatic event.

The classification 0-3 adds to this last category the pessimism and self-destructive or eroticized behaviours.

The criteria evidenced by Sheeringa are nowadays widely employed clinically and quite considered by the scientific community, bringing out salient aspects of PTSD in infants, children and adolescents, allowing the individuation of PTSD cases "below the threshold".

In addition to the symptomatologic difference between adulthood and childhood, which led to opportune thoughts and changes on the diagnostic level, there is another aspect of the disorder that opened the road to a new construct. In 1992 Herman, on the basis of prior clinical studies, differentiated the disorders originating from a single traumatic event, as in cases of accidents and natural disasters, from the disorders linked to cumulative traumas, prolonged in time, of interpersonal origin. The difference in nature of the traumatic events gave birth to the formulation of the concept of single trauma ("T") and complex trauma ("t"). Based on the harmful effects of complex trauma (van der Kolk 2005) asserted the necessity of a new diagnostic label for this "new" sort of trauma: Developmental Trauma Disorder.

The symptomatology describing this disorder includes:

1. *Emotional Dysregulation* (emotive feebleness, explosive rage, self-destructive behaviours, social retreat, dysphoria, depression, loss of motivation) and *Impulses' Dysregulation* (self-harm, risky behaviour, aggressiveness, eating disorder, use of substances, oppositional behaviour, repetition of traumatic situations).
2. *Attention disorders, cognitive disorders and awareness disorders* (depersonalisation, dissociation, memory disorders, inability to focus, learning difficulties, poor operative functioning, absence of curiosity, poor linguistic development).
3. *Self-perception's distortion and systems of meaning's distortion* (low self-esteem, corporeal image's disorders, body boundaries' deficiency and separation from the others, sense of shame, apprehended sense of impotence and guilt, new abuses' expectation).
4. *Interpersonal difficulties* (dysfunctional attachments, difficulty trusting others, poor interpersonal efficiency, sexual problems in adulthood, new abuses, poor social abilities).
5. *Somatisation and biological dysregulation* (digestive problems, migraine, conversion symptoms, sexual symptoms, chronic pain, energy loss, cardio-pulmonary symptoms, analgesia, equilibrium disorders and proprioception's disorder, sensorial integration's difficulty).

According to van der Kolk (2005) an adequate identification of the complex trauma "t" is pivotal, for it would supply a more realistic representation of the

comorbidity diagnosis, often overestimated because not included in a post-traumatic picture.

Further thoughts are suggested by the observation of the Post-Traumatic Stress Disorder in adolescents. In teenagers, PTSD manifests itself mainly through intrusive images, of which frequently they are unable to talk about, agitation and aggressiveness, sleep disorders and concentration problems.

In this age group it appears evident a change in habits, and specific symptoms like dulling and avoidance manifest themselves through the loss of interest in activities considered before as source of wellness and through an impoverishment of familiar and amicable relationships.

In the presence of repeated and prolonged traumas adolescents can suffer from disassociative disorders, psychotic symptoms, sadness, affective restriction, self-aggressiveness, bursts of anger and abuse of substances.

According to Lubit and colleagues (2003), when traumatic experience concerns an abuse, the adolescent can manifest also somatic complaints, loss of control, hostility and sense of impotence, by putting in place sexual actions or an inability to maintain good social relationships.

Caregivers and relational traumas "t"

Researches that aimed to verify a potential correlation between age of exposition to the trauma, PTSD occurrence and gravity of the same, have produced discordant results because such disorder manifests itself in different ways in children and teenagers, according to the different development levels, as it is demonstrated by Hamblen e Barnett (2009), or also with reference to the relational context of caregiving (Sheeringa et al. 2004).

This last piece of information is very important in the clinic case conceptualisation and its following treatment. It appears in fact important to wonder how the attachment comes into play when we deal with traumas. If it is true that the traumatic experience can influence the quality of attachment, it is also true that the quality of attachment can be a risk factor or protective factor for the elaboration of such experience from a child or a teenager.

As already stated, we have to distinguish the more or less single traumas that can easily incline the child to develop an acute or chronic PTSD from the relational traumas repeated in infanthood, which can generate the Developmental Trauma Disorder picture.

The Post-Traumatic Stress Disorder can arise not only following macroscopic events, but also following the exposition to less strong but repeated in time experiences, which have a cumulative effect in time giving birth to what van der Kolk and colleagues defined a "traumatic atmosphere" (2004). Baranello in 2000 defined the minor intensity trauma as an ensemble of situations which, if isolated, do not cause negative effects, but if repeated in a dysfunctional relational context become traumatic.

The child's reactions towards the traumatic event depend significantly on the relational context of caring in which he lives (Sheeringa 2004), boosting or weakening the impact that the traumatic event can have on the child.

Internal and external risk factors

Among the internal risk factors determining a higher vulnerability of the child to the development of PTSD the United States Department of Health and Human Services (2011) highlights Mental Retardation, Emotional Disorders, Sight and Acoustic Deficit, Specific Learning Disorders, physical disabilities, behavioural problems and other medical issues.

Lubit in 2011 talks also about a genetic predisposition towards the development of Post-Traumatic Stress Disorder, related to temperament and to the hypothalamic-pituitary axis' reactivity.

On the other hand the external risk factors are related to the traumatic experience entity, to the parents' reactions, surely weakened as stated above by the presence of a potential traumatic story pertaining to them and by the child's degree of involvement in the traumatic experience (Hamblen and Barnett 2009).

EMDR

In 2013 the World Health Organization's guidelines suggested EMDR for children, adolescents and adults diagnosed with PTSD, since it is finalized to the reduction of the subjective stress level and the strengthening of the adaptive cognitions linked to a traumatic event.

The essential theory on which the application of EMDR is based and on which the treatment's cognitive action relies, is the Adaptive Information Processing (AIP), developed over the years by Shapiro (1995-2002). According to this model, the sensorial inputs forming an experience are automatically integrated with already existing information originated from past experiences, which create the sense of the event. Cognitive schemes work also as filters, selecting useful information and discarding others, codifying and categorizing them, thus guiding the attribution of meaning to an experience. The main function of this process is to guide the future answers of the individual. In case of traumatic memories, this innate brain process goes through some changes, experiencing an interruption of the appropriate mnestic neural networks.

The general scope of EMDR is to exploit a brain physiological process, through which it is possible to access the recollection that has been dysfunctionally memorized, and employs the natural neural processes to memorize the same recollection adequately. The final result is an assimilation of the new information into existing memory structures. When this happens, people are able to verbalize coherently and logically the event, and this provides new acquisitions for their lives.

The hypothesis proposed to explain this activation and facilitation of elaboration through the ocular movements are several. Among these we find:

- *Orientation response*: it is possible that ocular movements stimulate the search for the orientation reflex. According to this hypothesis ocular movements reduce the arousal level with respect to the control condition in the absence of these movements.
- *Relaxation response*: it is hypothesized that these movements produce a conditioned relaxation response by activating the parasympathetic system and inhibiting the sympathetic one.
- *Distraction*: ocular movements distract the patient from his/her trauma, allowing a deconditioning due to the incapacity of the patient to fully concentrate on the traumatic image.
- *Synaptic changes*: these movements would provoke neural jolts, facilitating the elaboration.
- *REM sleep*: it was suggested a parallel with the processes activated by REM sleep phases. It

appears in fact that REM sleep has this function of elaboration and information storage.
– *Hemispheric involvement*: with EMDR it is observed a synchronisation of the two cortical hemispheres' slower brainwaves activities.

The hypotheses on how EMDR ocular movement triggers all this are still today object of discussion.

EMDR protocol for children and adolescents

The application of EMDR in children and adolescents therapies necessitates some protocol adjustments, for an increased attention towards children psychological therapies' peculiarity is required. Of paramount importance is the relationship with parents during treatment and the motivation's upkeep, for usually it is not the little patient who needs the psychotherapy treatment directly. Especially with children, it is required to work in a very concrete fashion, focusing more on images rather than on other kind of stimuli like cognitions and emotions. According to Greenwald (2000), it must be kept in mind that children's attention span is shorter, and their linguistic capability isn't yet sufficiently developed.

In accordance with what has been underlined by Greenwald (2000), the interventions to be considered can be summed up as follows:

1. *Alliance with parents*. The support of the treatment from parents is essential for the therapy's sustainability. Their fears and preoccupations need to find a space where to be listened to, not provoking any guilt feelings, which are counter-productive for the work with the child.
2. *Parents' physical proximity*. The child must know that he/she has the possibility to easily reach his/her parents. Parents, therefore, have to be nearby or, if the child is very young, stay right in the therapy room.
3. *Procedure explanation.* As with adults, so it is important with children to explain what it is going to be done.
4. *Therapeutic relationship*. Creating security and empathic listening conditions will grant a good relationship with the child.
5. *Respect of the child's timing*. If the child manifests a strong discomfort in facing the traumatic experience it is best to approach him/her by working first on less important disorders.
6. *Positive installations*. Positive installations allow the access to the trauma in safer conditions. Before proceeding with these images' consolidation it is possible to ask the child to draw them.
7. *Stop signals*. As with the adult, so to the child is given the possibility to halt the ocular movements with a stop signal agreed with the therapist.
8. *Physical discomfort*. In case the child reports physical pain it is good practice to end the treatment, unlike what happens with adults. The discomfort will then be possibly solved through the installation of a pain-healing image.

Another important issue concerns the modifications to standard protocol in order to grant its adjustment to therapeutic work with children, even the very young ones.

During the EMDR's eight protocol phases, some adjustments thought expressly for children are employed with no betrayal of the underlying approach:

– Phase one. In the anamnesis phase, all the contexts with which the child is in contact are to be considered: family and school for example. In particular, it is important the work with caretaking figures that can supply useful information (Greenwald 2000). Moreover, it appears important to evaluate whether the caregiver has unsolved memories himself, tied to the same trauma or to precedent traumatic experiences re-activated by the exposure to the present adverse condition.
– Phase two. In the preparation phase, during which treatment's terms and benefits are described, the therapist collects the informed consent from child and parents. The use of metaphors, in this case, can be very effective in the explanation of EMDR to children, given their strong adherence to reality. Greenwald (2000), for example, suggests some metaphors like the "video recorder" one, to see images of one's own memories as if watching a movie, or that one of the "sprained finger", to illustrate how, just like when a finger breaks, feelings can generate sufferance and it is necessary to wait for them to heal.
– Phase three. In the assessment phase, targets individuated by children can often refer to recent situations, seen the sheer concreteness that little ones are keen on. The individuation of an image can be supported by a drawing or a game. If there is neither an image nor a drawing to refer to, one will simply ask what does the child notice when he/she thinks to the chosen situation. As for the positive or negative cognitions, these can be referred in third person, by using a plush for example, so to ensure protection from an excessively strong emotional impact. The individuation of the disorder level too in children's therapy must follow the path of play, of drawing and of metaphor.
– Phase four. During ocular stimulations, a particular attention is given to the trend of the child's disorder level.
– Phase five. If in the initial phase the child didn't produce a positive cognition, in the subsequent phase of installation it will be sufficient for the child to be able to assert that the painful experience appears to be far away, and now he/she can feel safe.
– Phase six. It is asked to the child to report about physical sensations, but unlike the adult, it is good practice to stop if EMDR results to be uncontrollable.
– Phase seven. Before leaving the therapy room it is good to make sure that the child takes away with him/her a sensation of safety by letting him/her visualize a "recipient" in which is contained all that there is of painful still to be elaborated.
– Phase eight. In this phase, in order to verify the results obtained, it is possible to watch the child in the process of playing and share with the parents positive observations concerning the improvements that can be noted.

EMDR application on children and adolescents

Pellicer in 1993 already documented the efficacy of EMDR after a therapy session on a single case concerning a ten-year-old girl with recurring nightmares. In the same year Cocco and Sharpe (1993) successfully applied the treatment on a four-year-old boy with traumatic symptoms, through acoustic bilateral stimulation. One year later Greenwald (1994) reported that with one or two EMDR sessions the post-traumatic symptoms of

five children caused by hurricane Andrew's disaster receded. Two follow-up attempts of one week and four weeks were then made, and the observed improvements' retention was noticed. Chemtob and Nakashima in 2002 referred further positive results from the EMDR employment with children of an elementary school traumatized by hurricane Iniki, in Kauai, who resulted to be non-responders to a therapeutic plan adopted at that time and generally proven to be effective. This was one of the first studies adopting a (retarded) control group and independent evaluators. After three sessions, post-traumatic symptoms were reduced by an average of 58%, with maintenance of these results even several months later. Anxiety and depression symptoms as well receded significantly. In 1998 Puffer and colleagues conducted a study larger than the previous ones on a group of 20 children and adolescents between 8 and 17. Compared to the retarded control group, children subject to EMDR treatment saw their post-traumatic symptoms soothed after just one single session, concentrated on a single traumatic event.

These first clinical results laid the foundations for further studies, more recent, whose characteristics have often been very heterogeneous. In 2002 Soberman conducted a study on 29 children and adolescents between 10 and 16 with Conduct Disorder, hypothesizing a causal relationship between exposition to trauma and CD development, since a high rate of traumas and traumatic symptoms is present in young people with this kind of disorder; clinical experience and diagnostic criteria teach us that a trauma can lead to many CD traits, and the fact of having suffered violence can generate in turn violent behaviours in the victim. On this basis, it has been evaluated EMDR efficacy in CD symptoms' reduction by acting on the trauma. EMDR has been integrated with a standard treatment (group therapy, family psychoeducation, special services) and compared to a control group with standard treatment without EMDR support. Unlike previous studies, Greenwald's suggested protocol guidelines were considered – therefore, lines adapted for children and adolescents have been employed. Since the obtained results proved that the experimental group achieved the same results as the control group on the CD symptoms' reduction, two important aspects are suggested: that is, EMDR can be considered a decisive support to standard therapies in the treatment of traumatic memories, and it can be extended to the treatment of several children and adolescents' disorders originated by traumas.

Another study that proved the effectiveness of EMDR support within a multimodal psychotherapy addressed to children was the one described by Tulfnell (2005). Four children between the age of 4 and 11 with PTSD caused by a car accident have been observed. In this case too it was necessary to adjust the protocol to the children's development level. By observing closely the children's history, it is noticeable a panorama far more complex than the one depicted by the single accident's trauma. The children in fact showed multiple relational type traumas precedent to the accident, which contributed to the retention of post-traumatic symptoms and to their arousal, like abuses and abandonments, and the presence of caregivers who in turn had their own histories of traumatic events. The treatment was applied to the children's caregivers as well, and at the end of the therapy – which was after three months in which 3 to 7 EMDR sessions took place – the post-traumatic symptoms receded.

Notwithstanding the grave limits of Tulfnell's study, like the lack of controls and standardized measures, the observations that have been proposed make his research quite interesting. Multimodal therapy, in this instance, was deemed necessary in case the subjects would present multiple traumas, as it was necessary according to the author to operate on the maintenance factors in those cases where children still dwelled on traumatic situations that perpetuated the symptoms.

A 2009 study by Hensel was concentrated on a sample of 32 children and adolescents between 1 and 18 years of age. The traumatic events within the sample regarded single traumas like sexual abuse, animal attack, car accident, fire accident, one's house collapsing, group aggression and aggression testimony. Of the 32, only 2 reached the full PTSD diagnosis, while the others claimed post-traumatic symptoms like fear of the dark, separation anxiety, insomnia, phobias, and regression's manifestations. Compared to the control group on the waiting list, the experimental condition evidenced a higher symptoms' regression, improvements that remained stable even at the time of follow-up six months after. Unlike the prior study, though, in the control group it was observed a significant disorders' reduction, probably due to the passing of time, which allowed a spontaneous decrease. The sample's age range was divided in pre-school age (1-6 years) and school age (6-18 years). The treatment was effective for both age ranges, although older children evidenced a better reaction to the therapy compared to younger ones, probably because older age enabled a more cooperative alliance with the therapist, and a higher awareness augmented the motivation towards therapy.

This study highlighted an important clinic aspect about the possibility of treating children with EMDR, that is the potential extension of the therapy to children below 4 years of age and with mental disorders, as in the case of a child from a sample affected by autism. The research has furthermore proven the applicability and efficacy of EMDR also in cases of children who, even if satisfying PTSD diagnostic criteria, present symptoms caused by a traumatic event.

The results emerged from the named researches illustrate clearly that the treatment of disorders in infancy, childhood and adolescence, and in particular in the employ of EMDR treatment, subject of this article, some variables appear of paramount importance as determining element in facilitating or hindering post-traumatic symptoms' regression. Among these, borne by the treated children, appears the presence of traumatic life experiences constellated by numerous relational traumas preceding the trauma that originated the symptoms, the so-called multiple traumas "t", and the possibility to treat also caregivers, especially when parents result to be traumatized themselves by adverse relational experiences prior to the trauma.

1.Method

1.1 Selection of studies

It was conducted a literature search concerning the effects of EMDR treatment on symptomatologic pictures derived by Post-Traumatic Stress Disorder diagnosis in children and adolescents.

In the first instance we analysed studies traceable in digital databases like PsycINFO, MEDLINE, Google Scholar and Cochrane Library. Databases were explored by using a series of keywords in different combinations: EMDR, Eye Movements, Reprocessing, trauma, PTSD, traumatic stress Disorder, child, adolescence, therapy.

Secondly, the traditional research method was

employed, targeting revisions and articles that reported experimental studies on PTSD treatment in infants, children and adolescents.

1.2 Inclusion criteria

The inclusion criteria adopted to proceed in the revision are the following:

1. Studies had to consider in their method the presence of a control group (children and adolescents receiving a different kind of psychotherapy treatment specific for PTSD, or else children and adolescents waitlisted for the treatment).
2. Children and adolescents had to be treated for a post-traumatic stress symptomatology.
3. The presence of a randomization criterion in the selection of patients for the experimental group and the control group.
4. Studies had to include very young children up to 18-year-old adolescents maximum.
5. Studies had to pertain to a temporal range dating from 2007 to now.

The literature search produced six studies matching all the inclusion criteria, which have been the subject of revision and successive contemplation.

2. Results

The objective of the first study we examined (*Ahmad* et al. 2007) was to analyze the efficacy of EMDR treatment for children with post traumatic stress disorder (PTSD) compared with untreated children in a waiting list control group (WLC) partecipating in a randomized controlled superiority trial (RCT). Thirty-three 6-16-year-old children with a DSM-IV diagnosis of PTSD were randomly assigned to eight weekly EMDR sessions or the WLC group. The Posttraumatic Stress Sympton Scale for Children (PTSS-scale) was used in Interviews with children to evaluate their symptoms and outcome. Post treatment scores of the EMDR group were significantly lower than the WLC indicating improvement in total PTSS-C scores, PTSD related symptom scale, and the subscales re-experiencing and avoidance among subjects in the EMDR group, while untreated children improved in PTSD-non-related sympton scale.

Kemp and colleagues (2010) investigated in a wait-list controlled pilot study the efficacy of four EMDR sessions in comparison to a six-week wait-list control condition in the treatment of 27 children (aged 6 to 12 years) suffering from persistent PTSD symptoms after a motor vehicle accident. An effect for EMDR was identified on primary outcome and process measures including the Child Post-Traumatic Stress-Reaction Index, clinician rated diagnostic criteria for PTSD, Subjective Units of Disturbance and Validity of Cognition scales. All participants initially met two or more PTSD criteria. After EMDR treatment, this decreased to 25% in the EMDR group but remained at 100% in the wait-list group. Treatment gains were maintened at three and 12 month follow up.

The primary aim of the *Roos*'s study (2011) was to compare the effectiveness and efficiency of Cognitive Behavioural Therapy (CBT) and Eye Movement Desensitisation and Reprocessing (EMDR). Fifty-two children and adolescence aged 4-18 were randomly allocated to either CBT or EMDR group in a disaster mental health after-care setting after an explosion of a fireworks factory. All children received up to four individual treatment sessions over a 4-8 week period along with up to four sessions of parents guidance.

Both treatment approaches produced significant reductions on all measures and results were maintained at follow up. Besides gains of EMDR were reached in fewer sessions.

The *Diehle*' S study (2015) investigated the effectiveness and efficiency of CBT and EMDR treatment. Forty-eight children (8-18 years) were randomly assigned to eight sessions of TF-CBT or EMDR.

TF-CBT and EMDR showed large reductions from pre-to post-treatment on the Clinician-Administered PTSD Scale for Children and Adolescence (CAPS-CA). The difference in reduction was small and not statistically significant. Parents of children treated with TF-CBT reported a significant reduction of comorbid depressive and hyperactive symptoms.

An Indian study (*HaasanzadehMoghaddam and Khalatbari* 2016) investigated EMDR therapy on children with post traumatic disorder (PTSD) in traffic accidents. The research population consisted of children 7-11 years old in Teheran city who are surviving to a serious traffic accidents in 2014 that after screening twenty children selected who had the highest prevalence PTSD and randomly divided into two groups of ten patients: the first group, called control group and second was experimental group. As a result, it stated that EMDR therapy has been effective on depression and stress in children with post traumatic stress disorder.

Study	Year	Traumatic event/ behaviour	Reported diagnosis of PTSD	N EMDR	N Study controls	N Session	Age EMDR	Type of study control
Ahmad, Larsson	2007	Multiple types	DSM IV	17	16	8	6-16	Waiting list
Kemp	2010	Motor vehicle accident/major depressive Disorder and ADHD	DSM IV	12	12	4	6-16	Waiting list
De Roos	2011	Disaster	DSM IV	19	21	4	4-18	FT-CBT
Diehle	2015	Multiple types	DSM IV	25	23	12	8-18	FT-CBT
Haasanzadeh Moghaddam	2016	Car accident	DSM IV	10	10		7-11	Waiting list

3. Discussion

The aim of this review of EMDR in children with PTSD was to examine the efficacy of the treatment when compared to control groups or to well-established trauma treatments for children. The results of the analyzed studies indicate that children receiving EMDR treatment seem to benefit from this therapy sessions in accordance with the results of many recent studies on adults (Bradley et al. 2005, Davidson and Parker 2001).

If we compared EMDR treatments to other trauma treatments, for example Trauma Focused cognitive behavioural therapy, EMDR presents a little but significant incremental value. And the one of the most important result in these recent studies is the fewer sessions of treatment, using EMDR, associated with more positive outcomes.

Besides, this review shows that studies using a combination of parents and children report appear more efficient.

Therapists treating children need to be trained to use new assessment and diagnostic criteria (DSM V 2013) for PTSD because the manifestation of the PTSD symptoms in children is not the same as in adults as a result of different developmental and environmental issues.

This review suggests that additional researches on children with PTSD symptoms have to pay attention to:

. Risk factors that contribute to the development of PTSD symptoms on children, for example type of trauma, single trauma (T trauma) or repeated trauma (t trauma);

. The importance of a parent's treatment to improve the positive outcomes of the child's treatment;

. The need of some more studies analysing EMDR treatment on very little children.

Bibliography.

Ahmad A, Larsson B, Sundelin-Wahlsten V (2007). EMDR treatment for Children with PTSD: Results of a randomized controlled trial. *Nordic Journal of Psychiatry* 61, 5, 349-354.

APA (1980) *Diagnostic and Statistical Manual of Mental Disorders*, 3 Edition. American Psychiatric Association, Washington.

- (1987) *Diagnostic and Statistical Manual of Mental Disorders*, 3 ed. R. American Psychiatric Association, Washington.

- (2000) *Diagnostic and Statistical Manual of Mental Disorders: DSM IV-TR.* American Psychiatric Association, Washington.

- (2013). *Diagnostic and statistical manual of mental disorders* (DSM-5®). American Psychiatric Pub.

Baranello M (2000). Trauma sociale, trauma relazionale e microtrauma: per una differenziazione eziopatogenetica tra PTSD e BPD. *SRM Psicologia Rivista* 3-4, www.psyreview.org

Bradley R, Greene J, Russ E, Dutra L & Westen D (2005). A multidimensional meta-analysis of psychotherapy for PTSD. *American journal of Psychiatry* 162, 2, 214-227.

Chemtob CM, Nakashima J, Hamada RS and Carlson JC (2002). Brief Psychological intervention for elementary school children with disaster-related post traumatic stress disorder: a field study. *Journal of clinical psychology* 58, 1, 99-112.

Cocco N and Sharp L (1993). An auditory variant of Eye Movement Desensitization in a case of childhood post-traumatic stress disorder. *Journal of Behavior Therapy and Experimental Psychiatry* 24, 313-371.

Davidson PR and Parker K (2001). Eye movement desensitization and reprocessing (EMDR): a meta-analysis. *Journal of Consulting and clinical Psychology* 69, 2, 305-316.

De Bellis MD and Zisk AB (2014). The biological effects of Childhood trauma. *Child and Adolescent Psychiatric clinics of North America* 23, 2, 185-222.

Diehle J, Opmeer BC, Boer F, Mannarino AP & Lindauer RJ (2015). Trauma-focused cognitive behavioral therapy or eye movement desensitization and reprocessing: what works in children with posttraumatic stress symptoms? A randomized controlled trial. *European child & adolescent psychiatry* 24, 2, 227-236.

de Roos C, Greenwald R, den Hollander-Gijsman M, Noorthoorn E, van Buuren S & De Jongh A (2011). A randomised comparison of cognitive behavioural therapy (CBT) and eye movement desensitisation and reprocessing (EMDR) in disaster-exposed children. *European Journal of Psychotraumatology* 2, 1.

Farina B and Liotti G (2011). Dimensione dissociativa e trauma dello sviluppo. *Cognitivismo Clinico* 8, 1.

Greenwald R, Smyth NJ & de Jongh A (2000). EMDR for the treatment of PTSD. *Journal of clinical psychiatry* 61.

Greenwald R (1994). Eye movement desensitization and reprocessing (EMDR): An overview. *Journal of Contemporary Psychotherapy* 24, 1, 15.

Hamblen J and Barnett E (2009). *PTSD in children and adolescents,* United States Dipartment of Veteran Affairs, National Center for PTSD, http://www.ptsd.va.gov/professional/pages/ptsd_in_children_and_adolescents_overview_for_professionals.asp.

Hassanzadeh Moghaddam M & Khalatbari J (2016). Investigating the Effectiveness of Eye Movement Desensitization and Reprocessing (EMDR) on Children with Post-Traumatic Stress Disorder (Traffic Accident). *The International Journal of Indian Psychology* 3, 3, 11, 45.

Hensel T (2009). EMDR with children and adolescents after single-incident trauma an intervention study. *Journal of EMDR Practice and Research* 3, 1, 2-9.

Herman JL (1992). *Trauma and recovery.* Basic Books, New York.

Kemp M, Drummond P & McDermott B (2010). A wait-list controlled pilot study of eye movement desensitization and reprocessing (EMDR) for children with post-traumatic stress disorder (PTSD) symptoms from motor vehicle accidents. *Clinical child psychology and psychiatry* 15, 1, 5-25.

Lubit RH, Rovine D, Defrancisci L & Eth S (2003). Impact of trauma on Children. *Journal of Psychiatric Practice* 9, 128-138.

Lubit RH (2011). *Post Traumatic Stress Disorder in children, Epidemiology,* Medscape Reference, Drugs, Diseases and Procedures, http//www.emedicine.medscape.com/article/918844-overview#a0199.

Pellicer X (1993). Eye movement Desensitisation treatment of a child's nightmares: A case report. *Journal of Behavior Therapy and Experimental Psychiatry* 24, 1, 73-75.

Puffer MK, Greenwald R & Elrod DE (1998). A single session EMDR study with twenty traumatized children and adolescents. *Traumatology* 3, 2, 6.

Rincón-Cortés M and Sullivan RM (2014). Early Life Trauma and Attachment: immediate and enduring effects on neurobehavioural and stress axis development. *Frontiers in Endocrinolog 5, 33.*

Scheeringa MS, Zeanah CH, Myers L & Putnam F (2004). Heart period and variability findings in preschool children with posttraumatic stress symptoms. *Biological psychiatry* 55, 7, 685-691.

Scheeringa MS, Zeanah CH, Myers L & Putnam FW (2003). New findings on alternative criteria for PTSD in preschool children. *Journal of the American Academy of*

Child & Adolescent Psychiatry 42, 5, 561-570.
Scheeringa MS & Zeanah CH (1995). Symptom expression and trauma variables in children under 48 months of age. *Infant Mental Health Journal* 16, 4, 259-270.
Shapiro F & Solomon RM (1995). *Eye movement desensitization and reprocessing.* John Wiley & Sons, Inc.
Shapiro F (2002). EMDR 12 years after its introduction: past and future research. *Journal of clinical psychology* 58, 1, 1-22.
Soberman GB, Greenwald R & Rule DL (2002). A controlled study of eye movement desensitization and reprocessing (EMDR) for boys with conduct problem. *Journal of aggression, maltreatment & trauma* 6, 1, 217-236.
Tufnell G (2005). Eye movement desensitization and reprocessing in the treatment of pre-adolescent children with post-traumatic symptoms. *Clinical Child Psychology and Psychiatry* 10, 4, 587-600.
U.S. Department of Health and Human Services. Administration for Children and Families, Administration on children, Youth and Family, Children's bureau, Child maltreatment (2010) *http://www.acf.hhs.gov/programma/cb/stats_research/Index.htm#can* (2001).
van der Kolk BA (2005). Developmental Trauma Disorder: toward a rational diagnosis for Children with complex trauma histories. *Psychiatric Annals* 35, 401-408.
Van der Kolk BA (2004). Psychobiology of posttraumatic stress disorder. *Textbook of biological psychiatry* 319-338.
Verardo AR (2010). Il disturbo post traumatico da stress nel bambino. In Simonetta E (ed) *Esperienze traumatiche di vita in età evolutiva: EMDR come terapia,* pp. 32-40. Franco Angeli, Milano.
World Health Organization (WHO)-The ICD-10: *Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*, Washington, 1992.