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Present and future of EMDR in clinical psychology and psychotherapy, volume III

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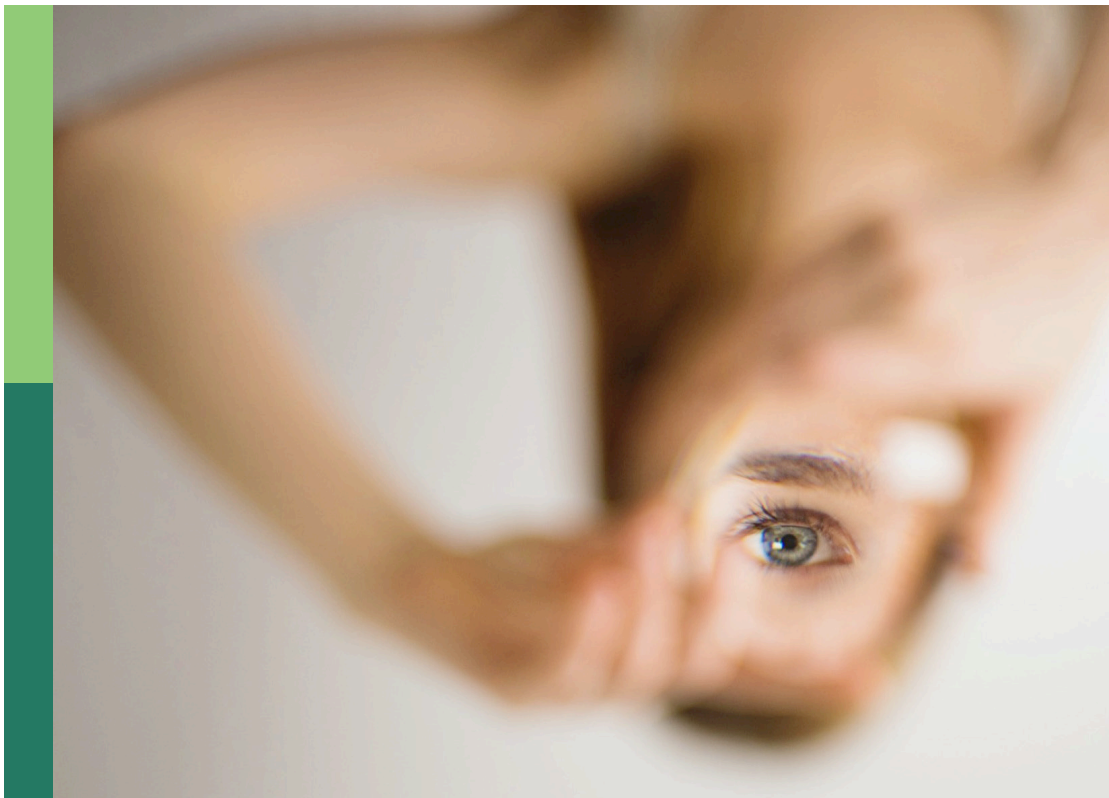

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Present and future of EMDR in clinical psychology and psychotherapy, volume III

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Editorial: Present and future of EMDR in clinical psychology and psychotherapy, volume III

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Editorial on the Research Topic
Present and future of EMDR in clinical psychology and psychotherapy, volume III

In the evolving landscape of mental health treatment, Eye Movement Desensitization and Reprocessing (EMDR) therapy continues to stand out as one of the most transformative therapeutic approaches. Building on the foundations laid in the previous two volumes (Castelnuovo et al., 2019; Onofri, 2023), this third installment of *Present and Future of EMDR in Clinical Psychology and Psychotherapy* advances both theoretical understanding and clinical applications of EMDR therapy, expanding its scope beyond traditional trauma treatment.

Volume I, published in 2017, introduced a wide array of clinical evidence, showcasing EMDR therapy's effectiveness across conditions such as PTSD (Yurtsever et al., 2018; Wilson et al., 2018; Moreno-Alcázar et al., 2017), panic (Horst et al., 2017), depression (Hase et al., 2018; Ostacoli et al., 2018), somatic disorders (Szpringer et al., 2018) and other conditions (Carletto et al., 2018; Valiente-Gómez et al., 2017).

Volume II, released in 2023, highlighted EMDR therapy's adaptability also during the COVID-19 pandemic and its integration with other therapeutic modalities (Lazzaroni et al., 2021, 2022; Faretta et al., 2022; Yurtsever et al., 2022; Fernandez et al., 2022; Farrell et al., 2022). Together, these works have underscored the sustained growth and innovative evolution of EMDR.

This third volume reflects a further understanding of EMDR therapy's mechanisms, emphasizing its flexibility and broad applicability.

As we introduce the third volume of *Present and Future of EMDR in Clinical Psychology and Psychotherapy*, we continue to witness significant advancements in the application and understanding of Eye Movement Desensitization and Reprocessing (EMDR) therapy. In recent years, research has proliferated, demonstrating the efficacy of EMDR therapy in addressing trauma (Wright et al., 2024; Torres-Giménez et al., 2024; Matthijssen et al., 2024), panic (Inci Izmir et al., 2024), eating disorders (Rossi et al., 2024), mood disorders (Seok and Kim, 2024), psychosis (Varese et al., 2024; Marlow et al., 2024; Every-Palmer et al., 2024; Strelchuk et al., 2024), chronic pain (Vock et al.), and various other psychological conditions (Rodríguez-Garay and Mosquera, 2022; Martínez-Fernández et al., 2024; Schipper-Eindhoven et al., 2024; Zat Çiftçi et al., 2024; Stingl et al., 2024; Bal and Kiriş, 2024; Hafkemeijer et al., 2024). This volume reflects the ongoing commitment of the EMDR community to explore new clinical areas and expand our understanding of its therapeutic potential.

While previous volumes have made substantial contributions validating the effectiveness of EMDR therapy and uncovering its underlying mechanisms (Landin-Romero et al., 2018; Pagani et al., 2017; Matthijssen et al., 2017; Hase et al., 2017), it is becoming increasingly important that future research also turns its focus toward the therapeutic process itself (Ramallo-Machin et al.). Understanding how EMDR unfolds in real-time within the therapeutic relationship (Hase and Brisch, 2022), and what factors contribute to its success beyond mechanistic or outcome-driven research, could illuminate pathways to more individualized and effective interventions. In addition this volume reflects the development of the EMDR technique to the comprehensive psychotherapy which EMDR therapy is.

The articles included in this volume mark a decisive step forward in this direction.

More than one contribution, for example, emphasize the importance of therapist-patient attunement, the nuances of countertransference, and the role of emotional resonance during sessions (Ramallo-Machin et al.; Hase et al.). These elements remind us that EMDR is not merely a technique applied in isolation but part of a dynamic interaction where the relational and emotional context is critical, as it is EMDR therapy.

Looking ahead, we must encourage future research to delve deeper into these relational processes. By studying not only *what* makes EMDR therapy effective but *how* it works within the therapeutic alliance, we will be better positioned to refine our approaches and enhance the quality of care. A broader inquiry into the therapist's emotional regulation, sensitivity to patient cues, and the co-creation of a safe therapeutic space could offer invaluable insights.

Additionally, while the drive to reveal the neurobiological mechanisms of EMDR therapy has so far provided essential data, the complexity of the therapeutic process cannot be fully captured by brain scans or quantitative measures alone. We must balance the quest for scientific validation with a richer understanding of the lived experiences of both patients and therapists within the EMDR therapy framework. Future studies should aim to include qualitative methods that explore the subjective, emotional, and interpersonal dimensions of EMDR therapy, thus complementing the current focus on empirical outcomes.

This volume surely underscores the continuing evolution of EMDR therapy as a clinical tool, and it is an honor to present the contributions of distinguished researchers and practitioners. As we look toward the future, let us prioritize not only the technical refinement of EMDR therapy but also a deeper exploration of the relational and emotional processes that make it such a profoundly transformative therapy.

Acknowledging EMDR Europe's role in advancing research

Before delving into the key contributions of this volume, we wish to recognize the critical role that EMDR Europe has played in fostering research and clinical excellence. Their continuous commitment to advancing empirical research has driven significant progress in the development of EMDR therapy treatment plans, often referred to as protocols. Many recent research owe much to their support, which has fortified the scientific underpinnings of EMDR therapy, securing its position as an evidence-based approach to trauma and beyond.

Rapid growth of EMDR research

The body of research surrounding EMDR therapy is growing rapidly, with a notable shift in geographical focus. While the United States has historically been the center of EMDR therapy research in the beginning, Europe has emerged as a significant contributor. Countries such as the Netherlands, Spain, the UK, Italy, and Germany are leading the way, advancing the field through robust research initiatives. Moreover, emerging states are beginning to explore and implement EMDR therapy, signaling a broader international interest and EMDR therapy's expanding reach.

Key contributions of volume III

This volume features a range of contributions that deepen our understanding of EMDR therapy's applications. The articles exemplify the versatility and impact of EMDR therapy, from its integration with attachment theory to novel applications in pediatric oncology. A brief overview of the four main articles in this volume follows:

1. ***The Therapeutic Relationship in EMDR Therapy - A survey*** (Hase et al. 2024): This study revisits the foundations of EMDR therapy's development, particularly the evolution of the Adaptive Information Processing (AIP) model, and explores the role of the therapeutic relationship within an attachment framework. Based on a modified Delphi method, the study gathered insights from EMDR therapists to assess the attachment-based concept of the therapeutic relationship in EMDR therapy. Results support this perspective, highlighting the importance of the therapeutic bond, and suggesting implications for training and clinical application.
2. ***Apples and Oranges: Comparing PTSD Patients and Healthy Individuals in Bilateral Stimulation Responses*** (Pape et al. 2024): This study investigates physiological and subjective responses to bilateral stimulation (BLS) among PTSD patients compared to healthy individuals. Findings indicate distinct differences: while healthy individuals displayed reduced distress and enhanced attention under BLS, PTSD patients showed subjective relief without corresponding physiological changes. These results caution against assuming that BLS responses in healthy populations are directly transferable to clinical PTSD contexts.
3. ***Factors Influencing Quality of Processing in EMDR Therapy*** (Ramallo Machin et al. 2024): This article introduces the Processing Difficulties Scale (PDS), developed to identify and address in-session processing challenges specific to EMDR therapy. The study highlights the impact of complex trauma, dissociative symptoms, and emotional dysregulation on processing effectiveness, particularly in clients with early traumatization. This new scale offers a promising tool for optimizing therapeutic outcomes by tailoring interventions to address processing styles and challenges effectively.

4. ***EMDR in Pediatric Psychology: A Case Report of an Adolescent with Cancer*** (Zucchetti et al. 2024): A groundbreaking case study explores the application of EMDR therapy in treating PTSD symptoms in a 17-year-old cancer patient, a novel approach in pediatric oncology. The case demonstrates the EMDR therapy protocol's effectiveness in reducing emotional distress related to a leukemia diagnosis, supporting its potential as an early intervention in pediatric oncology settings.

Looking toward the future: EMDR therapy's expanding frontiers

As this third volume reveals, the future of EMDR therapy continues to unfold in promising directions. Innovations such as the Processing Difficulties Scale offer new insights into optimizing EMDR therapy sessions, particularly for complex trauma cases. With growing interest in integrating EMDR therapy with cutting-edge technologies, there is immense potential to create more immersive therapeutic experiences. Additionally, emerging research suggests EMDR therapy's applicability for somatic conditions like chronic pain, representing a new frontier in mind-body approaches.

Conclusion

The research compiled in *Present and Future of EMDR in Clinical Psychology and Psychotherapy, Volume III* reflects the ongoing growth and innovation within EMDR therapy. Building on the solid foundations of Volumes I and II, this volume brings fresh perspectives and expands the evidence base for EMDR therapy's use in diverse settings and populations. Thanks to EMDR Europe's steadfast support in the field of research, the field is moving toward higher scientific rigor and broader accessibility, ensuring that EMDR therapy will continue to play a vital role in trauma-informed care and in psychotherapy in general worldwide for years to come.

Author contributions

AO: Writing – original draft, Writing – review & editing. MH: Writing – original draft, Writing – review & editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that Gen AI was used in the creation of this manuscript. AI has been used for the initial translation from Italian into English of the manuscript.

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EMDR in pediatric hospital setting: a case report of an adolescent with cancer

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Introduction: Childhood cancer is rare, but it is the most frequent serious event with a high risk of traumatization for children, adolescents, parents and siblings. EMDR is widely studied as clinical intervention that addressed cancer-related stressors among cancer adult population, but to our knowledge, no researches have been conducted among children and adolescent with cancer.

Methods: The purpose of this case study is to describe for the first time the application of the EMDR protocol in a pediatric hospital setting with a 17-years-old Italian adolescent who received a diagnosis of leukemia. He accessed the psychological support service complaining of feelings of anxiety and general discomfort. EMDR protocol started after the diagnosis and ended after the usual eight phases. The Impact of Event Scale—Revised (IES-R) was used to assess stress disorders symptoms as outcome at the baseline (before the First Phase) and at the end of the EMDR protocol (after the Eight Phase).

Results: By using EMDR protocol the patient reported a decrease of emotional activation after a few EMDR sessions.

Conclusion: EMDR protocol may be effective for pediatric cancer patients in treating stress disorders symptoms and it can be proposed immediately after diagnosis as a standard care also in pediatric hospital setting.

KEYWORDS

pediatric oncology, cancer, EMDR, psychotherapy, pediatric hospital, case report, adolescents

Introduction

Cancer in children or adolescents is rare, but it remains the most frequent serious event in the pediatric age group. Every year, about 2,300 new cases of childhood cancer are recorded in Italy: 1,400 cases in the 0-14-year age group and 900 cases in the 15–19-year age group (AIRTUM Working Group, 2013). In the pediatric oncology field, oncological diagnosis represents a traumatic event not only for patients but for the entire families (Faretta et al., 2016; Van Warmerdam et al., 2019; Zucchetti et al., 2022). It evokes a sense of threat to a person's sense of vulnerability, or a loss of control, a sense of helplessness (Mercadante et al., 2004; Carlsson et al., 2019). Growing body of research indicates that posttraumatic stress disorder (PTSD) and symptoms (PTSS) are some of the most important

psychological consequences for those affected by childhood cancer (Portigliatti Pomeri et al., 2021), as well as their parents and siblings (Tremolada et al., 2016; Koutná et al., 2022). The traumatic experience of cancer illness usually starts at diagnosis communication, continuing throughout the course of care until the end of treatment and beginning of the survivorship phase (Zucchetti et al., 2023). Every moment of the oncological journey represents a potentially traumatic experience: the first access to the hospital/emergency room, receiving test results, diagnosis communication, the beginning of treatment, hospitalization, physical changes, surgical intervention, disease relapse and, for some, also the palliation phase. Common symptoms during these moments are post-traumatic stress, anxiety, mood and sleep problems, flashback, frequently worries, hyper-arousal, negative cognition and mood, anxiety, depression and fear (Lewandowski et al., 2011; Pinquart and Shen, 2011; Marusak et al., 2019). During adolescence these symptoms can get worse since that adolescence is the most delicate phase of life for all the development tasks and cancer diagnosis in this stage of life can interrupted or undermine the growth's process. Adolescent with cancer must interrupt school attendance, have to stay isolated because of illness, have to give up seeing friends, have to face physical changes. The most delicate thing they face, however, is the fear of illness and the fear of death. Fear of cancer recurrence or progression, anxiety and depressive symptoms are frequently reported problems among adolescent's cancer patients (Sun et al., 2019). Nonetheless, particularly during the survival phase, have also been described positive consequences named as posttraumatic growth (PTG) and occur in the domains of personal strength, relating to others, appreciation of life, new possibilities and spirituality (Turner et al., 2018). Psychosocial support is provided to adolescents with cancer by psychologists who follow the main guidelines of the psychoncology field implemented in the main center of the Italian Pediatric Hematology Oncology Association (AIEOP). This support, that consists in individual psychotherapy, psychoeducational intervention and/or clinical group support is provided routinely from the moment of the diagnosis, during treatment and after the end of the medical treatment (Zucchetti et al., 2023). Also, to support this delicate stage of life, many educational and recreational activities are offered to adolescents such as sports. From literature we known that the benefits and the skills learned from these activities, in addition to having a positive effect on social connection (Sebri et al., 2019; Durosini et al., 2021), can be transferred to other contexts that concern the psychological sphere such as body image and romantic relationships by also reducing typical negative symptoms such as for example stress experienced by cancer adolescents. In addition to these successful interventions for adolescents cancer patients, some studies are highlighting the potential of an innovative approach that is the Eye Movement Desensitization and Reprocessing (EMDR). This type of intervention has significant effect on stress symptoms among other populations, such as oncological adult patients (Capezzani et al., 2013; Faretta, 2014, 2018; Faretta and Civilotti, 2016; Faretta et al., 2016). To date, to the best of our knowledge, no studies have investigated the efficacy of EMDR therapy in the treatment of stress disorders symptoms experienced from cancer adolescent. The purpose of this case study is to describe for the first time the implementation of EMDR protocol for the treatment of a male cancer adolescent patient admitted for cancer treatment in a pediatric hospital setting. Our main hypothesis is that EMDR can be effective in reducing stress symptoms. CARE guidelines for writing a patient case report in a checklist were used to enhance the manuscript process (Supplementary material 1).

Patients information

Enrico (pseudonym) was diagnosed with a rare form of childhood leukemia and he was admitted at the Pediatric Oncology Department of the Regina Margherita Children's Hospital, one of the main pediatric hospital in Italy (Zucchetti et al., 2018). Socio-demographic characteristics of Enrico are: 17-years-old adolescent, he is a student, very dedicated and interested in school. He is an only child, he lives with his caregiver. Socio-demographic characteristic of his caregiver are: Enrico's mother is 45 years old, she is an educator. Enrico's father is 48 years old, he is an employee. They are married, both high school graduated. Place of residence is out of city. No significant event reported in last years. Enrico's medical treatment includes lengthy hospitalization for chemotherapy treatments and pain therapy. The course of treatment was expected to last about 2 years. Enrico and his family are offered the participation to the clinical and research psychological protocol named EMDR_ITA_PED approved by the Ethics Committee of AOU Città della Salute e della Scienza of Turin (Prot. No. 0073656; July 2022). The protocol provides in addition to standard psychological support also the EMDR treatment. Inclusion criteria are: patient diagnosed with oncohematology disease; age range $\geq$ 12 years old; acceptance informed consent. Exclusion criteria are: patients <12 years old; no acceptance of informed consent. All procedures performed were run following ethical standards of the institutional and/or national research committee. Before the study we informed patients and families about the aim and procedure of protocol EMDR Therapy and obtained their informed consent. For the Enrico's treatment we followed the EMDR Protocol proposed by Faretta et al. (2016), a specific protocol for cancer focused on difficulties related to different stage of the illness (Shapiro, 2001; Murray, 2010). The EMDR procedure was explained and we obtained consent for the treatment. No pharmacological treatment and other type of psychotherapy were provided before. The following is a brief description of the steps that will be followed:

> *Phase 1: Client history* - follows the standard EMDR protocol, with an increased focus on the self-disease relationship and significance of the disease in the patient's history.
> *Phase 2: Preparation* - follows the standard EMDR protocol, including time dedicated to psychoeducation on pain and oncological illness.
> *Phase 3: Assessment* - this is the only phase different from the standard EMDR protocol. Targets are related to traumatic experience due to illness, and to concerns and current issues (surgical intervention, treatments, hospitalization…).
> *Phase 4: Desensitization and reprocessing* - follows the standard EMDR protocol. In this phase the role of therapist as a "safe base" for patients is very important.
> *Phase 5: Installation* - follows the standard EMDR protocol and integrates the installation of positive cognition.
> *Phase 6: Body Scan* - is identical to standard EMDR procedure.

Phase 7: Closing the session - includes the imagery of health resources.
Phase 8: Re-evaluation - follows the standard EMDR protocol.

Diagnostic assessment

Quantitative measures: self-report questionnaire + time points

Psychological assessment was agreed with the EMDR Italy Association and then approved by the Ethics Committee of the AOU Città della Salute e della Scienza of Turin (EMDR_ITA_PED, Prot N. 0073656). The protocol provides an examination and assessment of each patient before the treatment in order to evaluate the appropriateness of the treatment and after the treatment in order to verify the effectiveness. Selected outcomes were collected at the beginning of the EMDR protocol (Time 0), and at the end of the protocol (Time 1), through the administration of some test. The first is the Impact Event Scale-Revised (IES-R), that is a 22-item self-report scale that measures subjective exposure to traumatic experiences with satisfactory values of internal consistency (overall Cronbach's alpha for the total IES-R was 0.94). The questionnaire requires to participant the naming of a specific stressful life event and then to indicate how distressed they have been by each listed stressful life event in the past 7 days on a 5-point scale. The other test we propose at Time 0 is the Distress Thermometer, a screening tools for measuring distress on a range 0–10 point Likert Scale. This scale includes also 4 sub-scale screening following problems: practical, family, emotional, physical, and spiritual. At Time 1 we proposed the same screening test as in Time 0 with the addition of the Post-Traumatic Growth Inventory Test composed by 21 items to assess positive outcomes reported by subjects who have experienced traumatic events using a scale ranging from 0 to 5. A higher score indicates a higher level of posttraumatic growth. Results about Enrico's assessment at Time 0 are: 8 at the Distress Test and more problems on a subscale of Emotive and Physical problems. At IES-R test results shows high scores on a subscale of Intrusion (= 3 on a range 0–4) and moderate symptoms in other subscale (Avoidance = 2,6 Hyperarousal = 2,75 on a range 0–4).

Therapeutic intervention

The EMDR protocol stared with Enrico immediately after the diagnosis communication. The intervention was proposed by the psychologist of the Pediatric Oncology Department, trained in the use of the EMDR method and supervised by the EMDR Italy Association. We proposed EMDR therapy also to his caregiver. Enrico's mum started EMDR therapy at oncological diagnosis but her psychotherapeutic course was not continuous. She continued to work and only on a few occasions accompanied E. to inpatient care. His father never expressed the need for psychotherapeutic support, but we only worked with him at a first level of intervention. Table 1 explains the specific content of EMDR intervention's phases and Figure 1 shows the stages and process of EMDR protocol by highlighting also some important time points of Enrico's course of treatment.

First phase: clinical assessment

Initial meetings with E. were focused on creating a therapeutic alliance. He was open to talking about his feelings of anger, mood changes and frustration. At an early point, E. reported specifically worries about schooling for the future months. In Italy, patients undergoing treatment cannot attend school due to the risk from the immunosuppression effect of oncology treatment. However, we proposed that E. participate in our Hospital School during treatments. Enrico cared a lot about school and while very organized he felt extreme fatigue during cancer treatment. He was afraid he would be unable to keep up with his studies, leading to significant anxiety. In order to not fall behind, he was forced to give up time usually devoted to his hobby and passion for music, and this created strong frustration in him. He shared that he often felt angry and volatile and no longer recognized himself. Enrico feared losing control. His caregivers appeared to be having some difficulties managing this situation, especially his mother.

Second phase: preparation

Identifying a patients' needs is part of phase one, through a good therapeutic alliance, and to reinforce emotional coping skills to restore to the patient a sense of self-efficacy and hope, safety and network support. E. needed help with his anxiety and feelings of not being able to do everything. His principal need was to recover his sense of efficacy to feel able to fight the situation. We used a psychoeducation intervention to explain the connection between his feelings and the oncological illness to help strengthen his sense of control of the events. We proceeded with the installation of a safe place for these purposes. E. chose the image of an isolated mountain lodge immersed in the green of nature connected to the word and feelings of well-being. With the aim of strengthening the self-help ability of E., we proceeded with resource installation. E. was feeling severely distressed by the disease and related physical changes leading to him feeling weak, incapable, tired, and defenseless. During Resource Development and Installation (RDI), E. identified three episodes when he felt confident after playing a concert. He reported that after overcoming a challenge during the concert he felt happy and relaxed. The first episode he referred to was a concert in which he performed with 3 other people. He was very anxious but it was a great experience; he was satisfied with his performance, he felt capable. He connected this memory with the words I'm capable. The second episode was a final exam at school, "the first big hurdle to be faced" for him: He described working hard despite his fear; his strength helped him and he was able to persevere and achieve success. He connected this memory with the words I can do it. The third episode of confidence was a relational resource: the relationship with his best friend. E. felt relaxed, safe, happy and carefree. With his friend he was able to stop worrying and he felt free. We used RDI to install a memory of a chess match when they laughed and he felt serene. E. connected these memories with the word joy.

Third phase: target selection

In this phase, dedicated to target selection, E. had to define clusters related to trauma connected with the experience of cancer illness. We asked him to identify the event and formulate a negative belief about himself (NC). The choice of target was a delicate moment for E. because in this phase he was suffering due to his treatment and medicine; he suffered from anxiety and, especially at night, he had severe crying fits, breathing difficulties, and moments of strong anger

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TABLE 1 Description of EMDR intervention phases.

Phases	Specific content, goal and reference
First phase: building therapeutic alliance and psychoeducation on the EMDR method	Psychologist during the first phase focused on building a positive relationship with patients. Explain EMDR methods doing psychoeducation and focuses the first few moments on stabilizing and focusing resources. Our goal in the early stages is to provide concrete help and try to stabilize patients, reinforce coping skills to restore a sense of self-efficacy. We collect the patient's personal history and begin to prepare our work on the traumatic events related to the disease. No significant events are reported. We proceed with the installation of safe place and RDI. E. reported about the image of a mountain immerged in the nature as a safe place. He would like to feel able to cope with the situation so he reported three episodes in which he felt capable.
Second phase: assessment	This phase is proposed in line with the specific protocol for cancer patients (Faretta, 2014), so target are related with cancer illness. We also administer test (IES-R and Distress Thermometer) as per protocol (described in methodology section) to have a more comprehensive assessment than the current emotional state of patients. To help Enrico the psychologist invited him to talk about his fears and most frightening thoughts related to what was happening (cancer illness). We invite patients to start with the most traumatic event. E. requires help about his anxiety due to the illness.
Third phase: target selection	Targets are related to traumatic experience due to illness, and to concerns and current issues. During this research he remembers from the first access to the hospital. Negative cognition from which we start is "I am helpless," Positive cognition is *"I can do it."* SUD = 8 VOC = 3.
Fourth phase: desensitization and changement	We start with desensitization with BLS. At the end SUD was 1 and VOC was 7-. He felt stronger and more appreciative of his own skills.
Fifth phase: installation of Positive Cognition (PC)	In this phase psychologist installed PC and asks the patient for feedback. E. felt himself stronger.
Sixth phase: body scan	Psychologist check whether the patient still perceives any negative feelings or distress. In body scan phase we did not meet any difficulties or barriers.
Seventh phase: closing and check	In this phase psychologist check patient's psychological state. We closed surely that E. was in a safe emotional condition.
Eighth phase: re evaluation	We conclude our treatment monitoring other moments of the course of care in order to continue an instantaneous processing of the potentially traumatic event. We conclude with the administration of test (IES-R, Distress Thermometer and Post-Traumatic Growth Inventory).

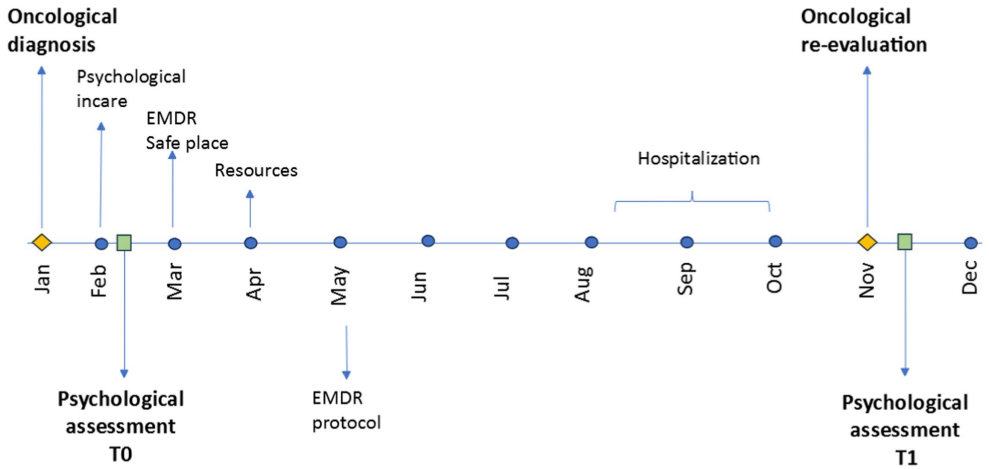

FIGURE 1
Time points.

that his mother tried to help him contain. In the morning he was quieter so we could work on his traumatic memories. During the search for triggers, he remembered the initial moments of his arrival at the hospital, starting with communication of the diagnosis when the doctor told him what his treatment would be. The traumatic imagines he evocated: the *oncologist at the door ready to go out while he remained still in the bed,* and *himself after the doctor went out, crying and banging his fist against the pillow.* He chose the first worst images

to be connected with the negative cognition *I am helpless.* His emotions were anger, frustration, and a strong weight on the chest. Positive cognition was *I can do it.* Perceived validity (VOC) = 3, Subjective Units of Disturbance Scale (SUD) = 8.

Fourth phase: desensitization and reprocessing

In this phase, we invited E. to undergo desensitization through Bilateral Stimulation (BLS). This is a delicate phase for patients, where a trusting relationship and therapeutic alliance are very important. E. used two sessions for this phase. Each session took 6 sets (using the wireless kit). During the first session, he reported a more vivid memory from which the mind tried to detach itself and return to its worst image, with the mind trying to escape (*Now the memory is more vivid; I'm a little more troubled, weighed down; my mind was trying to detach, random images...happy moments, the image is heavy; When I thought about anger, the image of me banging my fists against the pillow came back; Nothing new; My mind tried to escape*). At the end of the session, he reported SUD 8 and VOC 4. At the beginning of the second session, we verified that the SUD was 7 and VOC 5. After BLS, E. struggled to visualize the image and also the memory, which appears more blurred. The initial anger had turned to sadness. He was still struggling to relax (*Nothing, it seems less strong, I visualize it less; I struggle to visualize the memory, everything; I feel bitterness, sadness, it brings me back to the fact that I'm here, it's nothing new, I do not feel anger; I cannot focus on the memory, I'm not really relaxed right now*). At the end, the recorded SUD was 3 and VOC was 5. He said: *I realize actually, not...about the situation, but about the treatment, having to be here; My mind is not at all vulnerable today.* At the end of the last BLS, SUD was 1 and VOC was −7. *The minus figure is because in fact I have to stay here and that makes me think a little bit.*

Fifth phase: installation of positive cognition

Having reached SUD 1 and VOC 7-, accepting that minus as important but not a limitation to processing, we installed the positive cognition chosen and confirmed *I can do it* despite everything. The feedback during the installation was positive. E. felt stronger and more appreciative of his own skills.

Sixth phase: body scan

In recalling the event and focusing on PC, we focused on his body sensations to check for unpleasant sensations indicating distress. In this phase, we did not meet any obstacles and therefore proceeded with the BLS. E. was completely free of somatic tension or unpleasant feelings, instead feeling relaxed.

Seventh phase: closing the session

At this stage, when the session was complete and having ascertained that E. was in a safe emotional condition, we proceeded with a relaxation technique achieved through breathing and returning to the safe place.

Eighth phase: re-evaluation

In this final phase, E. did not make any reference to dreams or meaningful thoughts. In this first phase of cancer treatment, we focused our attention on the diagnosis communication, but significant moments of the illness were also monitored in order to continue an instantaneous processing of the traumatic event.

TABLE 2 Clinical findings across time points.

	T0	T1	Δ
IES-R *Subscale Intrusion*	3	1.6	1.4
Subscale Avoidance	2.6	2	0.6
*Subscale Hyperarousa*l	2.75	1.8	0.95
Distress thermometer Problem list	8	4	4
Emotive items	6 YES/0 NO (6/6)	3 YES/ 3 NO (3/6)	3
Practical items	2 YES/ 5 NO (2/7)	2 YES/ 5 NO (2/7)	0
Family items	1 YES/3 NO (1/4)	0 YES/4 NO (0/4)	1
Spiritual items	0 YES/ 1 NO (0/1)	0 YES/ 1 NO (0/1)	0
Physical items	7 YES/ 15 NO (7/22)	6 YES/16 NO (6/22)	1
Post traumatic growth inventory	–	5 (on a range 0–5) about: *feeling strong, cultivate new interests*	–

Outcomes

Table 2 shows the results of the EMDR Protocol between the two waves and the reduction of the stress symptoms in the patient at Time 0 and at Time 1. Results highlight at Time 0 high mean scores and close to the value for the presence of PTSD symptoms (Mean ≥ 3 on a range 0–4). Subscale that showed more important emotional activation at Time 0 is the Subscale of Intrusion (Mean = 3); Between Time 0 and Time 1 there is a reduction in emotional impact in all Subscales but especially in the Subscale of Intrusion (Δ1,4). Distress Thermometer shows high scores at Time 0 (=8) that decrease significantly at Time 1 (=4). On a Scale of Problem List, emotive problems are those most frequently reported at Time 0 (=6/6) and decreasing at Time 1 by half (=3/6). Furthermore, at Time 1 through the administration of the Post-Traumatic Growth Inventory, E. refers to perceive himself stronger and to have cultivated new interests (= 5).

Discussion

Oncological diseases, especially if experienced in pediatric age, expose young children and adolescents to conditions of serious physical and emotional stress causing delays in their physical development, cognitive acquisitioning and issues related to their emotional and social functioning. It also represents a traumatic experience for the entire family and a disruption in daily family life. Pediatric oncological illness is a high-risk traumatization and retraumatization event that affects patients in their global identity: it generates a threat to the quality of life and psycho- physical integrity of the patients and family members, strong emotional reactions emerge with high arousal, avoidance, and intrusive thoughts. Recent studies underlined that especially adolescents with cancer experience anger feelings and dissociation. For all these reasons, the risk is the development of PTSD symptoms, not necessarily related with the histology or duration of treatment. Since that research highlighted that cancer or cancer- related events are experienced by children and adolescents as traumatic and stressful event proposing dedicated

interventions, it is not merely desirable but actually essential in psychooncology. As demonstrate in other important studies (Elmagd et al., 2018; Sebri et al., 2019; Durosini et al., 2021) reducing psychological disfunction through innovative supportive intervention can be the first step to increasing psycho-physical well-being, especially during cancer treatment, as long as the possible medical limitations are taken into consideration. EMDR therapy can be an effective and innovative strategy to fight stress feelings and sensations that children and adolescents experience during their oncology journey. For these reasons, we have seen that the faster we act in processing, starting with the communication of the diagnosis, the more resources patients will have to succeed in dealing with the later stages of the disease journey. EMDR therapy in fact seems to help patient, also during the adolescence stage, to deal with a stressful experience such as cancer. In addition, our data are in line with the most recent literature on the application of EMDR in psycho-oncology in the reduction of intrusive symptoms and also, for a global well being in a long run. As the literature suggests early interventions to prevent and process traumatic emotional experiences can prevent the onset of long-term posttraumatic stress disorder (Capezzani et al., 2013; Faretta et al., 2016). Our research has not encountered any major limitations so far, with the only possible issues relating to conditions of patients (fever, nausea, fatigue, contact isolation), in particular during hospitalization and the hospital setting because often patients have to stay in their room during hospitalization due to chemotherapy treatment, and healthcare workers often enter this room, thus interrupting the session. Also, since there are no controls, we could not assume that the EMDR protocol is more effective than usual care. Despite these limitations, EMDR could be considered as a potentially useful adjunctive treatment for adolescents who suffering from traumatic experience such as cancer disease. In the future the goal will be to expand EMDR use in the pediatric hospital setting for pediatric patients with EMDR adolescent's group for example, and also with other specific and traumatic situations such as palliative care or with Ukrainian oncological pediatric patients as a daily standard practice.

Patient perspective

Enrico at the end of the intervention trusted the method, reporting a decrease in intrusive thoughts and a reduction in fearful emotions thank to EMDR Protocol. He said he is more aware of his own way of experiencing the emotions related to that traumatic event.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethics Committe AOU city of health and science of Turin. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

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Supplementary material

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Group eye movement desensitization and reprocessing (EMDR) in chronic pain patients

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The prevalence of chronic pain is increasing, and conventional pain therapies often have limited efficacy in individuals with high levels of psychological distress and a history of trauma. In this context, the use of Eye Movement Desensitization and Reprocessing (EMDR), an evidence-based psychotherapy approach for the treatment of posttraumatic stress disorder, is becoming increasingly important. EMDR shows promising results, particularly for patients with pain and high levels of emotional distress. Although group therapy is becoming increasingly popular in pain management, EMDR has mainly been studied as an individual treatment. However, a systematic review suggests that group therapy can be an effective tool for improving mental health outcomes, especially when trauma is addressed together. Based on these findings, an outpatient EMDR group program was developed for patients with chronic pain. The program consists of a total of four treatment days with 5–5.5 h therapy sessions each day and provides patients with a supportive environment in which they can learn effective pain management strategies and interact with other patients with similar experiences. Initial pilot evaluations indicate high efficacy and adequate safety for patients with chronic pain.

KEYWORDS

eye movement desensitization reprocessing, EMDR, group therapy, pain, outpatient therapy

1 Introduction

Millions of people around the world suffer from pain, which has emerged as a major health problem. As populations age and chronic diseases become more prevalent, the incidence of pain is increasing, contributing to a growing societal burden (Wettstein and Tesarz, 2023). The impact of pain is not limited to physical discomfort, but also has significant social, economic and psychological consequences (GBD Disease and Injury Incidence and Prevalence Collaborators, 2017; Tesarz et al., 2019a).

Consequently, the treatment and management of pain is becoming an important part of public health. It is important to distinguish between acute and chronic pain. Acute pain is often self-limited and typically resolves as the body heals. In contrast, chronic pain, defined as pain that lasts longer than 3 months or recurs frequently, is associated with severe emotional distress and functional impairment (Treede et al., 2019). This longer duration and recurrence

pattern of chronic pain underscores the complexity and severity of its impact on individuals.

Addressing chronic pain effectively remains a major challenge, as it often persists despite appropriate treatment of the underlying conditions (Buchbinder et al., 2018). Drug and invasive therapies often have little effect (Williams et al., 2020). These therapies also carry the risk of severe side effects. Opioids in particular have been shown to be harmful (Harper et al., 2021). Non-drug treatments, such as intensified psychotherapeutic treatments, are therefore becoming increasingly important, especially in the comorbid presence of mental disorders and emotional stress (Williams et al., 2020).

Psychological factors such as depression, anxiety, the lack of self-efficacy and catastrophizing, collectively referred to as negative effects, are often already indications that pain is going to persist. Catastrophizing in particular, a pain-related construct characterized by negative cognitions, helplessness, pessimism, rumination and the fact that patients significantly overestimate pain-related symptoms, is a variable that appears to have a decisive influence on pain chronification. At the same time, these negative affects are also consequences of the constant confrontation and the experience of permanent and recurring pain (Edwards et al., 2016). Other consequences of chronic pain are fear of illness and somatization, lower self-esteem and lower self-efficacy. Furthermore, chronic pain patients report a stronger impairment of their emotional functionality, often also referred to as distress (Burke et al., 2015). Since psychological factors play a decisive role in chronic pain, both causally and supportively, psychotherapeutic methods have proven to be helpful.

However, the range of pain psychology therapies is limited and therapists often lack pain-specific training (Darnall et al., 2016). Group therapy can be a promising approach as it allows more patients to be seen, while creating a supportive environment where patients can learn effective pain management strategies and share experiences with others who have had similar experiences.

Although psychological therapies can improve the quality of life and functioning of people with pain, their impact on the alleviation of pain is often limited (Williams et al., 2020). In particular, patients with severe comorbid mental illness and a history of trauma pose a significant challenge to clinicians, as many psychological pain therapies do not adequately address trauma and posttraumatic stress symptoms (Lumley et al., 2022). Unfortunately, these patients are often excluded from group opportunities because of the fear that they will overwhelm the group or be re-traumatized. This exclusionary approach is inadequate, given that psychological distress is frequently observed in patients experiencing pain (Afari et al., 2014; Fishbain et al., 2017; Kind and Otis, 2019). This results in a significant number of patients missing out on potentially beneficial treatments. Fortunately, there exists a suite of successful strategies to tackle psychological trauma that are easy to learn and apply.

Numerous studies have confirmed the link between psychological trauma, PTSD, and chronic pain, with reported prevalence ranging from 24% to over 80% in various studies. In a review by Liedl and Knaevelsrud (2008), the connection between chronic pain and trauma-related disorders is made clear using various models.

The "mutual maintenance model" proposed by Sharp and Harvey suggests an interdependent relationship, where pain and PTSD symptoms interact and perpetuate each other. The model includes seven mechanisms, for example avoidance, memories of the trauma, but also fear and pain perception. An alternative explanatory framework is the "shared vulnerability model" proposed by Asmundson et al. This model suggests a predisposition—potentially even genetically rooted— that contributes to the onset of both PTSD and chronic pain. Individuals who experience both chronic pain and PTSD have an increased sensitivity to anxiety. This sensitivity involves heightened individual reactivity and exaggerated catastrophic responses to physical indicators of heightened anxiety. Previous models have tended to focus on individual facets of the relationship between pain and trauma. However, Norton and Asmundson have extended the extensively researched "fear-avoidance model" to include physiological arousal. This extension reveals a positive feedback loop in which physiological elements intersect with cognitive and behavioral aspects, hindering the adoption of effective coping mechanisms. Increased overall physiological arousal increases both the actual experience of pain and the belief that activities will increase pain (Sharp and Harvey, 2001; Asmundson et al., 2002). The complex and multifaceted interaction between trauma, PTSD and pain has led to the early discussion of the use of Eye Movement Desensitization and Reprocessing (EMDR) in the treatment of patients with pain and trauma.

EMDR is an evidence-based psychotherapy approach for the treatment of psychological trauma that is easy for therapists to learn and apply (Laliotis et al., 2021). EMDR involves exposure, dual focus of attention and bilateral stimulation to process traumatic memory and reduce associated distress (Laliotis et al., 2021). Unlike conventional Cognitive Behavioral Therapy (CBT) approaches, which are usually based on classical learning theories, EMDR is based on the Adaptive Information Processing (AIP) model. This model posits that the brain naturally seeks psychological balance, similar to the body's physical healing processes. According to AIP, mental disorders and illnesses arise from memories of traumatic events that are not fully processed or integrated into the brain's neural memory networks. These unprocessed, dysfunctionally stored memories can be reactivated by certain stimuli, leading to psychopathological symptoms such as PTSD, negative effects, and bodily symptoms. Whereas classical exposure methods in CBT involve systematic and controlled confrontation of the patient with anxiety-provoking stimuli or situations, such as detailed descriptions of events or direct questioning of beliefs, in order to reduce anxiety responses and develop coping strategies, the exposure principle of EMDR uses synchronized eye movements in conjunction with a dual focus of attention. This approach facilitates the incorporation of maladaptively stored memories into the brain's adaptive neural networks. This process alleviates psychological distress and enhances adaptive responses to future stimuli, thereby promoting psychological resilience and health (World Health Organization, 2013).

EMDR is recommended in clinical practice guidelines as a first-line treatment for PTSD (Martin et al., 2021). Due to its proven effectiveness in treating psychological trauma, EMDR is now also recommended by World Health Organization (2013). Given the high

Abbreviations: EMDR, Eye movement desensitization and reprocessing; CBT, Cognitive behavioral therapy; SUD, Subjective unit of disturbance; PoD, Points of distress; AIP model, Adaptive information processing model; G-TEP, Group traumatic episode protocol; EMDR-IGTP-OTS, EMDR integrative group treatment protocol for ongoing traumatic stress.

comorbidity of chronic pain and psychological trauma, and EMDR's ability to address body sensations and experiences, it is not surprising that EMDR is increasingly being used in the treatment of chronic pain (Matthijssen et al., 2020).

Several randomized controlled trials have demonstrated the efficacy of EMDR in the treatment of chronic pain conditions such as chronic musculoskeletal pain (Gerhardt et al., 2016), back pain (Gerhardt et al., 2016), headaches (Konuk et al., 2011), phantom limb pain (Rostaminejad et al., 2017), fibromyalgia (Friedberg, 2004), and rheumatoid arthritis (Tesarz et al., 2019b; Matthijssen et al., 2020). These studies have demonstrated the effectiveness of EMDR in reducing pain intensity, pain-related disability and associated psychological distress (Leisner et al., 2014). However, most of these studies examined EMDR as an individual treatment rather than in a group format, which is surprising given that group interventions are commonly used for both chronic pain and PTSD (Matthijssen et al., 2020). Given the benefits of group therapy, it is important to further explore the potential of EMDR group therapy as an effective treatment approach for patients with chronic pain and comorbid psychological trauma.

While individual EMDR therapy has been shown to be effective in treating psychological trauma (National Institute for Health and Care Excellence, 2018), interest in the effectiveness of group EMDR has increased in recent years (Kaptan et al., 2021). Group EMDR therapy has been shown to be particularly effective when large numbers of people are affected by the same event, such as after major events and natural disasters (Jarero et al., 2008). A 2021 systematic review indicates that the group format can be an effective tool for improving various mental health outcomes, including PTSD, depression and anxiety (Kaptan et al., 2021). The group EMDR approach is particularly appropriate when there is collective trauma, such as after earthquakes or tsunami disasters. In such situations, group therapy can create a supportive and empowering environment where participants can share their experiences and learn coping strategies from each other (Jarero et al., 2006).

This observation leads to the consideration of using group EMDR therapy in the treatment of chronic pain. Pain can be seen as a form of traumatic experience, and coping with the pain trauma together in a group therapy setting can be an effective therapeutic step.

The effectiveness of EMDR group therapy has been demonstrated in numerous studies (Kaptan et al., 2021). In addition to EMDR-specific factors in the sense of the AIP model, a number of other non-specific factors can be considered as underlying effective factors in the group setting. Yalom, for example, identified seven general factors of influence, such as the therapeutic relationship, group cohesion, interactions between members, the universality of suffering and the importance of the group process for individual change (Yalom, 2005). Accordingly, the shared experience of pain can help create a cohesion and understanding among group members, and this supportive environment can facilitate the use of EMDR-derived techniques. In addition, EMDR therapy can help patients to process the traumatic aspects of their pain experience, which may help to reduce pain intensity and associated psychological distress. This could help promote adaptive coping and alleviate pain.

Given the high comorbidity of chronic pain and psychological trauma and the proven efficacy of EMDR therapy in treating both conditions, an innovative outpatient EMDR therapeutic group program was developed for patients with chronic pain. The program aimed to provide a supportive and empowering environment in which patients could learn and practice effective pain management strategies, process traumatic memory and make supportive connections with other group members having similar experiences. In this article, we would like to introduce the treatment program and report on our initial experiences with its use, including its feasibility and acceptability among patients with chronic pain. We hope to contribute to the growing body of evidence supporting the use of EMDR therapy in the treatment of chronic pain and psychological trauma through a comprehensive evaluation of this EMDR group program.

1.1 Current scientific evidence on EMDR group therapy

The effectiveness of EMDR therapy used in groups to treat mental disorders in adults and children was examined in a recent review (Kaptan et al., 2021). The review identified 22 studies with a total of 1,739 participants that examined four different EMDR protocols specifically designed for group therapy. These protocols adapted the eight standard phases of EMDR therapy to group therapy. They were: (1) the EMDR Integrative Group Treatment Protocol (IGTP) (Jarero et al., 2008), (2) the EMDR Integrative Group Treatment Protocol for Ongoing Traumatic Stress (EMDR-IGTP-OTS) (Jarero et al., 2006, 2018), (3) the Group Traumatic Episode Protocol (Lehnung et al., 2019; Korkmazlar et al., 2020), and (4) the EMDR Group Child Protocol (Korkmazlar et al., 2020). The EMDR IGTP protocol had the strongest evidence base with 13 studies, followed by EMDR IGTP OTS with four studies and G-TEP with four studies. Only one study was available for the EMDR-GP/C protocol. Despite the heterogeneity of the studies in terms of sample, setting, outcomes and number of sessions, EMDR group interventions significantly reduced post-traumatic stress, depression and anxiety symptoms after treatment compared to pre-treatment or control groups. However, the methodology of the studies was subject to a relevant risk of bias, suggesting that further studies with sound methodology, larger samples and sufficiently long follow-up periods are needed to determine the effectiveness of EMDR group therapy. Furthermore, no studies of EMDR group interventions for chronic pain were identified in this comprehensive systematic literature review, highlighting the importance of our work.

2 Methods

The present study aimed to develop an intensified EMDR therapy group program for patients with chronic pain. To achieve this goal, a series of expert interviews and workshops were conducted with therapists experienced in running EMDR therapy groups. In addition, two focus groups with seasoned therapists experienced in delivering EMDR to patients with chronic pain were included, complemented by the participation of therapists and physicians experienced in pain management and two EMDRIA certified EMDR consultants. These interviews and workshops provided insights and recommendations relevant to the development of the enhanced EMDR group treatment protocol. Two pilot groups were conducted to test the feasibility and acceptability of the protocol, the results of which ultimately contributed to the development of the enhanced EMDR group

treatment protocol. Patients' experiences and changes in symptoms during the intervention were recorded descriptively and exploratively in an open feedback session following the intervention as well as in an anonymous online survey with the "Patient Global Impression of Change" (PGIC) scale (Guy, 1976; Dworkin et al., 2008) and on possible side effects 1–2 weeks after the intervention. As this was a development phase in which the intervention program was to be adapted and improved, the survey focused on participants' open feedback on the content, global impression of change, safety and possible side effects. The evaluation asked about personal impressions, the most and least helpful elements of the therapy as well as individual suggestions for improvement, and negative aversive events during and after the therapy. Based on these data, we developed the intensified EMDR group treatment program for the treatment of chronic pain, presented here.

3 Contents of the intensified EMDR group program

Our final intensified EMDR group program extends over four treatment days of 5–5.5 h each day (see Table 1). It is based on three pillars: (1) EMDR-based exposure and resource work, (2) education, and (3) physical activation. The education prepares patients for the actual exposure work, strengthens patients' belief in the therapy and is intended to help patients engage in the EMDR approach and physical activation as well as strengthen accompanying adaptive coping behaviors.

The combination of psychoeducation and physical activation is based on a study by Van Woudenberg et al. (2018), which showed that this is an effective and efficient approach in the context of intensified exposure programs. This is also supported by the work of Liedl and Knaevelsrud (2008), who emphasizes the positive effects of physical activity. The use of education is a central component of many guidelines, particularly in pain management. Recent studies also show that reinterpreting pain as a neurobiological correlate (rather than a physical defect) is therapeutically effective (Ashar et al, 2022, 2023). In addition, physical activity was chosen as a complementary component because some of the participants were very exhausted by the therapy and physical activity could have a positive and complementary counteracting effect. In this context, we have decided to use guided walking as a physical activity and to give patients the opportunity to get to know each other better in a casual context and to process the EMDR sessions.

The program is run by a therapist together with a co-therapist, and the roles can be alternated. All participants received a telephone screening interview prior to participation in the group program, as well as a pre-interview with one of the group therapists. The therapy content is based on exposure through individual group EMDR work using adapted EMDR group protocols, complemented by resource and pain management-oriented group work, physical activation and education. This setting allows for the development of stable group cohesion so that both (1) the group therapy setting can be used to facilitate the change of unhelpful pain-related thoughts and behaviors, and to foster social support through group interactions; and (2) individual trauma work can be conducted in the group setting.

3.1 Therapeutic elements of the intensified EMDR group program

To optimize exposure and trauma processing work in our treatment program, we chose to integrate two different EMDR group therapy protocols: the EMDR Integrative Group Treatment Protocol for Ongoing Traumatic Stress (EMDR-IGTP-OTS) (Jarero et al., 2018) and the Group Traumatic Episode Protocol (GTEP) (Lehnung et al., 2019). Both treatment protocols were slightly modified for our program by specifically targeting distressing material related to pain (processing episodes as part of the patient's "mental pain film") or directly targeting the pain itself. Through these adaptations, we were able to ensure that the therapy content was tailored to the specific needs of our patients, allowing for effective processing of traumatic events and pain symptoms. This approach of individual group EMDR work to process stressful experiences and joint group work for resource activation was found to be very supportive and enriching by the patients.

TABLE 1 Treatment program overview.

Preliminary interviews	Day 1 1:00 p.m. to 6:30 p.m.	Day 2 1:00 p.m. to 6:00 p.m.	Day 3 1:00 p.m. to 6:00 p.m.	Day 4 1:00 p.m. to 6:00 p.m.
Phone screening	Welcome Getting to know each other	Arrival	Arrival	Arrival
Individual preliminary interviews	Education I (Pain)			
	Education II (EMDR and protocols) PT-OTS pain episodes	G-TEP-pain episodes	G-TEP-pain episodes	G-TEP-pain episodes
	Active walking	Active walking	Active walking	Active walking
	PT-OTS	PT-OTS- Pain episodes	PT-OTS-pain visualization	Pain absorption exercise
	Short physical activation	Short physical activation	Short physical activation	
	Break	Break	Break	Break
	Conclusion	Education III (pain and pain memory)	Education IV (pain and stress)	Conclusion and feedback

IGTP-OTS, EMDR Integrative Group Treatment Protocol for Ongoing Traumatic Stress; G-TEP, Group Traumatic Episode Protocol.

3.1.1 Telephone screening and preliminary individual therapy session

Before admission to the group therapy setting, a telephone screening and a preliminary individual therapy discussion took place with all participants (see Table 2). During the screening, the patients were given important information about the group, the format, the procedure, and the time frame. In addition, patients had the opportunity to clarify their own questions regarding the therapy. This procedure is of great importance as it gives patients a clear idea of what to expect and how the therapy will proceed. In addition, any concerns can be clarified in advance, which increases confidence in the therapy and can support the success of the treatment. Before the group therapy began, there was also an individual preliminary interview, which was conducted by the group therapists and lasted between 20 and 30 min. In this individual session, the therapists obtained an overview of the patient's medical history, explored the patient's treatment motivation, and asked about the patient's subjective pain history, psychological comorbidities as well as important resources and competences. They were also asked about their expectations of the therapy. Information about the timing of the group and any exclusion criteria were assessed. This preliminary consultation enabled the therapists to better understand the individual needs and prerequisites of the patients and to adapt the therapy accordingly. In these discussions, information was also provided about the setting, the exposure character and the background of EMDR in trauma and pain (such as the AIP model, pain memory and the importance of dysfunctional memories in pain chronification).

3.1.2 The EMDR group protocol for ongoing stress

The EMDR Integrative Group Treatment Protocol for Ongoing Traumatic Stress (EMDR-IGTP-OTS) is an enhanced version of the EMDR Integrative Group Treatment Protocol (EMDR-IGTP) developed by Jarero and Artigas (2012). Its primary objective is to offer a therapeutic framework for individuals who do not experience a subsequent post-traumatic safety window, such as those facing persistent emotional distress and ongoing traumatic exposure, including cases related to cancer. The EMDR-IGTP-OTS aims to facilitate the reprocessing of traumatic memories in such individuals.

Compared to other protocols, the EMDR-IGTP-OTS mainly uses drawings and symbols to reprocess the distressing memories. This leads to a deceleration of the process and is usually perceived by the participants as less stressful and more controllable. The version adapted for the specific need of patients with pain specifically offers the possibility to directly address the pain and the stressful experiences associated with it. The EMDR-IGTP-OTS is simple to conduct and requires no special equipment or materials. All that is needed is blank A4 sheets of paper and crayons to draw on. There is no sharing of experiences in the group except for brief feedback after doing an initial stabilization exercise at the beginning: Strictly speaking, the IGTP-OTS is therefore not an EMDR group therapy, but a protocol for conducting (individual) EMDR therapy in a group setting. Also, the history taking is done individually and not in the group. This means that there is only a small risk of group participants being overwhelmed by the experiences of other participants. For alternating bilateral stimulation, the EMDR butterfly hug method for self-administered bilateral stimulation (Jarero and Artigas, 2023) is recommended. It involves the individual crossing their arms and alternately tapping their chest with their hands, creating a soothing rhythmic sensation that helps reduce distress and facilitate the processing of traumatic memories during EMDR sessions. This method promotes a sense of calm and safety, enhancing the effectiveness of the therapy. Overall, the protocol is based on the classic eight phases of the EMDR standard procedure.

- Phase 1: This phase includes the client's anamnesis, which is taken individually. Accordingly, each group participant receives a detailed individual interview before the start, in which the therapist has the opportunity to learn details about the trauma history as well as important resources of the patient. This part with done beforehand within the preliminary individual therapy session before inclusion in the intensified EMDR group program.
- Phase 2: In the next phase, the therapists briefly introduce themselves and it starts with a psychoeducation session, the introduction to the self-soothing exercises, the Subjective Units of Disturbance Scale (SUDS) and the teaching of how to perform the butterfly hug.
- Phase 3: The next step is to prepare for doing the exposure work ("assessment phase"). For this, the participants divide the blank A4 sheet in front of them into four rectangles and label them A, B, C, and D. In order to capture the full spectrum of traumatic stress, participants are asked to run a mental movie of their entire pain history, from right the beginning until today, or even to look into the future. In the first session, participants are asked to choose the hardest, most painful or distressing moment *"From the whole mental movie, please choose the hardest, most painful, or distressing moment…"* Participants are instructed to observe which emotions and physical sensations accompany that memory at this moment. Then the participants draw this moment symbolically or in their own way in the square with the letter "A"

TABLE 2 Content of the preliminary interviews.

Preliminary interviews	Content
	■ Individual preliminary talks of 20–30 min by the group therapists (by telephone, or therapist's consultation) ■ Client history and motivation check ■ Subjective pain history, psychological comorbidity, important resources and competences of the patient ■ Expectations of therapy ■ Brief instruction EMDR and pain, information about side effects ■ Information on the group schedule, advice on weatherproof clothing ■ Exclusion criteria ■ If necessary, send a patient brochure on EMDR and pain

and rate the corresponding disturbance level (subjective units of disturbance, SUD). Alternatively, in the pain therapy setting, the pain itself can be focused on with the help of pain visualization ("*But you can also try to shape the pain as such. The following questions help: If the pain had a colour, what would it be? If the pain had a shape, what would that be? If the pain had a different texture, what would it be? Would it be hard or soft? Rough or smooth?*").

- Phase 4: The next step is to lead the group into reprocessing together ("desensitization phase"). For this, the participants are asked to consciously put themselves back into the moment chosen in square A, applying the bilateral stimuli in the form of butterfly hugs until they feel in their body that it has been enough (1–3 min on average). The duration of exposure and bilateral stimulation thus varies from individual to individual and is based on the participants who need the longest. When about 90% of the participants have finished the butterfly hug, it is usually possible to move on to the next step. After this desensitization procedure, the participants are asked to draw in the next square of the worksheet (B) how they feel now and to assess the corresponding disturbance level (SUD).
- These instructions for square B and the procedure are repeated for square C and D, so that a total of four times the distressing memory is reprocessed and the respective degree of disturbance is evaluated. After the reprocessing of the last square, the participants are asked to look at all the drawings and choose the one that disturb them the most. Then, participants are asked to turn the paper over and write down the corresponding SUD they feel now. Deliberate care is taken to ensure that participants do not make the mistake of copying only the SUD of the most distressing drawing but write down the SUD of the disturbance they are feeling NOW… IN THE PRESENT MOMENT.
- Phase 5: The next step focuses on the vision of the future. For this, participants are guided to draw how they see themselves in the future and title their drawing. In this phase, it is NOT necessarily about imagining a happy future/outcome or successfully coping with an expected future event, but it is more important that participants are authentic and honest with themselves than forcing positivity. It should be noted that in contrast to the standard EMDR protocol in the individual setting, the installation of a positive cognition is not provided in the context of this EMDR group protocol, since in the context of OTS work each participant may have a different point in time for reaching an ecological level of distress, and thus at the end of a session one or the other may well still have blocking beliefs that get in the way of installing a positive cognition.
- Phase 6: Participants are instructed to remember the drawing that disturb them the most, close their eyes and scan their body from head to feet and at the end to do the butterfly hug.
- Phase 7: Instead, a joint relaxation exercise is carried out with all participants at the end of the protocol ("closure phase"), in order to release as many participants as possible from the intervention in a positive state. It is recommended that the drawings and worksheets remain with the therapists. This can symbolically underline that the burden is given or left behind—and not taken home.

3.1.3 The group traumatic episode protocol

The Group Traumatic Episode Protocol (G-TEP) provides a group therapy approach for individuals who have experienced life-changing and traumatic events that continue to have lasting effects. This protocol focuses on the entire traumatic episode, including the initial traumatic experience and all related events, regardless of how recent they may be. This adapted version is applicable even in the absence of a history of life-changing and traumatic events. The protocol can therefore be used with any patient in pain who reports distressing experiences associated with their pain. The therapeutic process is highly specialized, with the therapist leading participants through a step-by-step exposure to the traumatic memories while maintaining dual attentional focus using bilateral stimuli. The session is designed so that a single worksheet takes you through the process step by step. The processing of stressful events is not necessarily chronological. Usually, about 3–5 stressful events, so-called "points of distress" (=PoDs) are identified. Processing usually takes place in several (2–4) sessions of 70–90 min each, possibly on consecutive days. In contrast to the EMDR-IGTP-OTS protocol, the G-TEP protocol deliberately provides for the exchange of experiences in the group: however, the exchange of experiences among the group participants is limited to the stabilizing elements and resource activation; the conscious exchange of participants about stressful/traumatic events is limited. The treatment setting should include at least one EMDR therapist and one psychosocial professional or trained assistant for every 10 participants.

For bilateral stimulation, the participants' self-performed tapping on their worksheet is used together with eye movements (as the participants follow their own fingers moving back and forth on the worksheet), the Butterfly Hug is only for installing resources. Overall, the protocol is based on 8 different steps through which the participants are guided step by step by the therapist.

- The protocol starts with a specific stabilization exercise called the "Four elements exercise" which is repeated at the end of each session. The exercise involves focusing on four elements—earth, air, water and fire—and identifying personal associations with each element. The exercise combines different levels of stress reduction: the element "earth" corresponds to grounding, the element "air" corresponds to the regulatory effect of breathing, the element "water" means the specific increase of saliva production to stimulate a vegetative relaxation reduction and the element "fire" refers to the imaginative power of visualizing through the installation of a safe place. By engaging with these elements, individuals can ground themselves in the present moment and develop a sense of safety and stability. The exercise can later be done independently by the participants outside the group setting.
- After activating resources, participants are asked to name the initial traumatic event they would like to work on. They can do this either through a short description or a drawing on their worksheet and then assess the corresponding SUD.
- Before the actual trauma exposure begins, a past and a future resource are first activated. Participants are asked to recall a positive memory and draw or describe it on their worksheet. This is then anchored by the butterfly hug.
- To activate a future resource, participants choose a positive cognition to represent how they would like to think about

themselves in the future. This is also recorded on the worksheet to support meta-communication. The trauma is presented on the worksheet surrounded by current, past and future resources to illustrate that the event is in the past and that there is safety in the here and now as well as that the future holds hope.

- In the next steps, the participants are guided into the actual process work. To do this, first the relevant targets, the PoDs are identified through a non-sequential Google search ("*Now let the whole episode, everything that happened, from the beginning until today, run in front of your inner eye, like a Google search on your computer. Look for something that is still bothering you, in no particular chronological order*"). Participants identify the PoDs of the traumatic event in no pre-given order and process them one by one, tapping from one side of the worksheet to the other.
  After identifying a PoD, participants are instructed to visually represent it on their worksheet by either drawing or writing. To initiate Bilateral Stimulation (BLS), all participants are asked to touch the "Disturbance" box (representing the past) and then the "Safe Place" box (representing the present) with one hand. They are instructed to follow their hand with their eyes while doing so, until they have identified a PoD. Once a PoD is found, participants document and enter it into the corresponding box on their worksheet. There are different options for the length of the bilateral stimulation: For example, the length of each set can be set by the group leader (e.g., 10 or 20) and done synchronously together in the group under the guidance of the group leader. The advantage of this joint tapping is that it promotes group cohesion. The disadvantage is that the perceived appropriate length of the tapping can vary individually. Alternatively, therefore, the length of each set can be left open by the group leader so that everyone can tailor it until a change is noticed during the tapping or a break becomes necessary. It should be noted that the "Eye Movement Desensitiziation"-strategy of this approach here focuses strongly on the PoD, in contrast to the classical EMDR setting, where association chains fostered. That is the dual focus of attention returns there again and again and inquires the level SUD (Subjective Unit of Disturbance), which however imposes a limit on the chains of associations. The protocol recommended to use six to nine sets of BLS to reduce the SUD for each PoD as much as possible. After each BLS set, participants are asked to pay attention to their thoughts, feelings, body sensations or whatever they perceive. After the 3rd, 6th, and 9th BLS sets, the focus is turned back to the PoD and the SUD is rated on the scale from 0 to 10 and recorded on the worksheet. These exposures and desensitization steps are carried out by each participant individually, no exchange with other group participants is planned in this phase.
- After the 9th bilateral stimulation set of a PoD, the SUD level is finally assessed. If the SUD has dropped to an ecological appropriate level, the next PoD can be identified by another "Google search" and processed according to the same procedure (3×3 sets á 10–20 BLS). Participants whose episodes SUD is still very high (SUD > 5), should continue with the same PoDs. It is recommended to work on a minimum of 2–3 PoDs per session.
- Thereafter, participants once again rate their SUD level for the whole episode and choose a positive cognition to anchor ("*How would you like to think about the whole episode now? What did you learn? What do you take away from today?*"). At this point, sharing their experiences in the group can be helpful. Then the cognition is written down or drawn and anchored with the butterfly hug.
- Finally, after anchoring the positive cognition, the four elements exercise is done once again. At the end of a session, the group leader should assess how each participant is feeling and identify who needs more time to work through the stressful material and offer additional support if necessary.

3.1.4 The pain absorption exercise in the group

A modified version of the classical EMDR "absorption technique" (Hofmann, 2009) was used for the group setting. The aim of this modification was, on the one hand, to specifically address the patients' pain problems and, on the other hand, to integrate them into the group setting in such a way that the advantages of the group could be used.

The basis of the modified absorption technique is the same as in the classical absorption technique and is based on the principle of linking a specific stressful situation with individual resource-rich memories and sensations. However, the focus of the modified version is on the pain. Here, the pain is first visualized and the associated degree of stress is assessed. In the next step, participants are asked to identify individual skills or competencies and the positive body feeling associated with them. These are anchored through bilateral stimulation by means of a butterfly hug. In the last step, the resources are used to address the visualized pain and reduce the associated stress level.

In total, seven steps can be distinguished in this exercise. The exercise starts with a short explanation and general preparatory instructions (step 1). Then the participants are asked to visualize their pain (step 2) and to assess the associated current stress level with the help of the SUD scale (step 3). In the next step (step 4), the participants are asked to name different skills and competences that can particularly help them to cope with their pain. This process is done as a group work in order to use the group as a supportive and empowering environment.

Subsequently (step 5), two individual competencies are selected by each participant and these are anchored together with the memory of a situation in which they succeeded in using this skill and together with the corresponding body feeling by means of bilateral provocation. At the end of the exercise, the original pain image is returned to and bilaterally provoked against the background of the two resources (step 6). Finally, the degree of stress is evaluated again (step 7). The modified absorption technique thus offers an effective way of working on individual pain problems in a group setting, drawing specifically on individual resources. The group work enables the exchange and strengthening of individual pain management strategies as well as the establishment of helpful relationships with other patients who have had similar experiences.

3.2 Evaluation of the group—exploratory evaluation

All patients suffered from chronic pain, mainly in the musculoskeletal system. However, we included all eligible patients regardless of pain diagnosis. Patients ranged in age from 19 to 63 years and all but one were female. Inclusion criteria for participation in the group were chronic primary or secondary pain, willingness to participate in group therapy and attendance at all scheduled

appointments. In addition, patients had to be able to self-regulate sufficiently and not fulfill any of the absolute contraindications such as suicidal tendencies (see Table 3). During the qualitative follow-up survey, participants expressed significant benefits derived from two key aspects: the opportunity to connect with others who share similar experiences, and the utilization of EMDR-specific techniques. These aspects were highlighted as particularly valuable and impactful for the participants. Assessing potential side effects, no relevant side effects were reported in connection with the therapy. Furthermore, it is noteworthy that none of the participants reported a strong or very strong worsening of their symptoms during the course of therapy. These findings reinforce the notion that our therapeutic program is both safe and well tolerated within the group setting. Taken together, the evaluation reveals positive outcomes and a high level of satisfaction among participants. The positive impact of group dynamics, coupled with the effective application of EMDR-specific techniques, demonstrates the efficacy and potential of our therapeutic program for individuals experiencing chronic pain and emotional distress.

4 Discussion

Recognizing the many benefits that group therapy can bring to people with chronic pain, we have developed an advanced EMDR group therapy program, despite the fact that EMDR has largely been researched as an individual intervention. This program aims to create a supportive and empowering environment for patients, facilitating trauma processing, the acquisition of effective pain management skills, and the formation of helpful bonds with others who share similar experiences. Early pilot studies have been encouraging but have also highlighted some unique aspects that need to be considered in implementation, including the group setting, length and breadth of sessions, content design, inclusion of additional therapeutic components, safety considerations and potential patient exclusion guidelines.

4.1 Format and scope of the group offer

Our intensified EMDR group therapy program for patients with chronic pain combines EMDR therapy with physical activation and education. It uses both individual and group work to help patients cope with stressful experiences and activate resources to manage their suffering. During the pilot phase, we learned that building strong group cohesion is crucial for successful EMDR group therapy. Starting EMDR work too early can be unproductive and cause patients to withdraw from therapy. To avoid this, our program emphasizes a period of intensive group work before EMDR therapy begins. This consists of setting group rules and various exercises to help patients get to know each other better. We have also found that starting with the less intensive EMDR-IGTP-OTS protocol, where the traumatic experience is drawn and symbolized, can ease patients into therapy and improve their acceptance. This approach has led to better acceptance of the more intensive G-TEP. Relative to the EMDR-IGTP-OTS protocol, the G-TEP protocol induced more emotional discomfort among the participants. Although it appeared to promote a more intensive processing, it simultaneously necessitated that the participants maintain a high level of trust in the setting. Commencing with this protocol was found to be disadvantageous, as it made certain participants uncomfortable and even resulted in some quitting the treatment. Significant improvements in exposure work were achieved by implementing a well-structured approach that included an extended group work phase at the beginning of the intervention. Targeted efforts to promote group cohesion and a gradual integration of the EMDR-IGTP-OTS protocol for exposure work effectively addressed potential challenges, ultimately leading to improved outcomes. A clearly structured and consistent treatment framework (fixed therapy times, consistent breaks, guided walking) has also proved helpful. This imitates to some extent the protocol-based approach of the standard EMDR protocol and thus offers a reliable framework for dealing with emotional stress.

4.2 Extension of therapy sessions

Regular group therapy sessions usually consist of weekly or fortnightly sessions of 50–90 min each (Kaptan et al., 2021). However, in the context of EMDR group therapy, this time frame has proven to be insufficient. In pilot studies, the session duration was gradually increased to 3 h and finally set at around 5 h. There were two main reasons for this adaptation: firstly, some participants needed a longer preparation time before addressing central distressing and traumatic issues, and a longer session length allowed for two processing and exposure units per session. Secondly, the standard therapy time of 50 or

TABLE 3 Possible contraindications.

Severe dissociation or psychosis	■ Individuals with severe dissociative or psychotic symptoms may have difficulty engaging with the structured and focused nature of group therapy and may require more individualized treatment to address these symptoms.
Active suicidal ideation, severe self-harming behavior	■ People who have active suicidal or severe self-harming behavior may need more intensive and individualized treatment than can be provided in a group setting.
Insufficient social stability	■ Individuals who lack structural (social) and functional (family) support may need more intensive and individualized treatment than is possible in a group setting.
Active substance abuse/dependence	■ People who actively use or are dependent on drugs or excessive alcohol may not be suitable candidates for group therapy as they may not be able to fully engage with the therapeutic process.
Inability to tolerate a group setting	■ If severe anxiety or other problems make group participation significantly more difficult, individual therapy may be a more appropriate form of treatment.
Lack of motivation or commitment	■ Group therapy requires a certain level of motivation and commitment from the participants. If individuals are not willing or able to engage in therapy, they cannot benefit from the treatment and disrupt the group dynamic.

90 min was not sufficient for many participants to achieve a satisfactory reduction in subjective distress. By extending the session time and incorporating repeated exposure within a session, interspersed with resource work, these difficulties were overcome, and the effectiveness and acceptance of the treatment was significantly improved.

4.3 Integration of complementary therapeutic elements into the EMDR treatment program

Extending the duration of individual therapy sessions is challenging because participants tend to become increasingly fatigued as the session progresses. This was due to the prolonged engagement required during therapy, which gradually drains participants' energy levels and reduces their overall level of stamina. Participants reported severe mental exhaustion after the emotional arousal and subsequent desensitization, so that further treatment was not considered helpful by the therapists in this situation. Relaxation exercises or a "free break" also did not have a sufficient impact on the group's perceived energy level. The integration of activating elements such as guided walking proved to be an effective solution to overcome the participants' exhaustion caused by the long therapy sessions and to restore their receptivity. With this in mind, we included a joint activation exercise in the treatment program, where patients were invited to take a brisk walk accompanied by therapists on a voluntary basis. Furthermore, the effects of trauma confrontation were enhanced by subsequent exercise. This was well accepted by the patients and could positively influence the subsequent working atmosphere (Bryant et al., 2023).

4.4 Group cohesion and group therapy work

Over the course of the pilot phase, it had become apparent that a sufficient degree of trust in the therapeutic setting as well as a supporting group cohesion is an important prerequisite for working on emotionally stressful content. To actively promote this, various interventions can be carried out in small and large group work. For example, a group therapy intervention was carried out at the beginning of a treatment day, in which the participants had to choose a card from many different cards with different motives that they felt applied to them. They then share with the group why they chose that card. This exercise actively promotes group cohesion as the participants gain insights into the personality and emotional state of the other group members. In addition, this exercise can also serve as a mood screening, as it gives an overview of the group's current mood and state of mind.

4.5 Safety and possible contraindications

Safety is an important aspect to consider when using exposure-based therapies. Studies on the use of EMDR in the treatment of patients with post-traumatic stress disorder have not found evidence of increased safety risks in group settings (Kaptan et al., 2021). Of the 22 studies that examined the use of EMDR in group settings, six reported no adverse effects, while five reported that individual EMDR sessions were occasionally required and some participants experienced an increase in depression, stress and anger during therapy (Kaptan et al., 2021). Overall, the available data do not suggest a specific safety risk for EMDR group therapy, but the data are not yet sufficient for a conclusive assessment.

However, the risk of possible side effects from the exposure elements is higher than in purely educational therapy groups. Therefore, it may well be that individual participants need additional support during or after the group intervention. This should be considered when planning and implementing the EMDR group intervention. On the one hand, a possibility should be created to offer individual sessions to individual participants who need additional support after the group intervention. Our experience has shown that this only concerns individual cases and that one or two sessions are usually sufficient here. However, it is much more common that individual participants need additional support during the EMDR intervention—especially in the first half of the treatment intervention this can happen—when patients on the one hand become increasingly courageous to go into exposure, but at the same time the presence of the safe "here and now" through the group and the activation of their own resources is not yet sufficiently consolidated. For this purpose, the concept of the emotional support team was introduced (Jarero et al., 2006): In addition to the group leader, a therapist (per 10 participants) should always take part in the group to be able to offer additional support to individual participants who need it during the therapy. This therapist team does not have to actively participate in the EMDR work but should be able to help individual patients regain a safe state and address additional needs.

Another risk of the group setting is that individual participants may become distressed by the description of the traumatic experiences of other members. This potentially carries the risk of a possible "re-traumatization," at least if the affected persons again enter a state of extreme fear and helplessness that overwhelms their individual coping skills. During an exposure, it is the therapist's responsibility to ensure that participants do not lose contact with the safe present in order to minimize the risk of losing control again. The therapist also needs to create a supportive group atmosphere that provides an appropriate level of safety, control and self-esteem for all participants.

In the pilot phase, the importance of evaluating individual suitability for group therapy EMDR was evident. The individual pre-session between the patient and therapist played a crucial role in this process. Here, the presence of possible contraindications (see Table 3) and the participant's sufficient stability should be critically examined. In addition, the first therapist's impression of the participant during the first stabilization exercises and exposure units in the group can play an important role: If participants have difficulty reducing stress during the stabilization exercises or early exposures offered, consideration can be given to exclude them from the group program and offering them individual treatment. While it is important to critically evaluate group suitability before beginning therapy, it should also be evaluated after the regular treatment program is completed whether individual participants need additional support. If necessary, additional (individual) sessions should be offered.

5 Conclusion

In summary, our experience with an intensified outpatient group treatment with EMDR suggests that we have developed a promising

treatment program for patients with chronic pain. This provides new and promising treatment options, especially for those patients with pain who have high levels of emotional distress and post-traumatic stress symptoms. The opportunity to share with other patients and the pain management strategies learned are particularly promising. We hope that future studies will take up this approach to further develop and optimize the program and prove its effectiveness. This could help to better meet the needs of this special group of patients and improve their quality of life.

Ethics statement

The study protocol was approved by the Ethics Research Committee II of the Faculty of Medicine, University of Heidelberg (S-767/2022) and will be carried out in compliance with the Helsinki Declaration. Written consent was provided from all participants before enrollment.

Author contributions

SV: Conceptualization, Project administration, Writing – original draft, Writing – review & editing, Data curation, Formal analysis, Investigation, Methodology. AD: Conceptualization, Writing – original draft, Writing – review & editing. JR: Conceptualization, Writing – original draft. FE: Writing – review & editing. SW: Methodology, Writing – review & editing. EB: Data curation, Investigation, Methodology, Writing – review & editing. H-CF: Funding acquisition, Resources, Writing – review & editing. IJ: Supervision, Writing – review & editing. GS: Supervision, Writing – review & editing. JT: Conceptualization, Writing – original draft, Writing – review & editing, Project administration.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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EMDR: dispelling the false memory creation myth in response to Otgaar et al. (2022a)

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1 Introduction

Exposure to traumatic events can lead to diverse memory impairments such as dissociation, intrusiveness, avoidance, distortion, or recovery (Mary et al., 2020) affecting individuals' mental health, wellbeing, identity, relationships, and functioning (Giotakos, 2020). Thus, comprehending how trauma impacts memory and its assessment and treatment in clinical settings is paramount.

Otgaar et al.'s body of work, including the article under review (Otgaar et al., 2021, 2022a,b) has significantly propelled our understanding of false memories and their implications, particularly in psychological research and legal contexts. However, in the article that will be examined, the researchers claim that psychotherapy can induce false memories of trauma and that therapists can suggest clients' memories of experiences that they never had (Otgaar et al., 2022a). Despite the value of their contributions, their recent claims that psychotherapy, notably EMDR, can induce false memories of trauma warrant a closer examination. They argue that such false memories are widespread and pose risks in real-life situations, especially in legal settings, potentially compromising the credibility and justice for trauma survivors (Otgaar et al., 2022a). They also challenge the efficacy and safety of some evidence-based treatments for trauma-related disorders, such as EMDR therapy (Otgaar et al., 2022a).

In this paper, we critically examine the article by Otgaar et al. (2022a) which claims that psychotherapy can induce false memories of trauma and that therapists can suggest memories of experiences that clients never had. Specifically, Otgaar et al. (2022a) describe a unique case of therapy-induced false memories. The article recounts past cases wherein abuse was the focal point of legal proceedings. Arguments are drawn from a detailed description of an Italian case, wherein therapeutic records exhibited clear indications of suggestive treatment. The court concluded that the therapist had implanted false memories. In support of the court's determination, the authors present examples of research illustrating how false memories can be formed, including the influence of suggestion on their development.

In this opinion paper, our aim is to refute some of the authors' claims. Firstly, we will address the assertion that the reporting of abuse is not as prevalent as suggested. Secondly, we will delve into the mechanism of dissociation. Subsequently, we will analyze the methodological quality of the studies cited by the authors to support the existence of false memories. As a fourth point, we will discuss the argument that clinicians may employ suggestive techniques to induce false memories. Fifthly, we will explore the complexity and diversity of trauma and memory in real-life situations. Finally, we will highlight

how Eye Movement Desensitization and Reprocessing (EMDR) is an evidence-based treatment recommended by international guidelines for addressing traumatic symptoms, emphasizing its role in facilitating healing without the induction of false memories in clients.

2 Discussion

2.1 How frequent are reports of traumatic sexual abuse?

Otgaar et al. specify that "*People who are subjected to severe trauma, such as sexual abuse, frequently talk about their experiences with, for example, the police, child protection, or friends*" (Otgaar et al., 2022a). However, it is possible to refute the fact that sexual abuse is frequently reported. While we acknowledge Otgaar et al.'s (2022b) concern regarding the potential complexities these disclosures might introduce in legal and therapeutic processes, recent data paint a contrasting picture. A very recent report by the U.S. Department of Justice estimates that only 21.5% of sexual assault and rape offenses are actually reported in 2021 (Thompson, 2022), a figure preceded by a 22.9% in 2020 (Morgan and Thompson, 2021), with a similar trend in past years (Morgan and Truman, 2019, 2020). This discrepancy underscores the complexity of trauma reporting and the myriad factors that influence a survivor's decision to come forward, aspects that are vital for both comprehending the extent of abuse and ensuring effective support.

In this regard, mentioning the Italian data from the publication "*Lives in the* Balance" (Bianchi and Moretti, 2006), which emerged from a retrospective survey conducted on behalf of the National Observatory on Childhood and Adolescence in 2005–2006. Compared to the 24% of the Italian female population aged 19–59 who reported having been victims of sexual abuse at a younger age, only 5% said they had dealt with institutions (social-health services, judicial authorities) following their disclosure.

A 2011 study by Zinzow and Thompson (2011), from Clemson University in South Carolina, aimed at identifying the resistance that encourages sexual abuse victims to remain silent. Of the 719 female students who filled out the initial questionnaire, 127 had been victims of sexual abuse; of these, 108 (85 %) had not reported the abuse they had experienced. They were asked about the reasons a victim of sexual abuse might have not chosen to disclose the experience. Among the most frequent resistances are defensive mechanisms of rationalization and denial ("*I handled it on my own*") and minimization of the incident ("*it wasn't that bad*").

In addition to these data, it is important to understand why, often, victims of abuse (due to feelings of shame) have difficulty exposing the traumatic event. The cause of shame in post-traumatic states is complex, but it appears that there is a multitude of overlapping factors that make shame a predominant, if not the primary, emotional experience after trauma. Research indicates that shame can be triggered by the traumatic experience itself (Budden, 2009); misplaced or inaccurate feelings of guilt or responsibility for what happened in the traumatic event (e.g., "it was my fault..." "this wouldn't have happened if I had just...") (Wilson et al., 2006; Bhuptani and Messman, 2023); feelings of contamination and unlivability as a result of neglect or abuse, particularly in childhood (Pattison, 2000); rumination on one's own behaviors, actions, and reactions at the time of trauma (Lee et al., 2001); fear of judgment from others if they discover the trauma (Øktedalen et al., 2014) or social taboos associated with experienced trauma (e.g., childhood sexual abuse by a family member) (Banaj and Pellicano, 2020).

Pervasive feelings of shame about the incident, such as fear of being judged faulty, often lead victims blame themselves (Schwarz et al., 2017). Other factors include fear of not being believed, fear of retaliation by the perpetrator and distrust of the police and institutions in general. Another study, performed with both male and female students, reveals similar results (Sable et al., 2006).

2.2 Dissociation

There is, however, another factor that often represents a constant debate on false memories: the effects on memory due to dissociation, a defensive mechanism that the brain puts in place to protect itself from the destructive effects of traumatic experience. Otgaar et al. (2022a) acknowledge dissociation but frame it in a manner that we believe simplifies its origins and connection to trauma. In response, we aim to highlight the nuanced understanding of dissociation as a psychobiological reaction, supported by extensive neurobiological evidence (Loftus, 1993; Laney and Loftus, 2005; Brand et al., 2017). This understanding not only challenges the reductionist view but also enriches our appreciation for the sophisticated ways in which the human mind copes with trauma. Dissociation as a Response to Trauma is understood as a psychobiological reaction that can emerge in response to highly distressing and/or traumatic situations: escape of the mind when physical escape is not possible (Nijenhuis et al., 1998; Vermetten et al., 2007).

Neurobiological findings that contributed to the introduction of the PTSD-D diagnosis (Lanius et al., 2014) have also provided support for conceptualizations of dissociation as a trauma-related response. Being able to discuss neurobiological findings linked to dissociation can help facilitate understanding of dissociation and underscore the connection between trauma and dissociation.

Recent research using objective measures (such as functional magnetic resonance imaging and skin conductance) has found that trauma-related depersonalization and derealization are associated with overmodulation of emotional responsiveness (Sierra and Berrios, 1998). The overmodulation model is also consistent with findings indicating an inverse relationship between the severity of dissociation and cortisol reactivity (Simeon et al., 2007), as well as reduced skin conductance and increased response latency in patients with chronic depersonalization when exposed to unpleasant images (Sierra et al., 2002). Regarding dissociative identity disorder's (DID) dissociative self-states (DSS), research has demonstrated that different DSSs show different neurobiological responses to their own traumatic scripts. Specifically, when individuals are tested while in a self-state that endorses having experienced the trauma as a personal event, they exhibit the typical emotional and physiological hyperarousal expected in PTSD. However, if they undergo brain scans or other types of testing while in a self-state that does not confirm traumatic events as

autobiographical, they do not show the classic signs of heart rate variability, such as increased heart rate, systolic blood pressure, or the brain network patterns indicative of emotional hyperarousal. Instead, they exhibit a pattern of emotional overmodulation, including increased activation in the medial prefrontal cortex, insula, and amygdala (Tsai et al., 1999; Reinders et al., 2003, 2006, 2012, 2014; Lanius et al., 2010; Schlumpf et al., 2013).

In this regard, it is of utmost importance to mention two important articles in which the same authors report, with incontrovertible evidence by means of functional and structural magnetic resonance imaging, the presence in clients confronted with their own traumatic memory of neurobiological alterations in the amygdala and prefrontal cortex associated with dissociative symptoms demonstrating its presence as a protective factor against the distress caused by revisiting the trauma (Lanius et al., 2010; Nardo et al., 2013).

Dissociative experiences serve an avoidance function. Experiences of derealization, depersonalization, gaps in awareness, and amnesia can function to distance a person from a negative emotional experience in the present moment. Dissociative experiences can also prevent cognitive awareness or divert attention away from stimuli or events that would be distressing, which can be considered a form of experiential avoidance (Carlson et al., 2012).

In addition to the scientific confirmation, according to the ICD-11 and the DSM-5, dissociation is the involuntary disruption or discontinuity of the normal integration of various aspects of psychological functioning, such as identity, memory, perception, or behavior (American Psychiatric Association, 2013; World Health Organization, 2019).

2.3 Reliance on questionable methodology

Otgaar et al.'s (2022b) article also relies on a methodology to study false memories and trauma that we find questionable. While the exploration of these themes is undoubtedly valuable, we posit that the experimental conditions described do not fully encapsulate the complexities of real-life trauma experiences and memory dynamics. Muschalla and Schönborn (2021) highlight the diversity and potential for inducing false beliefs or memories under experimental conditions, yet they also caution about the heterogeneity and limitations of these findings (Muschalla and Schönborn, 2021). This critique is not to diminish the importance of laboratory research but to advocate for a broader methodological approach that can more accurately reflect and address the lived experiences of trauma survivors.

Another article discusses the role of mental imagery in memory distortion for traumatic events and notes that there are significant methodological limitations to keep in mind when evaluating all laboratory-based research on traumatic memory (Strange and Takarangi, 2015). The authors argue that although laboratory research can provide critical insights because of tightly controlled experimental designs, it is frequently a poor analog for an event that meets the criteria described.

These references suggest that while laboratory experiments can provide some insights into the nature of false memories and trauma, they have limitations in terms of their ecological validity and generalizability. They may not accurately reflect the complexity and diversity of trauma and memory in real-life situations, underscoring the need for methodological approaches that encompass the multifaceted nature of human experiences with trauma.

2.4 Distorted and biased view on clinicians

Otgaar et al. (2022b) article also has a distorted and biased view on clinicians who work with trauma survivors and their memories. The article suggests that clinicians are naive and uncritical about the possibility of dissociation and false memories, and they are accused of using suggestive techniques that induce false memories in their clients.

However, this portrayal is overly simplistic and fails to recognize the depth of understanding and the critical approach clinicians apply to their work. Firstly, clinicians who work with trauma survivors and their memories are not naive or uncritical about the possibility of dissociation and false memories. They are deeply aware of and critical about the complexity and diversity of trauma and memory in real-life situations. They follow empirical evidence, clinical experience, ethical principles, and professional standards that guide their assessment and treatment of trauma survivors and their memories (Malacrea et al., 2022).

Furthermore, the recognition and endorsement of EMDR by reputable mental health organizations, including the American Psychological Association (APA) and the WHO, stand as testament to its effectiveness. These endorsements not only validate the clinical utility of EMDR but also reflect its acceptance within the mental health community at large. EMDR has been the subject of numerous research studies and has been recognized as an efficient and effective treatment for PTSD in civilian populations by the American Psychological Association (APA). The International Society for Traumatic Stress Studies (ISTSS) further supports EMDR, deeming it an effective treatment guideline for complex PTSD in adults (Cloitre et al., 2012). Additionally, entities, such as the Clinical Resource Efficacy Team of the Northern Ireland Department of Health, the Quality Institute Health Care CBO/Trimbos Institute, the French National Institute of Health and Medical Research, and the American Psychiatric Association, have considered EMDR as an elective treatment for PTSD along with CBT.

Secondly, it is critical to note that clinicians who work with trauma survivors and their memories do not employ suggestive techniques that induce false memories in their clients. Clinicians use evidence-based treatments for trauma-related disorders, such as EMDR therapy, that respect the autonomy and competence of their clients. Clinicians facilitate and monitor the natural information processing system of their clients, not influence or manipulate it (Shapiro, 2001).

Lastly, clinicians are trained and informed by reputable and credible sources that reflect the current state of knowledge and practice in the field of psychotraumatology. This commitment to ongoing education and professional development ensures they remain proficient in assisting trauma survivors, further enhancing their skills and understanding (Malacrea et al., 2022).

2.5 Subversion of the conclusions of a reliable study

Otgaar et al. (2022b) article also misinterprets the conclusions of a reliable study by Goodman et al. (2018) that examined the memories of subjects who had actually experienced traumatic experiences during childhood. Otgaar et al. (2022a) use the results of this study to support their claim that a true traumatic memory would be reported accurately and vividly, implying that less vivid reenactments would likely be attributable to false memories induced by suggestion. However, this interpretation is inaccurate and misleading, as it overlooks other important findings and implications of Goodman et al. (2018) study.

Firstly, Otgaar et al. (2022a) overlook that Goodman et al. (2018) also found that traumatized subjects confidently recalled the core of events, i.e., the abuse they experienced, but that details naturally tended to blur over time. This finding suggests that memory accuracy and vividness are not fixed or linear measures, but rather depend on various factors, such as the type and intensity of trauma, the type and relevance of details, the time elapsed since the trauma, etc. (Goodman et al., 2018).

Secondly, Otgaar et al. (2022a) misinterpret the study by Goodman et al. (2018) where the authors state that 30% of their subjects recovered memories of traumatic experiences after a prolonged period in which they had no memory of them, mistakenly attributing this to the creation of memories through suggestion. Instead, this finding simply suggests that dissociation and recovery of traumatic memories are real and common phenomena among trauma survivors.

Finally, Otgaar et al. (2022b) fail to acknowledge that Goodman et al. (2018) also found that none of their subjects recalled the suggested false events that were implanted by the interviewers during their experiment. This finding suggests that trauma survivors are not easily susceptible to false memories induced by suggestion, especially when they have strong and consistent memories of their abuse (Goodman et al., 2018).

2.6 Regarding EMDR therapy

Otgaar et al.'s (2022a) article also questioning EMDR therapy, an evidence-based treatment for trauma-related disorders, by claiming that it involves suggestive techniques that induce false memories. They argue that EMDR therapy causes a deflation of imagination, or a facilitation of memory retrieval caused by eye movements that could potentially lead to false memories. Furthermore, they contend that EMDR therapy is not supported by any robust neurobiological foundation.

However, this attack is unfounded and misleading. Firstly, EMDR therapy does not involve suggestive techniques that induce false memories. On the contrary, EMDR therapy follows a very structured protocol that requires the therapist to refrain from intervening, speaking, or suggesting anything to the client during the reprocessing of traumatic memories (Shapiro, 2001). The therapist's role is to facilitate and monitor the client's natural information processing system, not to influence or manipulate it (Shapiro, 2001). EMDR therapy is applied only on episodic memories that the client is able to describe before starting the treatment, not on repressed memories or memories that are not accessible to consciousness (Shapiro, 2001).

Secondly, EMDR therapy is supported by a vast and growing body of literature and practice that demonstrates its efficacy and safety for various psychological disorders (WHO, 2013; Bisson et al., 2019). EMDR therapy is based on empirical evidence, clinical experience, ethical principles, and professional standards that respect the complexity and diversity of trauma and memory in real-life situations (Malacrea et al., 2022). EMDR therapy does not induce or implant false memories in clients; rather, it facilitates and monitors their adaptive information processing using eye movements as a stimulation technique (Baek et al., 2019).

Thirdly, EMDR therapy is supported by neuroimaging studies that demonstrate its solid neurobiological foundation. These studies show how EMDR therapy contributes to the adaptive information processing of traumatic memories by stimulating various brain regions and structures that are involved in memory encoding, storage, and retrieval.

EMDR therapy helps to normalize their activity by facilitating the migration, processing, contextualization, integration, consolidation, or reconsolidation of traumatic memories (Harper et al., 2009; Pagani et al., 2011, 2012, 2017; Landin-Romero et al., 2018; Baek et al., 2019; Mattera et al., 2022).

3 Conclusion

The discussion surrounding traumatic memories, dissociation, and the role of psychotherapy in memory recall is complex and multifaceted. This comprehensive analysis has delved into various aspects, including the frequency of reporting traumatic sexual abuse, the impact of dissociation on memory, the reliability of a single case study, the methodology employed in studying false memories, the portrayal of clinicians, the interpretation of reliable studies, and the critique of EMDR therapy.

Starting with the frequency of reporting traumatic sexual abuse, it is evident that a significant discrepancy exists between reported cases and actual instances. While some argue that a substantial number of trauma survivors come forward and discuss their experiences, empirical data suggests that a considerable percentage remains undisclosed, highlighting the intricate nature of reporting sexual abuse. Factors such as shame, fear of judgment, and distrust of authorities contribute to the underreporting phenomenon, making it imperative to consider the multifaceted reasons survivors choose to remain silent.

Dissociation emerged as a crucial element in the discussion, challenging the notion that it is merely a myth propagated by false memory proponents. Research, including neurobiological findings, supports the existence of dissociation as a response to trauma. This defensive mechanism serves as a psychobiological reaction to distressing situations, emphasizing its role in protecting the mind when physical escape is unattainable. The complexity of dissociative experiences, including depersonalization and derealization, was explored, shedding light on their potential functions in avoiding negative emotional experiences.

The critique of Otgaar et al.'s (2022a) single case study and their reliance on questionable methodology exposed potential

limitations in their conclusions. A nuanced examination of trauma survivors and their memories requires a broader perspective than what a singular case can provide. Additionally, the methodology employed in laboratory experiments, while informative, may lack ecological validity and struggle to capture the intricacies of real-life trauma and memory.

A distorted view of clinicians was addressed, emphasizing that professionals working with trauma survivors are neither naive nor uncritical about dissociation and false memories. EMDR therapy, an evidence-based treatment, faced unwarranted skepticism. The unfounded claims that EMDR involves suggestive techniques that induce false memories were debunked, highlighting the structured and ethical nature of this therapeutic approach. Moreover, EMDR therapy's extensive empirical support, safety, and neurobiological foundation were underscored, countering the unsubstantiated criticisms.

In summary, the examination of these topics calls for a balanced and nuanced approach. Trauma survivors' experiences are intricate, influenced by psychological, emotional, and societal factors. Dissociation, rather than being dismissed as a myth, is acknowledged as a genuine response to trauma, supported by neurobiological evidence. Criticisms of psychotherapy, particularly EMDR, should be scrutinized within the framework of robust empirical evidence and ethical considerations. The path forward in trauma research and therapy necessitates collaborative efforts, open dialogue, and a commitment to exploring and addressing the complexities of trauma and memory with empathy, rigor, and an interdisciplinary approach. The evolving landscape of trauma research underscores the need for ongoing dialogue and exploration, respecting the complexity inherent in the study of memory and its relation to traumatic experiences.

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Exhausting, but necessary: the lived experience of participants in an intensive inpatient trauma treatment program

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Background: Intensive inpatient treatment programs have shown robust results in the treatment of post-traumatic stress disorder (PTSD). How patients experience this treatment program and what changes they experience as a result of the treatment have, however, only scarcely been explored through qualitative studies.

Objective: This study aimed to explore the lived experience of participants in an intensive inpatient trauma treatment program. Our research questions were as follows: how do patients experience intensive trauma-focused treatment? How do they experience possible changes related to participating in the treatment program?

Methods: Six patients diagnosed with PTSD with significant comorbidities, who recently participated in an intensive 2-week (4 + 4 days) inpatient trauma treatment program with prolonged exposure (PE), eye movement desensitization and reprocessing (EMDR), and therapist rotation (TR), were interviewed with a semi-structured qualitative interview. Transcripts were analyzed using a thematic analysis approach.

Results: Our analysis resulted in five main themes: (1) the need to feel safe; (2) the benefits of many and different therapeutic encounters; (3) variable experience with elements of treatment; (4) intensity; and (5) experienced change. Our results suggest that feeling safe within the framework of the treatment program facilitated the treatment process. Many and different therapeutic encounters, both through TR and with ward staff, contributed to experienced change. All participants described the intensity as facilitative to trauma processing. However, most participants also describe often feeling too overwhelmed to benefit from all elements of the treatment program.

Conclusions: Our findings suggest that participants experience the overall treatment program as beneficial and contributing to experienced change. Participants described the intensity of the program as exhausting, but necessary. Most did, however, report at times of being too overwhelmed to benefit from elements of the program. Consequently, our results prompt us to question the optimal level of intensity.

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KEYWORDS

PTSD, EMDR, PE, therapist rotation, intensive trauma treatment, qualitative research, patients' perspective

1 Background

"The cure for pain is in the pain." This quote by the 13th-century Persian poet Rumi takes on particular significance when exploring patients' experiences of current-day trauma treatment. Trauma-focused therapy, particularly confronting traumatic memories, is known to be demanding and painful. Consequently, we need better knowledge of how trauma-focused treatment is experienced to know if enduring the pain justifies the possible gains. Post-traumatic stress disorder (PTSD) leads to significant subjective suffering and often limits vocational and social functioning. It is associated with increased risk of suicide, poor physical health, and significant psychiatric comorbidity (Bisson et al., 2015), thus burdening both the patient and society (Kessler et al., 2017; Watson, 2019). The World Health Organization's (WHO) guidelines for PTSD treatment (WHO, 2013) recommend cognitive–behavioral-based treatments for PTSD, such as prolonged exposure (PE) (Foa et al., 2021) and eye movement desensitization and reprocessing (EMDR) (Shapiro, 2018). A recent systematic review of treatments for PTSD confirms these recommendations (Lewis et al., 2020a). Previous quantitative research studies have compared trauma-focused to non-trauma-focused treatment, finding the strongest effect for PTSD in trauma-focused treatments (TFT) (Bradley et al., 2005; Bisson et al., 2013; Cusack et al., 2016). However, dropout rates are significantly higher for trauma-focused therapy than for non-trauma-focused therapy (Lewis et al., 2020a). Lewis et al. suggest that this disparity is related to the patient's ability to tolerate their focus on traumatic events (Lewis et al., 2020b).

During the last 10 years, intensive trauma-focused treatment programs (ITTPs) have been developed. A systematic review of intensive empirically supported treatments for PTSD containing treatment modalities including PE and EMDR found that these intensive treatments have a higher rate of treatment completion and suggests that intensive treatment for PTSD may be an effective alternative to standard treatment to prevent dropout (Sciarrino et al., 2020). The current study models itself on the inpatient ITTP developed at the Psychotrauma Expertise Center (PSYTREC), Netherlands (Van Woudenberg et al., 2018). This program includes daily EMDR and PE sessions, physical activity (PA), psychoeducation groups (PEG), and therapist rotation (TR) (Van Minnen et al., 2018). This research group has published several studies documenting robust treatment results for patients with PTSD (Van Woudenberg et al., 2018), including those with comorbid disorders (Kolthof et al., 2022; Paridaen et al., 2023), and for those with the dissociative subtype of PTSD (Zoet et al., 2018). In a recent Swedish feasibility study, a similar intensive treatment program using PE and EMDR reported significant reductions in PTSD symptoms (Gahnfelt et al., 2023). However, none of these research groups nor other researchers have qualitatively explored how intensive multicomponent inpatient trauma treatment is experienced by participants. A public regional outpatient unit for trauma treatment in Trondheim, Norway, has implemented a version of the Dutch intensive treatment program and adapted it to their outpatient facility with good results (Auren et al., 2022). This research group reported, through a qualitative study, that patients found the treatment program very demanding but worthy in terms of symptom reduction. The intensity of the treatment and TR were experienced as important for treatment efficacy, and the sense of unity with other participants and PA were both factors that facilitated easier completion of the program (Thoresen et al., 2022). Furthermore, two qualitative studies have described intensive trauma-focused therapy programs with one treatment modality. In a written survey of veterans with PTSD receiving a 2-week massed PE treatment program, Sherrill et al. (2022)found that treatment engagement was sustained through quick and meaningful symptom relief and that treatment was prioritized and avoidance-limited. Kovacevic et al. (2023) reported that participants in a 1-week massed Cognitive Processing Treatment program described changed PTSD symptoms and improved cognitive and affective coping skills.

Non-intensive TFT has been the subject of inquiry in some qualitative research studies. A recent systematic review encompassing nine studies (seven PE or trauma-focused cognitive behavioral therapy) synthesized the findings into four primary domains representing the temporal sequence of TFT: overcoming ambivalence toward TFT, experience of treatment elements, motivation for dropout or retention, and perceived changes post-treatment. The authors summarize that, though patients report high levels of distress and re-emergence of symptoms during treatment, most perceived the hardship as essential for improvement (Gjerstad et al., 2024). The review incorporates only one study on EMDR; it does, however, reference an earlier systematic review that examines five EMDR studies (only one with PTSD as the main focus of treatment). The author emphasizes the patients' perception of safety as a necessary condition for EMDR to be effective and explores changes including coming to terms with the past, cognitive and behavioral changes, and core "transformational" changes experienced by patients as resulting from EMDR (Whitehouse, 2021). Both reviews highlight the significance of qualitative studies that incorporate the patient's perspective, which deepens our understanding and enhances the effectiveness of trauma-focused treatments.

In summary, there is robust evidence for the treatment effect of ITTP. This intervention has, however, scarcely been investigated through qualitative analysis, and little is known about how patients experience intensive inpatient multicomponent trauma treatment. The current study aimed to explore patients' lived experience of a 2-week intensive inpatient trauma treatment program combining EMDR, PE, PA, PEG, and TR. Our research questions were as follows: How do patients experience intensive trauma-focused treatment? How do they experience possible changes related to participating in the treatment program?

Abbreviations: DSM-V, Diagnostic and Statistical Manual of Mental Disorders-version IV; EMDR, eye movement desensitization and reprocessing; IE, imaginary exposure; IVE, *in vivo* exposure; ITTP, Intensive Trauma Treatment Program; M.I.N.I.6.0.0., Mini International Neuropsychiatric Interview; PA, physical activity; PEG, psychoeducational groups; PE, prolonged exposure; TFT, trauma-focused treatment (TFT); TR, therapist rotation.

2 Methods

2.1 Design, ethics, and data collection

The present study was conducted in a public psychiatric-combined inpatient and outpatient clinic in Oslo, Norway. The clinic offers treatment for a wide range of mental illnesses and is part of the specialist healthcare system that requires patients to be referred by a doctor. All patients were recruited from this clinic. The current study is part of the ongoing Norwegian intensive inpatient trauma treatment pilot project. Intensive combined treatment with EMDR and PE has not been previously conducted in an inpatient setting in Norway. The main aim of this pilot project is to examine if ITTP is feasible in a regular public healthcare setting. A total of 18 patients participated in the parent feasibility study, in three groups of six patients, receiving treatment between 2021 and 2023. The current study describes the experiences of the second group of patients being treated. The results from the feasibility study have not yet been published as follow-up is still ongoing.

The Central Norway Regional Ethics Health Committee (REC South East 0704/2022) has approved the study, which also includes the qualitative interviews. Clinical Trial gov. identifier 453358. Written informed consent was obtained from all participants.

2.2 Participants and procedure

All patients ($N = 6$) from the second treatment group in the pilot study were invited and consented to participate in the nested qualitative interview. All six patients had completed the program and participated in all therapy sessions. The pilot study treatment program had the following inclusion criteria: patients had to fulfill diagnostic criteria for PTSD diagnosis, have had >1 traumatic life event, have had symptoms lasting >6 months, and have had at least one prior psychotherapeutic treatment (>3-month duration). Patients had to be in the age range of 18–65 years and should speak a Scandinavian language adequately. The exclusion criteria were patients having a psychotic or bipolar disorder, those with active substance abuse issues, individuals currently in a abusive or life-threatening situation, or those attempted to take their own life in the past 3 months before treatment. All participants were included from our outpatient clinic. Before referral, patients had been diagnostically assessed with a structured clinical interview, the Mini-International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998), and even with the Structured Clinical Interview for DSM-III-R (SCID-II) (Williams et al., 1992). After referral, patients were invited to an assessment interview at the inpatient treatment facility where they were given further information about the treatment before giving informed written consent. After inclusion, patients were prepared for treatment through a 4–5-day pretreatment admission where a detailed, individual treatment plan was devised (trauma timeline with index traumas and *in vivo* exposure plan), and patients received psychoeducation based on the treatment rationale.

Participants in the current study were six women aged 21–45 (average 28, median 25) years. All of them had previously received therapy for 1 year or more, among which five had engaged the public psychiatric health service since their mid-teens or early 20s. Four had been in contact with the child protection services and/or child psychiatric services due to psychological or physical abuse, neglect, and/or parents with substance abuse issues. All of them reported multiple traumas. All but one had experienced sexual assault. All had experienced systematic bullying and/or recurrent humiliating verbal assault. All patients had current comorbid psychiatric diagnoses including attention deficit disorder (Bisson et al., 2015), personality disorders (Watson, 2019), other dissociative (conversion) disorders (Kessler et al., 2017), and autism spectrum disorder (Bisson et al., 2015).

In an explorative feasibility study of this kind, a smaller participant pool is considered sufficient for thematic analysis (Braun and Clarke, 2006; Clarke et al., 2015). Interviewing six patients was thus deemed acceptable by the authors.

2.3 Treatment

The treatment program had a 2-week time frame with 8 full-treatment days (Monday–Thursday) and 2 days (Fridays) with team meetings and planning. Patients went home during the mid-treatment weekend. The program contained daily PE and EMDR sessions, between-session PA, and PEG (see Figure 1). A multidisciplinary team was provided to each patient. TR was used for EMDR and imaginary exposure (part of PE). The patients thus met 11–12 different therapists during the treatment. The program models itself on the PSYTREC program in the Netherlands (Van Woudenberg et al., 2018) but contains fewer PA and shorter EMDR sessions. Rather than focusing on PA, we have, similar to the Trondheim trauma treatment program (Brynhildsvoll Auren et al., 2021), expanded elements of PE by both listening to imaginary exposure (IE) session recordings and using *in vivo* exposure (IVE). IVE as an element of PE was implemented as it targets avoidance behavior particularly relevant for this patient group (Cusack et al., 2016).

Both IE and EMDR were carried out by psychologists and psychiatrists trained in the treatment methods. IVE, PA, PEG, and, when needed, assistance while listening to the recorded PE sessions were carried out by ward staff. Ward staff were also available for supportive *ad hoc* counseling. The ward staff consisted of nurses (some specialized in psychiatric nursing) and social workers. All permanent staff had received trauma treatment courses, including a course in PE. Therapists and representatives from ward staff had a daily 1-h meeting to ensure adherence to the treatment protocols (Shapiro, 2018; Foa et al., 2021) and to monitor progress and plan the following sessions. On-site supervision was provided in PE and EMDR therapy by qualified supervisors to further ensure treatment adherence. All patients remained under the primary care of their outpatient therapists prior to and after their treatment admission.

2.4 Data collection

A semi-structured interview was designed to explore patients' lived experience of the treatment. A semi-structured interview ensures thematic equality between interviews while still allowing

Daily treatment program
09.00 – 10.00 Imaginary exposure (PE)
10.30 – 12.00 In vivo exposure therapy (PE)
12.45 – 13.40 Physical activity/sports
14.00 – 15.00 EMDR
15.30 – 15.45 Afternoon meeting
16.15 – 17.00 Psychoeducational group
18.00 – 19.00 Listening to recorded PE session
Evenings: patients encouraged to socialize in common area: do puzzles, boardgames etc.
The program includes breaks for meals and snacks.

FIGURE 1
Daily treatment program.

a flexible exploration of the main themes (Kvale and Brinkmann, 2009; Qu and Dumay, 2011; Alvesson et al., 2020). The interview guide was developed by the pilot study research group. It consisted of seven main questions, with follow-up questions to deepen and broaden the main questions (see Table 1). Focusing on the experience of the treatment program, the patients were asked about both helpful and unhelpful elements of the treatment and further asked specifically about various treatment elements. Patients were asked about changes in cognitions, feelings, and bodily awareness as well as changed interpersonal relationships and changes in everyday behavior with respect to possible experienced change during or after treatment. The interview lasted 30–45 min and was conducted at the inpatient treatment facility. All patients were interviewed 1–2 weeks after finishing the treatment program by interviewers independent of the treatment program and research project. Three interviewers shared the task between them, and two were present at each interview. Before the interviews were conducted, the patients were told that the interview was going to be centered around their experiences, both good and bad, of receiving the treatment to learn from the patients and thus be able to offer better care. The patients were informed that the interviews would be transcribed and anonymized. The interviewers made an effort to create a supportive, informal tone, encouraging the participants to elaborate freely on relevant themes. The interviewer followed up with in-depth or clarifying questions when needed. The interviews were audio-recorded. A research assistant transcribed the interviews and anonymized all transcriptions. Due to a fault with the recording equipment, one interview was not recorded. This interview is, therefore, not included in the data material.

2.5 Analysis

We used thematic analysis, as described by Braun and Clarke (2006), to explore and analyze the material. This method identifies recurrent themes and patterns of meaning-making, is suited to analyze the experiences and meaning-making of participants, and is thus suitable for the current study. We identified themes or patterns within the data by using an inductive bottom-up approach—not trying to fit the data into a pre-existing frame (Patton, 1990). To better explore the lived experience and meaning-making of the participants in the program, we used the hermeneutical–phenomenological position (Gadamer, 2013). We conducted the analyses in six phases described below to increase the traceability (Castleberry and Nolen, 2018). Phase 1: The first author compared audio recordings of the interviews to transcriptions made by a research assistant to ensure the quality of the transcription. Phase 2: All authors read all transcripts looking for answers to the research questions. We explicitly looked for both negative and positive experiences. The first and second author generated initial codes and searched for themes independently and later compared and discussed their findings with the last author. To ensure correspondence between raw data and codes, specific words and syntax from the transcriptions were used when identifying and labeling various aspects of the data material. Phase 3: Codes were reorganized into possible themes. The last author gave feedback on the first and second author's reduction and initial thematic categorization, further refining the themes and subthemes through discussion. These three authors discussed their unique understanding of the material and critiqued the categorization conducted so far. Phase 4: The first, second, and last author reorganized and refined the themes and subthemes, comparing it to the initial coded data to ensure that the analyses were consistent with the information from the interviews. Codes under different themes were compared to each other to ensure right fit, and re-categorization was carried out where necessary. Phase 5: All authors reviewed themes and subthemes presented listwise, discussed their relevance for the research questions and the research project, and then agreed on the current categorization and presentation. The described process made our interpretations less dependent on individual preferences (Malterud, 2011). Phase 6: Each theme was described in a report that emphasized the core or essence of the theme. Participants' quotes were added to affirm discussion and arguments. Documents were used to track the process of coding and generation of themes.

The authors have different therapeutic orientations. VV-K is both a PE and an EMDR therapist; MJ, JHE, and WA are EMDR therapists; MJ is also a certified EMDR supervisor; and JE has no specific therapeutic orientation. This diversity has hopefully broadened and enriched our interpretation of the data. This transparency is made in accordance with the checklist of reporting qualitative research by Tong, Sainsbury, and Craig (Tong et al., 2007). We used the labels general, typical, and variant to indicate the recurrence and representativeness of therapists' experiences, as

TABLE 1 Examples of questions asked in the interview with patients.

Topics	Questions
Today's situation and need for treatment	How have you been since completing the treatment program? Has it been necessary for you to receive any treatment or additional follow-up since discharge?
Preparations for the treatment	Did you feel that you were adequately prepared for the treatment? Was there anything that could be done to make you better prepared?
During treatment	How did you experience the treatment you received in the inpatient ward? Do you think you changed in any way during, or after, the treatment? If so, how (changed thought patterns, emotions, bodily experiences, new insights, or altered relations)? Do you remember a special situation, event, or episode that was particularly important to you?

suggested by Hill et al. (2005). When something was mentioned by all, it was labeled as general and in the text referred to as "all patients." When something was mentioned by more than half the patients, it was considered typical and in the text referred to as "most patients." We use the expression "some patients" when something was found to be a variant represented by less than half the patients but more than one.

3 Results

We organized the material into five main themes: (1) the need to feel safe, (2) the benefits of many and different therapeutic encounters, (3) variable experience with different elements of treatment, (4) intensity, and (5) experienced change. The themes and subthemes, including representative quotes from patients, are summarized in Table 2. All names are pseudonymized.

3.1 The need to feel safe

All participants emphasized the importance of feeling safe on the ward and with ward staff and/or with therapists. Feeling safe allowed them to enter the treatment process and stick with the treatment program. Being adequately prepared for the program emerged as an important aspect of feeling safe.

3.1.1 Getting prepared for treatment

All participants emphasized the importance of getting adequately prepared for treatment and that the pretreatment admission was important for this purpose. Most participants described that getting to know the ward staff and the multidisciplinary team made them feel safer. Kristin said: "To me, the week (pre-treatment admission) was very important…I felt a need to know the place… and the people. Because I have always felt unsafe around other people. So this (the ward) was really the first place where I, like, have felt safe around other people. Adults. Therapists and so on…" Furthermore, learning about the treatment program and the rationale for treatment was emphasized as important. Merete said: "...But I absolutely felt that I got more out of the treatment because I knew, I knew for example exactly how I was going to talk about the memories. Because we had sort of practiced it in the pre-treatment admission." Most patients, however, said it was impossible to be prepared for how tough it was going to be.

3.1.2 Access to ward staff and multidisciplinary team

All participants emphasized how the ward staff made the treatment program feel safe. Most said that it was good to know that staff were available if they were struggling and that the ward staff knew what they were going through. Kari said: "…And when I experienced a lot of emotions, it didn't really matter who was my primary contact (ward staff), I just made eye contact with one of them and, like, '*Now we need to go and talk…*' And it is really good that everyone knows stuff. That they write reports, etc." Having a multidisciplinary team of two staff members and a therapist was pointed out as important by most participants. Patients described the team as an anchor, a family, or as a safety net. Merete said: "So they (two staff members from the team) were really good to have, and they also helped me when I was not doing well. But, it sometimes happened that they were not working, and then I got (assigned) a new member of staff that I maybe had never met before, and did not know anything about, and then I didn't feel totally comfortable asking for help, if I, for example, was dissociating (…) But, I thought that all (staff) were competent, and it was good that there was always someone to you could approach."

3.2 The benefit of many and different therapeutic encounters

All participants described how the treatment program had facilitated both new insights and meaningful encounters with ward staff and therapists. Most emphasized how this positively differed from previous psychotherapeutic treatments.

3.2.1 Added perspectives and focus on own process through therapist rotation

All but one expressed enthusiasm with regard to TR. Most described how TR gave them added perspectives. Some patients experienced that TR made it easier to focus on their own process rather than on the relationship to the therapist and that not being so close made it easier to open up and talk about difficult experiences. Merete said: "I thought it turned out really good, that we changed (therapist) often and that it… like I said… I came to feel like it was my process in a way. Rather than it being me and another that were going to go through it together. It also made it feel a little less - because it is really very private and personal stuff that one talks about – I think it would have felt a bit, like, creepy if, like, it was just one person I was to talk to about all those most difficult things…" Kari also described how TR made the

TABLE 2 The identified themes and subthemes with quotes from the patients.

Themes	Subthemes	Examples of quotes
The need to feel safe	Getting prepared for treatment Access to ward staff	"The pre-treatment admission taught me a lot" Merete "There was always someone there if you needed someone" Louise
The benefit of many and different therapeutic encounters	Added perspectives and focus on own process through therapist rotation New relational experiences	"It was really good to rotate the therapists. To get several perspectives." Kari "He was really good at setting me straight, almost like a parent (laughs)." Kristin
Variable experience with elements of treatment	What worked for one was difficult for another The total package was good	"To me, that (the listening) was what made me remember stuff." Kristin vs. "It (the listening) was awful (…) I got so self-critical." Louise "I just think the total package was great." Sigrid
Intensity	Exhausting, but necessary Too intensive? Being back on my own	"Because when I have been in therapy previously, I haven't managed to… to connect to my reactions. But like here, like, here you, in a way, had no choice." Merete "I was so exhausted that when I sat there. It (the psychoeducation) went in the one ear and out the other." Kristin "So the difficult thing is to find the balance between the tools I have learned for 2 weeks and the life I have lived prior to that." Kari
Experienced change	Acceptance and ownership to one's trauma history Less numbness and dissociation, greater access to feelings Changed personal relationships Self-compassion and grief	"And the fact that when we talked through the trauma, I had very few pieces of the puzzle, but they helped me fill in the rest of the picture." Merete "I feel that the fear is stronger because I don't dissociate from it. And that's really a good thing, but it is, like, really tiring." Kristin "I have had to break off with a lot of people, and now it's really empty." Kristin "I think it has become much less guilt and more grief." Sigrid

therapeutic process less dependent on the quality of the relation to one's therapist: "I experienced it as really beneficial to have different therapists. I felt that, most probably, if I had ended up with only one therapist then we would have built a kind of relationship. And if the chemistry hadn't been right, then I think I would have had a really lousy experience. Because I have had very many different therapists (previously), and I have had a bad experience… So it was really good."

The only patient who was negative to TR (Louise) said: "To me, it was difficult that we, like, changed therapists every therapy session. To me, it made the treatment a bit harder, because I had to relate to a new person every time (…) So that, I was a bit like, I should have liked it to keep to one or two, maybe three therapists that rotated."

3.2.2 New relational experiences

All the participants described new relational experiences. Most struggled to trust people in general, particularly men. During the treatment program, most participants experienced that more people than they had previously thought were trustworthy. Kristin emphasized how TR gave her new relational experiences: "I think it's really smart (therapist rotation), because I have very little trust (in people), because of specific things, so that helped me see that there are several people, like, that are good. And that people are, kind of, safe. So it was good to have several (therapists)."

Some described that a staff member that they struggled to trust in the beginning (because of his gender or because he/she reminded her of someone from the past) after some days became a safe person. Some described staff members as role models they had lacked in their upbringing. Kristin said: "And also it was just generally good to understand that it exists, just to see what adults really should be like. Because I have not seen it or experienced it. So I got a really, like, (new) perspective on my childhood and my parents (…) But one has to experience it to really understand it, cause one can hear it as much as that, but one has to experience it." These experiences often lead to an understanding of what they had missed out on in their upbringing.

For some, it was a new experience to open up and expose vulnerability. Kari said: "…but also the first time I got a real big panic attack with someone present, (previously) I have always been by myself. And that was real, like, exposure, to show someone (the panic attack). It sounds like such a cliche, but to, like, show someone your worst side."

3.3 Variable experience with different elements of treatments

All patients found two or more useful elements in the daily treatment program, but the participants disagreed about what was beneficial. What was helpful to one was challenging or even experienced as impeding to another. All patients, however, agreed that the treatment program overall was good.

3.3.1 What worked for one was difficult for another

All participants described EMDR as beneficial, and all described gains from elements PE. Most participants described that imaginary exposure (IE) helped them either retrieve details of trauma memories or gain access to emotions. Louise, on the other hand, was struggling with IE. She, however, found *in vivo* exposure helpful: "I experienced really good progress when we were going outside to do exposure (…) There I managed to keep up, and make it to the next level…"

Most of the patients described the daily program as challenging, but well-structured. Kari said: "I enjoyed that we started with PE

that I could listen to in the evening, and I liked that this was followed by *in vivo* exposure. And then EMDR in the afternoon. It was, kind of, a good set up." Some wanted to swap around the elements of treatment in the timetable. Louise said she would have preferred to have IE later in the day and possibly EMDR as the first therapy session. Kristin would also have preferred to do EMDR as the first session, as this treatment often made her feel calmer, while she experienced IE as more anxiety-inducing and therefore thought she would have benefitted more from *in vivo* exposure if she did this part of PE after EMDR.

The patient group was most divided with regard to listening to PE recordings. Most of the patients described listening to the PE session as helpful, in that it was a different kind of trauma exposure and made them remember details of their trauma history or increase self-compassion. Sigrid said: "Yes, it was the especially the recordings. To listen to them, that really helped me. It was so surprising to me, that like, to just listen to yourself telling an awful story, that it helps one have self-compassion." Kristin described how listening to recordings aided her memory "Ehm… I think it (the listening) went pretty well. It's just that one is pretty tired, and … but to me, that (the listening) was what made me remember stuff." Some patients, however, struggled to listen to their recorded PE sessions as the listening made them self-critical and/or dissociative.

Most patients enjoyed the physical activity groups. Kari said: "The activity groups were good. I enjoyed... It was such a good variation. And the fact that we went for walks and got to know each other. Boxing and climbing were the definitive favorites. And Kubb in the garden, great fun. And you get to feel more secure about the ward staff too." However, the group varied in the level of fitness, and some found it challenging to exercise in groups as it made them feel self-conscious.

3.3.2 The total package was good

All participants described the overall treatment program as good or very good. Some of the participants described how different elements of treatment complimented each other and created a synergistic effect. Merete said: "And I think it was nice that, it was tiring, but it was nice to be able to get two so different types of therapy in the same day. Cause it kind of helped me, to first get a lot of stuff to the surface, and then later I felt that EMDR kind of helped me to contextualize and talk around it." Kristin described: "I think talking about the trauma in the present tense (element of PE) helped me to remember (…) when I remembered more about how it was, and how I felt, the EMDR worked better too." Kristin also described how listening to the PE recordings aided her memory and further benefitted her progress in the EMDR sessions.

3.4 Intensity

3.4.1 Exhausting, but necessary

All the participants experienced the intensity of the treatment program as an important factor in the treatment process. Most experienced the intensity as necessary to stick to the processing of their trauma history. Louise said: "I think it was positive to kind of be very connected all the time. That there were no, like, long breaks between each treatment session. That it was easier in a way to reenter the trauma, or look back at things, because you were kind of in it—the milieu or the mindset." Most described how the intensity of the treatment program made it difficult to close up. Sigrid explained how this allowed her to move on: "With regards to how many sessions we have had over those 2 weeks. It's almost like 6 months of normal treatment. How much further one has come, because one is vulnerable all the time. Because you can't, kind of, close up. And to put it in that perspective, it's like… Yes, but Hello! It's not strange that I am tired (…) because that was two bloody tough weeks, but it's so worth it."

Some explained that the intensity helped them continue exposing themselves rather than avoid trauma triggers and related feelings. Merete described: "I think it's related to the fact that I didn't just have one therapy session and then was allowed to leave, and leave it behind, and avoid thinking about it." She further described how the tight session schedule made her have a very intense psychological reaction early in the first treatment week and said "That made it very clear how inflamed it was (the trauma history), and what stuff I had to work through. So that became a tough… but also a really important experience."

3.4.2 Too intensive?

As described in the previous section, all patients described that the intensity of the program was beneficial and necessary to the therapeutic process. However, most patients also reported times where they were too overwhelmed to benefit from elements of the treatment program. This was particularly related to either listening to PE recordings and/or in psycho-educational groups. Some patients specifically reported that migraine and/or dissociative symptoms impeded listening to PE recordings. Some also reported a more general experience of being pushed over their preferred limit in or in between the therapy sessions. Kari said: "I had a really high SUD (Subjective Unit of Distress) and felt my body really resisting it. And to still be pushed (to do treatment), when I was completely destroyed. But I understand that is a part of the treatment, but I think, to me, that was the worst." Only one patient however explicitly suggested changing the program and said she would have preferred to have 1 day free per week from therapy sessions.

3.4.3 Being back on my own

Most of the participants described the transition from the 2 intensive weeks of treatment to returning home after discharge as tough and that they needed time to settle before going back to their normal chores. Most wished they had been better prepared for discharge to experience a smoother transition. Kristin said: "So I think, that was what was challenging when I got out of here, that suddenly you're back to everyday life, but your body is still in that bubble, in the treatment program. So I kind of needed a few days to just calm my nervous system, before I really had to, should have had to, go out to do stuff." Most had started to regard their feelings and/or trauma history in a new way, and for some, that changed existing relationships, making the process of returning to these relationships difficult.

3.5 Experienced change

All participants expressed a change in how they related to their trauma history. All expressed being more emotionally connected and in touch with how they were feeling, most in a more nuanced and novel way than before commencing the treatment program. Most expressed that this influenced their day-to-day functioning and/or relationships.

3.5.1 Acceptance and ownership to one's trauma history

All participants expressed that the treatment program had given them new insights related to their trauma history. Merete said: "... And that is something that, like, totally changed the understanding of my own experiences. And I feel that change in a very positive way. And that helps differentiate… differentiate between what actually happened, and in a way understand… understand what happened back then (…) Initially it was just about understanding what perspectives (of trauma) I had had. And then it was all about changing those perspectives. And that was, and I wasn't prepared for this at all, but that was very, very helpful, and I really think it has changed a lot." Most participants explained how these new insights led to increased acceptance and ownership of their trauma history. Kristin said: "… what I remembered felt like it had been a dream. So, kind of, I had no ownership of what had happened. And that makes one really frustrated and confused and annoyed all the time. So, it helped a lot. And now knowing, when I am home, and I have a reaction, it's because of that memory, or that thing, like." A greater sense of acceptance and ownership made it easier to separate what they should and should not take responsibility for. Sigrid said: "I feel like the most important thing regarding trauma is the sense of control. And if you take on all the responsibility, you feel a lot of control. Right? Because then …everything is on me. But it's been surprisingly freeing to think that ≪this happened, and there were loads of other, earlier things that happened, and it wasn't my responsibility, and someone else should have taken on that responsibility."

3.5.2 Less numbness and dissociation and greater access to feelings

All patients describe a greater ability to access a broader spectrum of emotions and a better ability to understand their emotional and physical reactions. Louise said: "I have, among other things, allowed myself to feel irritable and angry with certain people, something I never did before. That was also something we worked on to accept that it is ok (to feel angry)."

Most reported that less numbness and dissociative reactions made them gain access to a larger range of emotions. Merete said: "It made a big difference—that I was able to talk about and think about things that I previously could not think about without dissociating. (…) and it was still uncomfortable, but it wasn't at all as uncomfortable as it had been. And I notice that, in my body too, that there is less, like, the anxiety level has lessened..." Kristin explained how dissociation and numbness previously had worked as self-protective mechanisms: "I just think, like I said, just about my dissociation, it is…It's like a kind of shield, that I in a way left behind here." Kari said: "Earlier I have always been shutting out everything. So now that I think a lot more, my brain has gotten a kind of kick-start. I feel that it is processing and works hard, like, compared to before when I couldn't even think, and was just laying around sleeping all day. So now I feel like it (the brain) has gotten some new energy, and then it's back working." Both greater acceptance of their own trauma history and having greater emotional accessibility made some participants clearer about their needs and more likely to take these needs into account in their everyday setting. Merete said: "I value more…what I feel is right, like. And I value my own feelings and needs a bit more…"

3.5.3 Changed interpersonal relationships

Most participants mentioned that new perspectives and insights related to their upbringing and trauma history affected their relationships with family, friends, or partners. Kristin said: "I can't view things the same way anymore. Like… I can't accept certain things from my family. Or, I want to be around my family, but it costs me a lot, like when people are screaming and those kind of things…So... That's been better, I have had to accept that I don't have a family I can lean on, and that I must lean on other things instead. To not have, like, not go around hoping… Cause I feel that that is what one does as a kid—hoping that things will get better, or that one can help someone, or…right. But I have tried breaking with that hope, but that has also been scary." Some participants described feeling lonelier and that their lack of a proper non-professional support system had become more apparent.

3.5.4 Self-compassion and grief

Most participants described how processing their trauma history had given them a more complete narrative and that by addressing feelings of guilt, shame, and responsibility for the experienced trauma, they had gained access to a more nuanced repertoire of emotions. This repertoire included feelings of grief as they more clearly saw themselves as victims of past traumatic events. Most thereby gained a new perspective on their upbringing and/or past relations.

Sigrid described her process like this: "It was during an EMDR session, I can't remember which. But… I told her about stuff. And… we went through it, and then she said '*Oh, that is so sad, and so painful that it happened.*' And that really hit me, because I never thought like that myself (crying). And I have had a very difficult childhood, and if only my mom had said that once, it would have helped me a lot. So it was a bit, like, odd, to think about. That just to hear it once is so intense. But it really helped me be kinder to myself. And like, it's painful and it's sad that it happened. But I can't change it, I must move on, and I can't pretend like it didn't happen…Because I had never heard such a thing. And to hear it several times, and in different ways, that has been really valuable."

4 Discussion

This study aimed to explore the lived experience of participants in an intensive inpatient trauma treatment program. Our findings suggest that feeling safe within the framework of the

treatment program, many and different therapeutic encounters, and the intensity of the program may contribute to experienced change. In the following sections, we discuss our findings in the light of therapeutic alliance, the level of intensity that is optimal for treatment benefits, and processes contributing to experienced change.

4.1 Feeling safe and establishing therapeutic alliance within the framework of the treatment program

To our knowledge, no previous qualitative study on inpatient intensive trauma treatment exists to date. Our patient sample described how accessibility to ward staff, a supportive multidisciplinary team, and pretreatment admission made them feel safe, something they emphasized as facilitative to the treatment process. All participants in our sample had significant comorbidities, and an inpatient facility likely provided a therapeutic framework that they experienced as perhaps necessary, or at least beneficial, to the therapeutic process. Therapeutic alliance is an established predictor of outcomes in psychotherapy (Flückiger et al., 2020; Howard et al., 2022). Recent quantitative and qualitative studies have reported that patients experience treatment alliance within massed trauma-focused treatment programs without TR (Goldfried, 1980; Galovski et al., 2022; Kovacevic et al., 2023). Our patient sample met new therapists nearly every day of the program and thus did not develop a one-to-one therapeutic alliance (bond) with the therapists. However, the patients developed an alliance (bond) with the multidisciplinary team and ward staff and a working alliance with the rotation therapists and treatment program itself.

One could imagine that this working alliance could enhance autonomy, as was explicitly mentioned by one patient who said TR made her feel that the process of therapy became *her* process rather than a shared experience with a therapist. One can hypothesize that this more autonomous process has a longer-lasting effect, continuing to be effective after completing treatment. Our findings support those of Van Minnen et al. (2018) who, in a quantitative study on patients in a similar intensive trauma treatment program, found that even patients with attachment problems could develop a good working alliance in a TR setting.

A recent narrative literature review that includes nine qualitative studies from diverse patient populations about their experiences of EMDR emphasizes the role of the therapeutic relationship (Marich et al., 2020). The authors discuss a study that compares the experiences of EMDR vs. eclectic therapy of victims of sexual abuse. This study reports that, while all the patients in the eclectic therapy group attributed their improvement to the therapeutic relationship, the EMDR patient group, though they spoke highly of their therapists, did not attribute their success in therapy to the therapeutic relationship but rather to the technical EMDR process and/or to how well the therapist followed the procedural protocols (Edmond et al., 2004). This finding is in line with a recent analysis by Hase and Brisch (2022) who used attachment theory as a framework for understanding how procedures and protocols in EMDR therapy are related to the therapeutic relationship. It could thus be that the therapeutic alliance with the therapists described by our patient group was partly a result of the EMDR treatment method.

Van Minnen et al. (2018) further found that 85% of patients preferred working with a TR team to being treated by one therapist only. Similar to this and the study by Thoresen et al. (2022), we found that patients were positive to TR and that TR facilitated new relational experiences and contributed to different perspectives. Expanding on these findings, we report that some patients experienced that changing therapists from session to session made it easier to focus on their own process rather than the relationship with the therapist and that not being so close made it easier to open up and talk about difficult past experiences.

Similar to Thoresen et al., we found that TR can provide corrective emotional experiences. These experiences are known to have curative potential in psychotherapy (Goldfried, 1980). Our sample reported experiencing being seen and understood by therapists and being able to trust and feel safe, experiences which they said were missing in their upbringing. Most patients reported similar corrective emotional experiences from ward staff, an aspect that is lacking in outpatient treatment.

To our knowledge, no previous qualitative study on inpatient intensive trauma treatment exists to date. Our patient sample described how accessibility to ward staff, a supportive multidisciplinary team, and pretreatment admission made them feel safe, something they emphasized as facilitative to the treatment process. All participants in our sample had significant comorbidities, and it is likely that an inpatient facility provided a therapeutic framework that they experienced as perhaps necessary, or at least beneficial, to the therapeutic process. Therapeutic alliance is an established predictor of outcomes in psychotherapy (Flückiger et al., 2020; Howard et al., 2022). Recent quantitative and qualitative studies have reported that patients experience a treatment alliance within massed trauma-focused treatment programs without TR (Goldfried, 1980; Galovski et al., 2022; Kovacevic et al., 2023). Our patient sample met new therapists nearly every day of the program and thus did not develop a one-to-one therapeutic alliance (bond) with the therapists. It seems like they, however, experienced an alliance (bond) with the multidisciplinary team and ward staff and a working alliance with the rotation therapists and treatment program itself.

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Van Minnen et al. (2018) also found that 85% of patients preferred working with a TR team to being treated by one therapist only. Similar to this study and the study by Thoresen et al. (2022), we found that patients were positive to TR and that TR facilitated new relational experiences and contributed to different perspectives. Expanding on these findings, we report that some patients experienced that changing therapists from session to

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A narrative literature review including nine qualitative studies from diverse patient populations about their experiences of EMDR therapy emphasizes the role of the therapeutic relationship (Marich et al., 2020). The authors include and discuss a study that compares the experiences of EMDR vs. those of eclectic therapy undergone by victims of sexual abuse. They report that, while all the patients in the eclectic therapy group attributed their improvement to the therapeutic relationship, the EMDR group patients, though they spoke highly of their therapists, did not attribute their success in therapy to the therapeutic relationship but rather to the technical EMDR process and/or to how well the respective therapist followed the procedural protocols (Edmond et al., 2004). This observation is in line with that of a recent analysis by Hase and Brisch (2022) who used attachment theory as a framework for understanding how procedures and protocols in EMDR therapy are related to the therapeutic relationship. It could thus be that the therapeutic alliance expressed by our patient group was, in part, a result of the EMDR treatment method.

Similar to the study by Thoresen et al., we found that TR can provide corrective emotional experiences. These experiences are known to have curative potential in psychotherapy (Goldfried, 1980). Our sample reported experiences of being seen and understood by therapists and also being able to trust and feel safe, experiences which they said lacked in their upbringing. Most patients reported similar corrective emotional experiences from ward staff, an aspect that is obviously lacking in out-patient treatment.

4.2 What is the optimal level of intensity?

Previous qualitative studies describe how intensive trauma treatment facilitates commitment to treatment and limits avoidance (Sherrill et al., 2022; Thoresen et al., 2022). Similarly, our sample described that the intensity of the treatment program facilitated processing their trauma history, as the program gave little opportunity to close up emotionally between sessions. However, most patients also reported times when they were too overwhelmed to benefit from elements of the treatment program. Some further reported a more general experience of being pushed over their preferred limit in or in-between the therapy sessions. Our results thus raise the question of what the optimal level of intensity is and if patients would profit equally well, or better, from a somewhat less busy schedule or a slightly longer admission with more breaks. An outpatient study where veterans were administered cognitive processing therapy compared a 3-week to a 2-week program. In the 2-week program psychoeducation, mindfulness and yoga were omitted, but the number of therapy sessions remained the same. The study concluded that the 2-week program could be considered non-inferior to the 3-week program in both clinical outcomes and satisfaction (Held et al., 2023). The study does not report the prevalence of comorbidity disorders in this veteran sample. It is possible that, in patient groups like ours, with high levels of comorbidity, factors like psychoeducation and physical activity are more important and that a somewhat longer admission with more breaks could be beneficial. Another of our findings is that patients in our sample profited from different aspects of the treatment program. It is thus not self-evident as to which part of the treatment program is superfluous and should be omitted, though Van Woudenberg et al. (2018) in the original PSYTREC program omitted PE listening "due to the intensive treatment format". It could be argued that an intensive treatment program should be more individualized, so elements that appear non-beneficial to individual patients should be replaced by more beneficial treatment elements; this finding, however, opens up to the potential pitfall of going along with patients' avoidance patterns.

4.3 Experienced change

Neither of the two earlier qualitative studies of intensive trauma therapy focused on patient's lived experience of change after completing treatment, though Thoresen et al. (2022) report patients feeling calmer and more present as well as having more hope for the future. In the current study, we found that all participants expressed a change in how they related to their trauma history and that the program had facilitated new insights into their emotional and/or cognitive reaction patterns. All participants reported being more emotionally connected, with less numbness and dissociation. Most further described greater acceptance and ownership of their trauma history and being clearer about not being responsible for traumatic events that they previously had blamed themselves for. In the wake of these insights came not only more self-compassion but also grief as most participants gained a new perspective on their upbringing and past or current relations. Similarly, reductions in maladaptive posttraumatic cognitions (related to among others self-blame) and trauma-affected erroneous perceptions of the self and the world have previously been described as a result of non-intensive trauma-focused treatment (Kangaslampi and Peltonen, 2022; Gjerstad et al., 2024). For some, new perspectives on their upbringing and relations made them change how they wanted to relate to or interact with these relations, some experiencing a need to change relationship patterns or break contact. Viewing their non-professional support system as scanter than anticipated, some of our patients felt lonelier and more vulnerable. This is a potential effect of therapy that we need to be aware of. Patients may need an updated post-discharge plan where they are adequately supported in what our sample describes as a demanding transition.

Thoresen et al. (2022) described the elements of the treatment program (EMDR and PE) as beneficial as they were effective in different ways. In the current study, we found that some patients described a synergistic effect between treatment modalities and that the elements of PE and EMDR complemented each other, making the combined effect stronger. This finding is interesting as the two approaches differ somewhat in their therapeutic target; PE's main mechanism of change appears to be through changing dysfunctional attitudes and thought patterns (cognitive change) (Kangaslampi and Peltonen, 2022; Brown et al., 2019), while the most supported mechanism of change in EMDR is through reducing vividness and emotionality of trauma memories

as well as through changed physiological parameters (Landin-Romero et al., 2018; Wadji et al., 2022). As suggested by Van Minnen et al. (2018), it seems possible that treating patients' trauma histories from several angles within the same treatment program could create a fuller, more multifaceted therapeutic trauma processing.

4.4 Strengths and limitations

This study has some important limitations. It consists of female participants only, which limits its generalizability. Due to technical issues with the recording, one interview could not be included in the data set and thematic analysis. This unfortunate omission could have potentially somewhat influenced our findings. The smaller number of participants in our study is compensated for by the format of our interview and the fact that the study explores a novel therapy intervention that has received very scarce previous qualitative investigation. The interviews were carried out shortly after the treatment was completed. The participants thus remembered the treatment vividly. Not enough time had passed, however, to explore the long-term effect of the program.

5 Conclusion and recommendations

This study aimed to explore the lived experience of participants in an intensive inpatient trauma treatment program. Our findings suggest that establishing therapeutic alliances within the framework of the treatment program as well as intensive multimodal trauma treatment may contribute to experienced change. Participants described greater acceptance and ownership of their trauma history and greater emotional accessibility as well as changed interpersonal relations. The intensity of the program was described as exhausting, but necessary. Most patients reported at times being too overwhelmed to benefit from elements of the program. Our results thus prompt us to question the optimal level of intensity.

Clinical implications: Our findings suggest that it is important to not only prepare participants adequately before commencing treatment but also better prepare for discharge, which could be particularly important in patients with high levels of comorbidities.

Future research recommendations: Future qualitative studies should interview patients after a longer time interval to investigate if the experienced change from ITTP is lasting. Qualitative exploration of the experience of ITTP therapists could also further improve our knowledge in this field. The optimal level of intensity in intensive trauma treatment should be further explored through qualitative as well as quantitative studies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Regional Committee for Medical and Health Research Ethics, South East Norway, Section A (REC) has approved the study protocol (reference number; REC South East 0704/202). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

VV-K: Conceptualization, Formal analysis, Project administration, Writing – original draft. JE: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Writing – review & editing. MJ: Conceptualization, Formal analysis, Writing – review & editing, Supervision. WA: Conceptualization, Project administration, Writing – review & editing. JE: Conceptualization, Formal Analysis, Methodology, Project administration, Writing – original draft.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Apples and oranges: PTSD patients and healthy individuals are not comparable in their subjective and physiological responding to emotion induction and bilateral stimulation

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Objectives: Bilateral stimulation is a core element of Eye Movement Desensitization and Reprocessing Therapy, a psychotherapeutic intervention for the treatment of Posttraumatic Stress Disorder (PTSD). Promising previous findings showed measurable physiological effects of bilateral stimulation in healthy individuals, but studies that replicated these findings in PTSD patients are sparse.

Methods: 23 patients with PTSD and 30 healthy controls were confronted with affective standard scripts (pleasant, neutral, unpleasant) while bilateral tactile stimulation was applied. Monolateral and no stimulation served as control conditions. Noise-induced startle reflex response (valence measure) and galvanic skin response (arousal measure) were used for physiological responses and the valence and arousal scale of the Self-Assessment-Manikin for subjective responses.

Results: Both groups showed a subjective distress reduction for unpleasant scripts and a subjective attention increase for positive scripts under bilateral stimulation. In healthy individuals, this was also for physiological measures, and a general startle-reducing effect of bilateral stimulation in the absence of affective stimuli was found. In PTSD patients, however, the effects were restricted on the subjective level, and no concomitant physiological effects were observed.

Conclusions and significance: The findings indicate, that generalizing the effects of BLS in healthy individuals to PTSD patients may be problematic. The herein-reported group differences can be explained by PTSD-specific peculiarities in emotion processing and cognitive processing style.

KEYWORDS

bilateral stimulation, EMDR, emotion, physiology, PTSD, startle reflex, tactile stimulation

Physiological characteristics of PTSD compared to healthy individuals

Posttraumatic stress disorder (PTSD) is an immediate or even delayed response to a traumatic event, characterized by frequent reliving of the trauma, avoidance of trauma-associated stimuli and physiological hyperarousal (Diagnostic and Statistical Manual of Mental Disorders DSM-V, Wittchen et al., 1997; APA, 2013). The disorder has a 1-year prevalence of 2.3 to 9.1% (Schein et al., 2021) and causes high socioeconomic costs due to reduced life quality, absenteeism and loss of productivity (Habetha et al., 2012).

PTSD is also associated with significant physiological changes. According to the trauma memory model, experiencing a traumatic event should lead to massive involuntary sympathetic activation and adrenaline release, which is physiologically reflected in an increase in heart rate (HR), skin conductivity (SC), and startle responsiveness. If there is a renewed confrontation with trauma-associated stimuli later, a comparable aversive reaction should be triggered, even if there is objectively no longer any danger, and an accompanied physiological hyper-arousal is postulated, even if there are no affective stimuli at all (e.g., Sartory et al., 2013; Brewin, 2018).

The following section outlines the group differences between PTSD patients and healthy individuals with respect to various physiological variables and response patterns.

Group differences in physiological basis parameters

The assumption of group differences in physiological basis parameters has only been partially confirmed: Increased startle responsiveness and slower habituation to loud sounds in patients with PTSD could only be demonstrated if this was measured via HR, but not if measured via orbicularis oculi electromyography (EMG) and SC (Metzger et al., 1999; Orr et al., 2003), except from very stressful situation with electric shocks, which did increase the EMG-measured startle reflex (Morgan et al., 1995). Some authors found basally increased RR intervals in PTSD patients (Blanchard, 1990), while other authors did not (McFall et al., 1992). With regard to SC and frontalis EMG, *no* over-activity correlating with the severity of PTSD was found (McDonagh-Coyle et al., 2001; Rothbaum et al., 2001). These discrepancies might partially be explained by the different power of the studies (Prins et al., 1995).

Group differences in the processing of trauma-associated vs. general affective stimuli

Other authors compared the emotional responses to affectively relevant images or scripts in subjects with vs. without PTSD. They found an exaggerated physiological reactivity to trauma-associated stimuli in PTSD patients. As physiological measures, the noise-induced startle reflex, SC (McNally et al., 1987; Pitman et al., 1990; Orr et al., 1993; McDonagh-Coyle et al., 2001; Tarrier et al., 2002; Pole, 2007), HR, blood pressure (BP), and frontalis EMG (Blanchard, 1990; Pitman et al., 1990; Orr et al., 1993; McDonagh-Coyle et al., 2001) were used. These measures were able to discriminate between PTSD subjects and healthy subjects (Orr et al., 1993), even when subjects were asked to alter/dissimulate their physiological responses (Gerardi et al., 1989, SC and HR). The processing of non-trauma-associated aversive stimuli, in contrast, was *not* different between the groups (Tarrier et al., 2002), but a significantly diminished emotional reactivity of pleasant and neutral stimuli in PTSD patients was found (McDonagh-Coyle et al., 2001).

Group differences in responding to bilateral stimulation

In the last decades, Eye Movement Desensitization and Reprocessing (EMDR) has been introduced as an effective treatment for PTSD, expanding the understanding of trauma therapy techniques by considering mechanisms of action beyond mere habituation (Shapiro, 1989, 1996, 2002, 2017; Bisson et al., 2013). In contrast to classical prolonged exposure trauma therapy, in the imaginative exposure phase of EMDR, bilateral alternating sensory stimuli are presented, which may consist of induced eye movements (visual stimulation), rhythmic touching of the body surface (tactile stimulation on, e.g., the hands), or alternating sounds acoustic stimulation (Shapiro, 2017). According to the adaptive information processing model (AIP model, Shapiro, 2001; Solomon and Shapiro, 2008) this should improve the processing and integration of stressful memories and provide affective relief.

On the one hand, numerous randomized clinical trials exist comparing the effectivity of EMDR treatment in PTSD patients to other methods of trauma therapy (Van Etten and Taylor, 1998; Ironson et al., 2002; Power et al., 2002). According to meta-analyses, the PTSD symptom-reducing effect of EMDR is comparable to other forms of trauma-focusing treatments such as Trauma-focused Cognitive Behavioral Therapy (Tf-CBT) (e.g., Chen et al., 2014; Khan et al., 2018). On the other hand, there is an increasing number of laboratory studies examining the underlying working mechanisms of EMDR in experimental settings (see an overview by Houben et al., 2020). These dismantling studies do not focus on EMDR as a whole but on potential mechanisms of action such as the specific type of stimulation. Some of these studies addressed PTSD patients (Wilson et al., 1996; Servan-Schreiber et al., 2006; Elofsson et al., 2008), some of them healthy individuals (Andrade et al., 1997; Barrowcliff et al., 2003; Gunter and Bodner, 2008; Engelhard et al., 2010; Nieuwenhuis et al., 2013). Besides subjective distress reduction (Servan-Schreiber et al., 2006), diverse physiological effects of bilateral stimulation were found. In PTSD patients, for example, a stimulation-induced decrease in skin conductance and heart rate was observed (Elofsson et al., 2008). Investigations in healthy individuals also found a valence-dependent reduction in startle reflex potentiation (indicating a reduced distress) during imagination of negative scripts and an increase in SCR (indicating an attention increase) during imagination of positive scripts (Reichel et al., 2021). However, there have not been many reviews specifically addressing the differential effects of stimulation on the two groups,

In the only meta-analysis found for this topic, no significant differences between clinical populations and healthy individuals were found (Lee and Cuijpers, 2013). These findings, however, are limited: They were created in full EMDR sessions and do not examine the effects of specific components of EMDR such as bilateral stimulation (BLS). Furthermore, previous studies on the temporal stability of EMDR effects mainly refer to EMDR as a whole, reporting conflicting results (Wilson et al., 1997; Carlson et al., 1998; Devilly et al., 1998; Macklin et al., 2000; Marcus et al., 2004). Finally, no objective measurement parameters were regarded, i.e., the findings are restricted to subjective data which may be disturbed by social desirability effects. Consequently, a direct comparison of PTSD patients and healthy individuals in the same study design which should include both subjective and physiological measures as well as follow up testing is needed.

Aims and hypotheses

The aim of the present research project is to expand the knowledge on subjective and physiological differences between PTSD patients and healthy individuals while emotional processing and their responsiveness to bilateral stimulation. For this purpose, an in *sensu* confrontation with imagination scripts of different valences (negative vs. neutral vs. positive) under different stimulation conditions (bilateral vs. monolateral vs. no stimulation) is to be carried out. During the imagination process, physiological and psychometric arousal parameters as well as physiological and psychometric valence parameters are to be measured.

In a first step, previous findings concerning group differences in physiological basis parameters and emotional reactivity should be replicated. For this question, comparisons are made between the groups (PTSD patients vs. control subjects) and between the different script categories (negative vs. neutral vs. positive vs. no script), whereby only trials without stimulation are considered.

In a second step, group differences in emotional reactivity under the different stimulation conditions (bilateral stimulation vs. monolateral stimulation vs. no stimulation) are focused. For this question, trials with bilateral stimulations are compared with those with monolateral and none stimulation.

The following hypotheses are tested:

Hypotheses on general emotional reactivity

H1: A significant interaction effect between the factors 'script category' (negative vs. neutral as main contrast) and 'group' (PTSD patients vs. control subjects) is expected, i.e., PTSD patients show (1) a stronger increase in aversive feelings and a stronger increase in arousal when imagining negative scripts (2) a lower increase in positive feelings and a lower increase in arousal when imagining positive scripts (compared to neutral scripts).

Hypotheses on the effect of bilateral stimulation

H2: A significant interaction effect between the factors 'stimulation type' (bilateral vs. no stimulation as main contrast) and 'script category' (negative vs. neutral) is expected, i.e., with bilateral stimulation the imagined affective (i.e., negative or positive) situations are experienced less intense (i.e., aversive or positive) and less arousal-generating than without stimulation (compared to neutral scripts). This applies equally to PTSD patients and healthy people, i.e., there is no difference between the groups.

Materials and methods

Participants

The study population consisted of 23 PTSD patients and 30 healthy subjects of both sexes (29 females, 14 males) between 18 and 56 years of age. At the first measurement point (T1), there were 23 patients and 30 controls. Both groups were matched and did not differ significantly for age [F (1, 51) = 3.6, $p = 0.062$], sex [χ^2 (1) = 1.7, $p = 0.192$], and education level [χ^2 (3) = 7.8, $p = 0.050$]. All participants gave their written informed consent. Sample characteristics are depicted in Table 1.

TABLE 1 Demographic and clinical sample characteristics.

	Full sample	Patients (PG)	Controls (CG)	$p_{PG\ vs.\ CG}$
Age	32.7 (10.8)	35.8 (12.2)	30.3 (9.0)	0.075
Gender	29 females, 14 males	19 females, 4 males	20 females, 10 males	0.225
Education	43 high, 6 middle, 0 low level	15 high, 4 middle, 3 low level	28 high, 2 middle, 0 low level	0.050
BDI	11.2 (11.6)	20.7 (11.9)	4.0 (3.1)	0.000***
BSI	42.2 (44.8)	75.7 (48.9)	16.5 (14.8)	0.000***
CAPS	32.9 (32.8)	60.0 (31.9)	12.0 (11.1)	0.000***
FDS IES QMI	– – 2.0 (0.7)	0.20 (0.16) 38.9 (18.8) 2.1 (0.8)	– – 1.9 (0.6)	– – 0.298
Startle	10.8 (7.4)	11.7 (8.2)	10.1 (6.8)	0.452
ISCR	46.0 (50.0)	32.2 (32.5)	56.1 (58.0)	0.088
SCR	111.7 (119.0)	79.7 (81.5)	135.1 (136.8)	0.097
SCL	6.6 (2.2)	6.0 (1.9)	7.1 (2.3)	0.112
HR acceleration	8.5 (6.1)	8.5 (4.8)	8.6 (7.0)	0.936
HR deceleration	7.5 (3.7)	6.8 (4.0)	8.1 (3.4)	0.553
HR overall	1.0 (7.0)	1.7 (4.3)	0.5 (8.7)	0.553

PTSD patients and healthy individuals did not differ significantly in age, gender, education level, mental imagination ability (QMI-Score), and physiological base parameters (raw startle magnitude in µV, ISCR, SCR, and SCL as arbitrary data), but in the scores of the screening scales. ISCR, integrated skin conductance response (arbitrary values/10^3), SCR, skin conductance response (arbitrary values), SCL, skin conductance level (arbitrary values/10^3), BDI, Becks Depression Inventory, BSI, Brief Symptom Inventory, and CAPS, Clinician Administered PTSD-Scale. Values are means and standard deviations or count. Group differences in age, physiological base parameters, and the screening scales are tested via univariate ANOVAs (two-tailed). Group differences in gender and education level are tested by chi^2-test (two-tailed). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

PTSD patients

The PTSD patients were recruited from inpatient and outpatient therapy programs of the Department of Psychiatry and Psychotherapy, Justus-Liebig University Giessen. The inclusion criterion was posttraumatic stress disorder (ICD-10: F43.1) as the primary diagnosis. The mean duration of posttraumatic stress disorder was 5 years (± 8 years). There were 15 patients with a history of polytraumatization and 8 patients with monotraumatization. Thirteen patients showed clinically relevant dissociative symptoms (FDS > 0.13) and fifteen patients depressive symptoms (BDI > 13), which was accepted due to the well-known high overlap of depressive and PTSD symptoms (e.g., Gros et al., 2012; Stingl et al., 2020). Four patients had already participated in EMDR therapy. Ethical approval was obtained of the ethical committee of University Medicine Giessen.

Control subjects

Recruitment methods for the control subjects included advertisement in newspapers, newsletters, and postings on the university campus. Inclusion criterion was the absence of any psychiatric diagnosis described in the ICD-10. Two control subjects were excluded due to clinical PTSD and depression symptoms (BDI > 19, CAPS >39). Three controls and one patient had to be excluded because of low mental imagination ability (QMI score > 3.5).

Exclusion criteria

Individuals with documented severe mental disorders (drug abuse, dementia, schizophrenic psychosis, and intellectual disability retardation), neurological diseases (such as seizures in the anamnesis), severe hearing or visual disabilities, medication with influence on startle reflex response (benzodiazepines, buspirone, opioids), recent medication switchover within the last 2 weeks, or insufficient knowledge of German were excluded from the study. All psychiatric diagnoses were based on ICD-10 criteria and established by experienced clinical raters. Each subject completed the following screening questionnaires: Beck Depression Inventory (BDI-II), Brief Symptom Inventory (BSI), the German version of the Dissociative Experiences Scale ('Fragebogen zu Dissoziativen Symptome', FDS), Impact of Event Scale (IES), and Questionnaire of Mental Imagery (QMI). Demographics and clinical characteristics of the overall sample are summarized in Table 1.

Emotion induction

Emotion induction was achieved by means of 36 imagination scripts: 12 negative, 12 neutral, and 12 positive. Negative and positive scripts were matched for their degree of arousal based on the scales of the Self-Assessment Manikin (SAM). For each stimulation condition, the same number of scripts with matched valence and arousal values was used. The scripts were largely acquired from the Affective Norms for English Text (ANET) database (Bradley and Lang, 2007b) and adapted for our German-speaking study population. Due to an insufficient number of neutral scripts in the ANET database, three scripts from Bausch et al. (2011) were added. Two further scripts were created by the study authors. It was ensured that these scripts did not differ from the ANET material in terms of relevant features (such as degree of valence and arousal, readability, text length, and situation type).

Stimulation mode

To avoid confusion with the eyelid reflex measurement, stimulation was conducted tactilely using the Deluxe Tac/Audioscan Device Revision 5.1 from NeuroTek Corporation via rhythmically changing vibration signals applied to the person's palms (Contact Neurotek Corporation; Wheat Ridge, CO). This instrument enabled the researcher to minimize experimenter effects by choosing a fixed duration and frequency of the vibration signals. Stimulation began at the beginning of the reading phase and stopped at the end of the imagining phase. In order to record changes in physiological baseline parameters, two thirds of the ITIs were also stimulated. 'Bilateral stimulation' (the right and the left hand were bilaterally stimulated in fast alternation) was compared with two control conditions: 'monolateral stimulation' (either the right or the left hand was stimulated) and 'no stimulation'. Half of the monolateral stimuli were applied to the right hand and the other half to the left hand. Bilateral and monolateral stimulation differed only in the bilateral-alternating character, but not in the duration and frequency of the vibration signals.

Self-assessment manikin

Subjective emotional responses to the script category x stimulation type conditions were rated on nine-point scales based on the SAM of Bradley and Lang (1994) immediately after each imagination trial. The subjects were instructed to think back and remember how they felt during the imagination task. Valence (from 1: negative, to 9: positive) and arousal (from 1: low arousal, to 9: high arousal) of the emotional reactions were measured.

Startle reflex

The noise-induced startle reflex is an involuntary blink reflex that varies depending on emotional valence. The Lab Linc V Tower by Coulbourn Instruments was used to record the physiological reactions and to generate the startle tone (Contact Coulbourn Instruments; Holliston, MA). The lid closure component of the startle reflex was measured as electromyogram (EMG) of the left orbicularis oculi muscle using Ag/AgCl miniature electrodes. A 95 dB tone with a continuous white noise of 50 milliseconds was generated by the V85-04 Audio Source Module and presented binaurally via headphones. Raw EMG signal was registered by the Isolated Bioamplifier with Bandpass Filter Model V75-04. The integrated EMG signal was digitally evaluated for magnitude and latency to the peak using the Human Startle Reflex System HMS 500 Software from Coulbourn Instruments. 'EMG magnitude' was defined as the difference between peak EMG (highest EMG value within 20 to 150 milliseconds after the noise) and baseline EMG (EMG value within the last 100 milliseconds before) consistent with Blumenthal et al. (2005). Trials that showed a lack of reflex response, an EMG magnitude <0.1 μV, or latency to the peak >150 milliseconds were

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TABLE 2 VAS ratings before and after the experiment.

		Full Sample		Patients		Controls		PG vs. CG
		M	*SD*	*M*	*SD*	*M*	*SD*	*p*
Pre-test	Mood	32.3	20.9	41.3	22.7	25.4	16.8	0.005**
	Arousal	34.9	20.8	40.4	24.2	26.3	24.7	0.044*
Post-test	Mood	32.4	25.3	43.1	22.5	28.6	17.3	0.011*
	Arousal	28.8	29.1	40.1	34.3	20.1	21.2	0.019*
Post vs. Pre	Mood	2.6	14.5	1.8	18.1	3.3	11.3	0.724
	Arousal	−3.6	19.8	−0.3	23.2	−6.2	16.6	0.280

Current mood and arousal before and after the experiment in both groups were assessed via Visual Analogue Scales: VAS Mood (from 1: positive, to 100: negative), VAS Arousal (from 1: low arousal, to 100: high arousal). Group comparisons were done per independent t-tests (two-tailed). Pre-post differences were tested via paired t-tests. Values are means (M) and standard deviations (SD). *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

categorized as non-responses and set to 0 μV. Trials with latency to the peak <20 milliseconds, movement artifacts or excessive baseline activity were considered as missings. If a participant's zero responses or missings exceed one third of all recorded trials, this participant was considered as a non-responder.

Electrodermal activity

Electrodermal activity (EDA) was derived via Ag/AgCl standard electrodes on the hypothenar muscle of the non-dominant hand. The signal was recorded by the V-Amp 16 Amplifier from Brain Products GmbH with a time constant of 5 s and a voltage across the electrodes of 0.5 V (Contact Brain Products GmbH, Gilching, Germany). Arbitrary raw data were processed by the Ledalab Software (Benedek and Kaernbach, 2010). The EDA slope was recorded digitally by SCR magnitude, integrated SCR magnitude, and SCR latency to the peak. 'SCR magnitude' was defined as the difference between peak SCR (the highest SCR value within 900 to 4,000 milliseconds after trial onset) and baseline SCR (mean SCR value in the 1,000 milliseconds before). 'Integrated SCR magnitude' was calculated by the time integral of the SCR magnitude within the response window. Integrated SCR magnitude as the variable with the biggest variance was selected for analysis. Responses with latency to the peak <900 milliseconds, movement artifacts or excessive baseline activity were defined as missings. Trials with latency to the peak >4,000 milliseconds were categorized as non-responses and set to 0 μV. Participants with electrodermal nonresponding (i.e., maximum SCR magnitude equal to zero) were excluded from further analysis.

Procedure

The study consisted of a preparation step and a measurement.

Preparation

All volunteers gave their informed consent. Demographic data were recollected, and the screening questionnaires listed in Table 2 were completed. Subjects who did not meet the inclusion criteria did not participate in the further steps.

Measurement

Directly before testing, mood (ranging from 1: positive, to 100: negative) and arousal (ranging from 1: low arousal, to 100: high arousal) were assessed via Visual Analogue Scales (VAS). Each participant was placed in front of a computer screen and electrodes and vibration pads were attached. After this preparation, script presentation and psychophysiological recordings began.

At the beginning of the measurement period, three startle reflex-triggering sounds were presented in order to reduce the potential effects of habituation. The scripts appeared in six balanced blocks in a pseudo-randomized order, interrupted by five-minute breaks. Each script consisted of the trial sequence illustrated in Figure 1: Reading (12 s), imagining (12 s), and rating the script (12 s), followed by a break in which only a white screen appeared (10–12 s). Seventy-five percent of the scripts of each category and 25 % of the white screens were combined with startle sounds. To prevent anticipation effects, the sounds appeared at variable times (6.5, 7.5, and 8.5 s after the beginning of the trials). The 10 to 12-s interval between the offset of trial n and onset of trial n + 1 was defined as the intertrial interval (ITI).

Data reduction and analysis

The collected data were statistically processed using IBM SPSS Statistics 22.0 Software. The raw data of each subject were averaged per script category and stimulation condition. To avoid confounding with the startle noise, EDA data were analyzed only for non-startle trials. Normal distribution requirement was checked using the Kolmogorov–Smirnov test. Physiological data were square root transformed due to positive skewness. Before this step, the constant 1 was added to avoid negative values. Comparisons in VAS values were done per univariate analyses of variance (ANOVA) (two-tailed).

Hypotheses were tested using ANOVAs for repeated measures. 'Stimulation type' (bilateral, monolateral, no stimulation), and 'script category' (negative, neutral, positive) were used as within-group factors, 'group' (patients vs. controls) as between-group factor, and SAM valence value, SAM arousal value, startle reflex magnitude, and integrated skin conductance response as dependent factors. For all analyses, *p*-values <0.05 (two-sided) were considered statistically

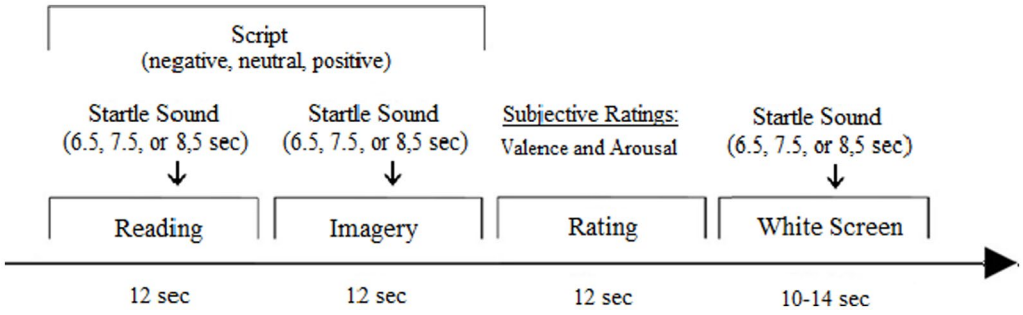

FIGURE 1
Trial sequence.

significant. In cases where Bonferroni corrections for multiple measurements were necessary, the calculated p-value was multiplied by the number of measurements. In cases in which sphericity could not be assumed, the Greenhouse Geisser correction for degrees of freedom was used. For the empirically well-founded hypotheses on general emotional reactivity, contrast analyses were performed. In all other cases, post-hoc tests were calculated where needed.

A post-hoc power analysis was conducted using G*Power3 (Faul et al., 2007) to compute the achieved power for the repeated measures ANOVA with two independent groups using a low effect size (partial $\eta^2 = 0.1$), and an α of 0.05. Results showed that with the total sample of 53 participants the achieved power is 0.99.

Results

Physiological basis parameters

To exclude group differences in physiological basis parameters, ANOVAs for physiological responses during the intertrial intervals were conducted with group as between-group variable. No group differences in startle magnitude [$F(1, 51) = 1.1$, $p = 0.296$] and SCR magnitude [$F(1, 50) < 1$, $p = 0.392$] were found.

Manipulation check

For the manipulation check, a two-factorial ANOVA design with 'script category' (negative vs. neutral vs. positive) as a within-factor and 'group' (patients vs. controls) as a between-factor was used. Only trials without stimulation were included. The results showed significant valence and arousal changes during the confrontation with the different scripts in both groups, as summarized in Figure 2.

SAM valence score

For subjective mood (SAM valence score, reaching from 1, unpleasant, to 9, pleasant), a significant main effect for 'script category' was found ($p < 0.001$): Positive scripts were assessed significantly more pleasant ($p < 0.001$) and negative scripts significantly more unpleasant ($p < 0.001$) than neutral scripts in both groups. The main effect for 'group' was not significant ($p = 0.099$), but a significant 'script category' x 'group' interaction effect was observed ($p = 0.029$). Separate ANOVAs, corrected for multiple testing, indicated that both groups differed significantly in their assessment of the positive scripts [$F(1, 51) = 11.7$, $p_c = 0.003$], but not in their assessment of the negative [$F(1, 51) < 1$, $p_c = 1.000$] and neutral scripts [$F(1, 51) < 1$, $p_c = 1.000$]. For the positive scripts, a significantly lower SAM valence score (indicating less pleasance) in the patients compared to the controls was found. Interestingly, if including BDI as a covariate, this group difference was not anymore significant [$F(1, 50) = 2.6$, $p_c = 0.342$]. Pretest arousal (VAS scale) did not have this effect [$F(1, 50) = 7.6$, $p_c = 0.048$]. Comorbidity with depressive disorders, but not group differences in pretest arousal, thus seems to have an influence on the processing of the pleasant scripts.

SAM arousal score

The analysis of the SAM arousal score also showed a significant main effect for 'script category' ($p < 0.001$): Negative scripts and positive scripts were rated significantly more arousal-provoking than neutral ones in both groups ($p < 0.001$), as expected, but the arousal increase of the negative scripts was significantly higher ($p < 0.001$). This finding was comparable in both groups, i.e., no significant 'script category' x 'group' interaction effect ($p = 0.116$) and no main effect for 'group' ($p = 0.214$) were found.

Startle reflex magnitude

For the startle magnitude, a linear increase from positive scripts over neutral to negative scripts was expected, as shown in many studies (Lang, 1995). This finding could not be replicated: In the overall sample, the main effect for 'script category' was not significant ($p = 0.074$). No significant main effect for 'group' ($p = 0.665$) and no significant 'script category' x 'group' interaction effect were found ($p = 0.371$). Separate analyses for each group, however, indicated that this problem was restricted to the patient group: For this group, no significant main effect for 'script category' was observed ($p_c = 0.766$). For healthy controls, in contrast, the main effect for script category was significant ($p_c = 0.046$): Positive scripts induced a lower startle magnitude than negative scripts ($p = 0.053$). Probably because of the low sample size, this *post hoc* test did not reach the level of significance.

Skin conductance response

Analysis of the SCR data revealed no 'script category' x 'group' interaction effect ($p = 0.508$) and no main effect for 'group' ($p = 0.280$), but a significant main effect for 'script category'($p = 0.005$): Negative scripts induced a significantly larger SCR than neutral scripts ($p = 0.005$) and positive scripts ($p = 0.035$) in the overall sample. For positive scripts, no significant SCR increase compared to neutral scripts was found ($p = 1.000$). This finding is in contrast to previous studies which reported comparable SCR increase for positive and

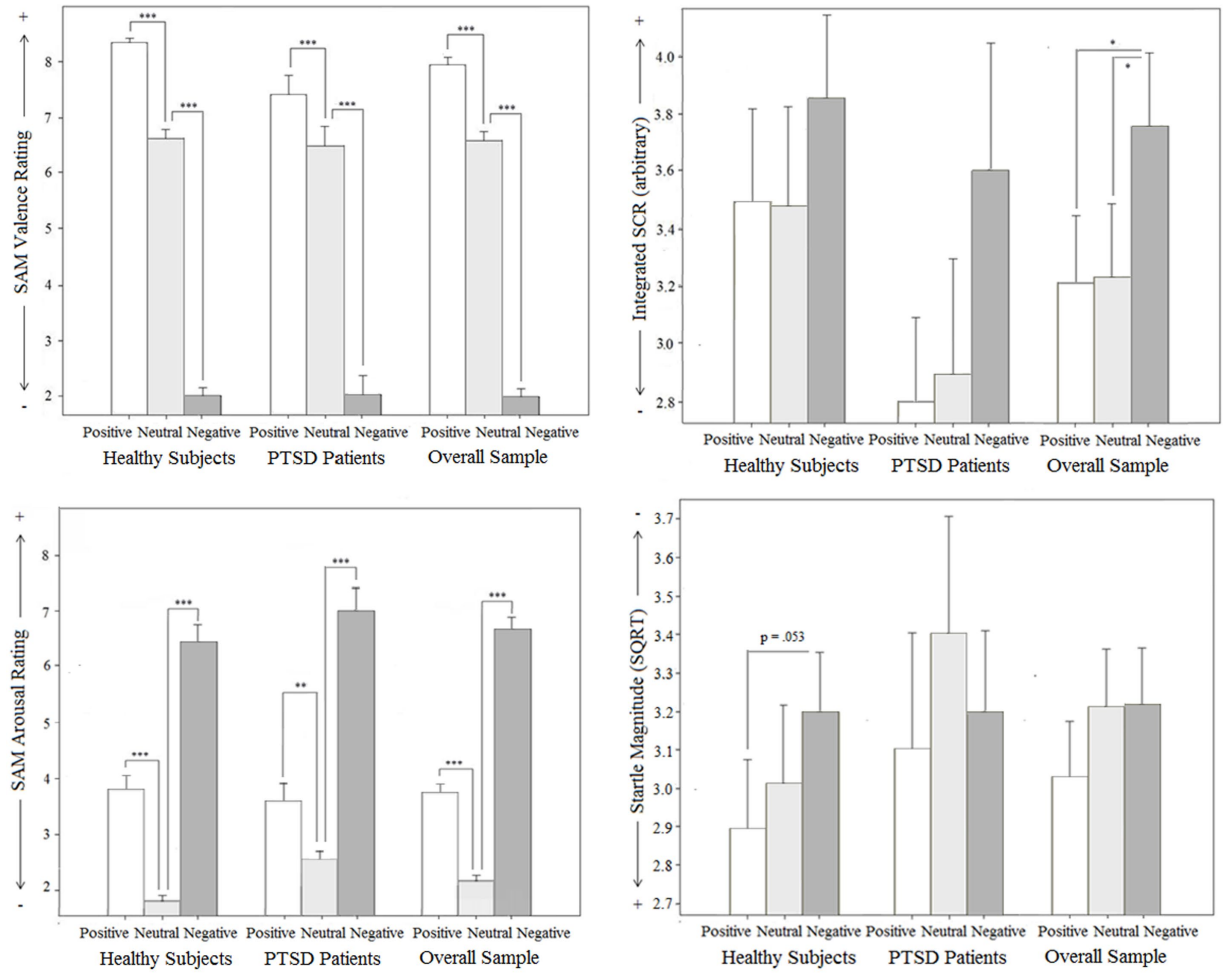

FIGURE 2
Manipulation check: Subjective (Subjective Assessment Manikin SAM for valence and arousal) and objective (Skin conductance response SCR and Startle reflex magnitude) effects for groups (PTSD and controls), total sample related to different emotional script qualities in intertrial intervals without stimulation.

negative scripts compared to neutral scripts. The positive scripts in the present study were thus not arousal-provoking enough. To provoke a higher arousal also for the positive affective stimuli, personalizing the scripts might be helpful. Another possibility might be using pictures instead of scripts.

Separate analyses for both groups, corrected for multiple testing, indicated that in the patient group the main effect for script category stayed significant ($p = 0.032$), whereas in the control group it did not ($p = 0.506$). That is the patients showed a stronger physiological arousal increase during the negative scripts.

To sum, while the patients did not differ from the controls in physiological basis variables, the affect-related modulation of the startle reflex magnitude was significantly disturbed with a missing startle inhibition for positive scripts. This finding correlated with significantly less subjective pleasance in the patients during imagining the positive scripts and a significantly worse mood (measured via VAS scales) at the beginning and the end of the experiment. These particularities might indicate a general dysfunction of the behavioral approach system resulting from the psychopathological characteristics of this sample. To explore this, a covariance analysis was conducted with SAM valence rating of the positive scripts as a dependent variable, 'group' as an independent variable, and PTSD specific psychopathological covariates (CASP, IES, BSI). When holding these factors constant, the group difference in the SAM valence score was no longer significant [CASP: $F(1,50) = 3.9$, $p = 0.055$; IES: $F(1, 50) = 3.0$, $p = 0.088$] or at least marginally reduced [BSI: $F(1, 50) = 4.1$, $p = 0.048$, compared to a $p = 0.12$]. Depression specific covariates (BDI) also eliminated the group difference [$F(1, 50) = 2.6$, $p = 0.114$], but not situational factors such as mood [VAS mood: $F(1, 50) = 7.2$, $p = 0.010$] and arousal [VAS arousal: $F(1, 50) = 7.6$, $p = 0.008$] before the experiment or the imagination ability of the subjects [QMI: $F(1, 50) = 12.0$, $p = 0.001$]. For these reasons, PTSD-typical maladaptive emotion processing processes as well as comorbidity with depressive symptoms can be used as an explanation.

Stimulation effect

Stimulation effect was examined using a three-factorial ANOVA design with 'script category' (negative vs. neutral vs. positive) and 'stimulation type' (bilateral vs. monoliteral vs. none stimulation) as

within-factors and 'group' (patients vs. controls) as a between-factor. The results are depicted in Figures 2–6.

SAM valence score

The findings for the SAM valence score (reaching from 1 = unpleasant, to 9 = pleasant) is first reported for the overall sample: A significant main effect for script category ($p < 0.001$), a main effect for stimulation type ($p = 0.031$), and a stimulation type x script category interaction effect was found ($p = 0.019$). *Post hoc* tests indicated that bilateral stimulation significantly decreased negative feelings while viewing *negative scripts* ($p = 0.032$), whereas monolateral stimulation did not ($p = 1.000$). For *positive scripts*, a significant decrease in positive feelings was observed under bilateral stimulation ($p = 0.004$), but not under monolateral stimulation ($p = 0.170$) Bilateral stimulation thus reduced subjective emotion intensity in the expected direction. For *neutral scripts*, there were no changes in emotional valence neither for bilateral ($p = 1.000$) nor for monolateral stimulation ($p = 1.000$).

The stimulation type x group interaction effect ($p = 0.353$) and the script category x stimulation effect x group interaction effect were not significant ($p = 0.133$). However, separate ANOVAs for each group (corrected for multiple testing) indicated that the valence-modulating effect of the stimulation was specific for healthy individuals, where a significant script category (positive vs. neutral vs. negative) x stimulation type (bilateral vs. monolateral vs. no stimulation) interaction effect was observed ($p_c = 0.002$). In PTSD patients, this effect did not reach the level of significance ($p_c = 1.000$).

As a side result, a significant main effect for group [$F(1, 51) = 4.9$, $p = 0.032$] was found: SAM valence score was significantly lower in patients compared to controls, indicating that the patients generally felt more negative while imagining the scripts.

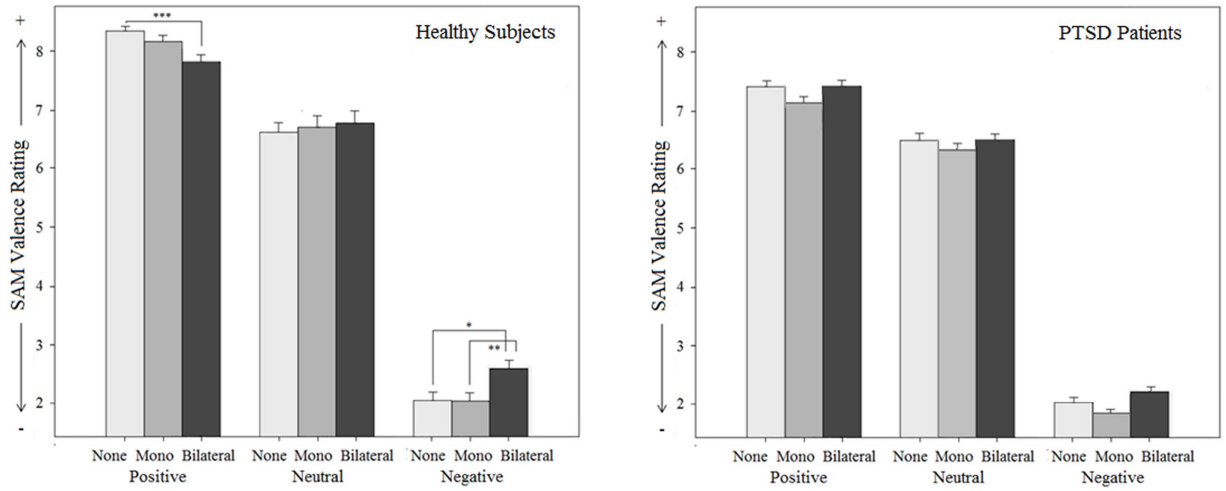

FIGURE 3
Manipulation check: Subjective (Subjective Assessment Manikin SAM for valence and arousal) and objective (Skin conductance response SCR and Startle reflex magnitude) effects for groups (PTSD and controls), total sample related to different emotional script qualities in intertrial intervals without stimulation.

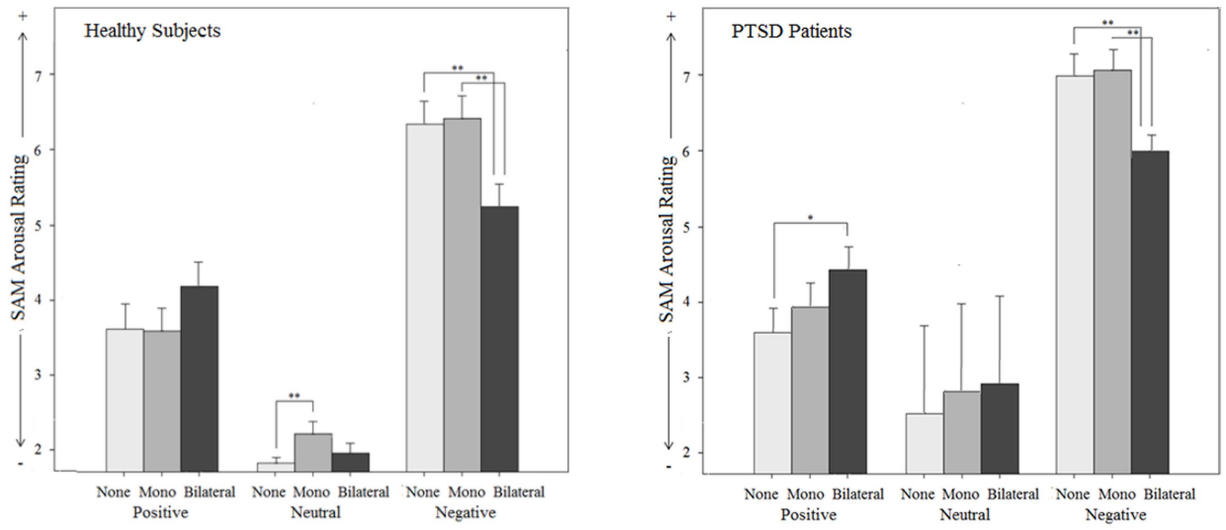

FIGURE 4
Subjective effects on arousal (Subjective Assessment Manikin SAM) by different types of stimulation (mono-, bilateral, no stimulation) for both groups (PTSD and controls) in relation to different emotional script qualities.

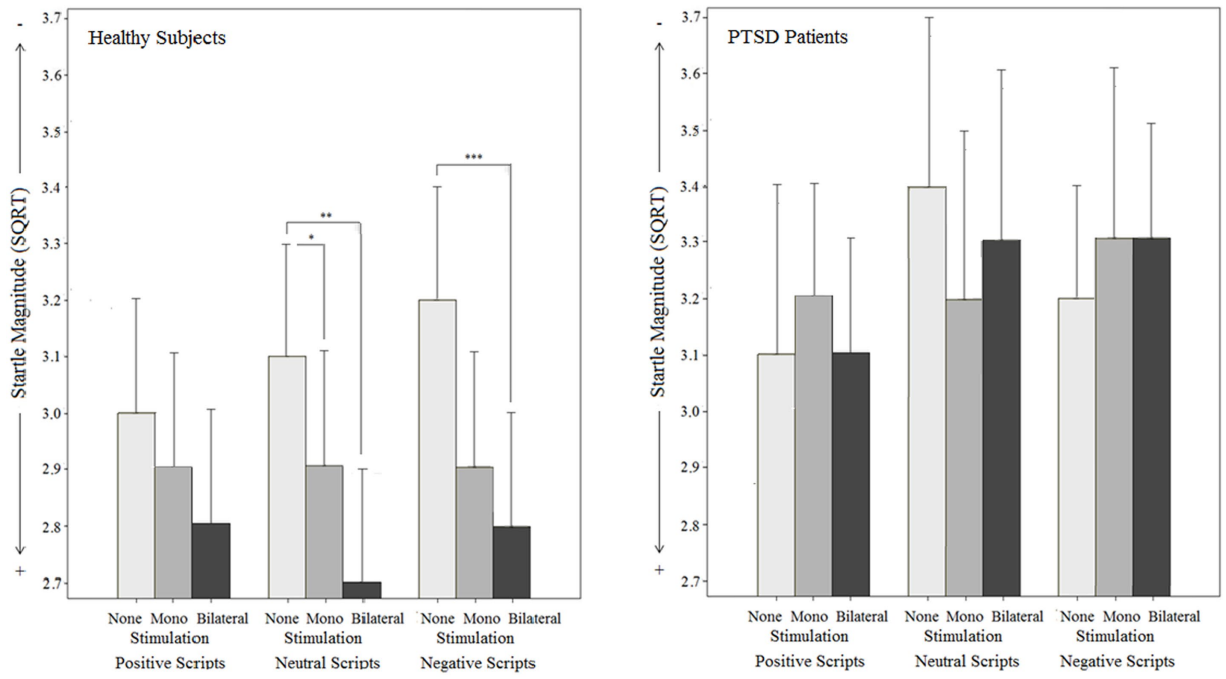

FIGURE 5
Objective effects on Startle reflex magnitude by different types of stimulation (mono-, bilateral, no stimulation) for both groups (PTSD and controls) in relation to different emotional script qualities.

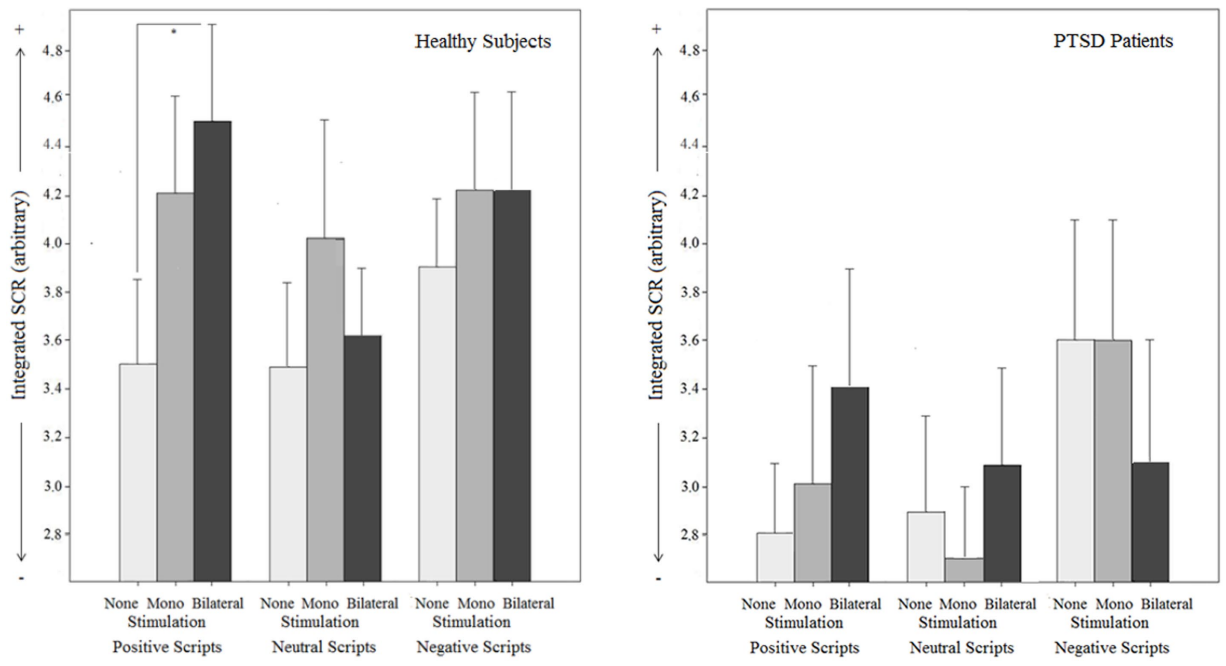

FIGURE 6
Objective effects on Skin conductance response (SCR) by different types of stimulation (mono-, bilateral, no stimulation) for both groups (PTSD and controls) in relation to different emotional script qualities.

SAM arousal score

For the SAM arousal score (reaching from 1, low arousal, to 9, high arousal), a significant script category x stimulation type interaction effect ($p < 0.001$) was observed in the overall sample: *Post hoc* tests showed that bilateral stimulation decreased subjective arousal exclusively for negative scripts ($MD_{bi\ vs.\ none} = -1.11$, $p = 0.000$, 95% CI [−1.64,-0.58]). For positive scripts, a reversed effect was detected with a significantly larger subjective arousal under bilateral stimulation

compared to no stimulation [$MD_{bi\ vs.\ none} = 0.58$, $p = 0.001$, 95% CI (0.22, 0.94)]. The assessment of neutral scripts was not influenced [$MD_{bi\ vs.\ none} = 0.19$, $p = 0.072$, 95% CI (−0.01, 0.38)]. Bilateral stimulation thus decreased arousal for negative content and increased arousal for positive content. Monolateral stimulation had no effect on arousal during negative [$MD_{mono\ vs.\ none} = 0.01$, $p = 1.000$, 95% CI (−0.52, 0.54)] and positive scripts [$MD_{mono\ vs.\ none} = -0.03$, $p = 1.000$, 95% CI (−0.60, 0.53)], but increased arousal for neutral scripts [$MD_{mono\ vs.\ none} = 0.30$, $p = 0.009$, 95% CI (0.06,0.55)]. This interaction effect was significant both in the patient sample ($p < 0.001$) and the control sample ($p < 0.000$). The script category x stimulation type x group interaction effect was not significant ($p = 0.559$), i.e., stimulation effect did not differ between the groups. The main effect for stimulation type ($p = 0.202$), the stimulation type x group interaction effect ($p = 0.660$), and the main effect for group ($p = 0.111$) were also not significant.

Startle reflex magnitude

The analysis of the startle magnitude revealed a significant main effect for stimulation type ($p = 0.008$) in the overall sample, but no stimulation type x script category interaction effect ($p = 0.515$): Bilateral stimulation ($MD_{bi\ vs.\ none} = -1.55$, $p = 0.013$, 95% CI [−0.28,-0.27]) decreased startle magnitude compared to no stimulation independently of script category. For monolateral stimulation, no significant stimulation effect was found [$MD_{mono\ vs.\ none} = -0.91$, $p = 0.269$, 95% CI (−0.22, 0.04)]. The main effect for group ($p = 0.324$) and the stimulation type x script category x group interaction were not significant ($p = 0.538$), but valence-specific startle-reducing effect exclusively for the controls was found. The data further revealed a significant interaction effect between stimulation type and group ($p = 0.010$):

For *healthy individuals*, the main effect for stimulation type was significant ($p_c < 0.001$) with a lower startle magnitude for bilateral stimulation ($MD_{bi\ vs.\ none} = -0.30$, $p < 0.001$, 95% CI [−0.44,-0.17]) and monolateral stimulation ($MD_{mono\ vs.\ none} = -0.20$, $p = 0.009$, 95% CI [−0.35,-0.04]) compared to no stimulation. Moreover, separate ANOVAs (manually corrected for multiple testing) indicated, that bilateral stimulation significantly reduced startle magnitude for negative ($p < 0.001$) and neutral scripts ($p < 0.001$), whereas no effect was found on positive scripts ($p = 0.379$). Monolateral stimulation had no effect on startle magnitude when the negative scripts ($p = 0.063$) and positive scripts ($p = 1.000$) were regarded separately, but a significant effect on the neutral scripts was found ($p = 0.009$).

For *PTSD patients*, the main effect for stimulation type was not significant ($p_c = 1.000$). This was the same for all script categories, i.e., there was no stimulation type x script category interaction effect neither for healthy individuals ($p_c = 0.762$) nor for patients with PTSD [$F(2.7, 58.6) < 1$, $p_c = 1.000$].

Skin conductance response

For SCR magnitude, the script category x stimulation type interaction effect [$F(3.4,167.8) = 2.0$, $p = 0.117$] was not significant, but separate analyses for each script category (manually corrected for multiple testing) showed a differential effect: When analyzing the positive scripts, a significant SCR increase under bilateral stimulation [$MD_{bi\ vs.\ none} = 2.35$, $p_c = 0.027$, 95% CI (0.47, 4.23)], but not under monolateral stimulation [$MD_{mono\ vs.\ none} = 1.23$, $p_c = 0.591$, 95% CI (−0.39, 2.84)] compared to no stimulation was detected. For the negative scripts, neither bilateral stimulation [$MD_{bi\ vs.\ none} = -0.27$, $p_c = 1.000$, 95% CI (−1.84, 1.78)] nor monolateral stimulation [$MD_{mono\ vs.\ none} = 0.40$, $p_c = 1.000$, 95% CI (−1.05, 1.86)] had an SCR-modulating effect. Similarly, there was no SCR-modulation effect under bilateral [$MD_{bi\ vs.\ none} = 0.34$, $p_c = 1.000$, 95% CI (−1.05, 1.73)] or monolateral stimulation [$MD_{mono\ vs.\ none} = 0.59$, $p_c = 1.000$, 95% CI (−0.99, 2.17)] for the neutral scripts. These findings indicate a valence-dependent SCR-increasing effect of bilateral stimulation. No script category x stimulation type x group interaction [$F(3.4,167.8) = 1.0$, $p = 0.399$], no stimulation type x group interaction [$F(2,100) = 1.7$, $p = 0.184$], and no main effects for stimulation type [$F(2,100) = 1.871$, $p = 0.159$] and group [$F(1, 50) = 3.1$, $p = 0.084$] were found.

Intertrial intervals

To examine stimulation influence on physiological basis parameters, ANOVAs were calculated during the intertrial intervals with 'stimulation type' (bilateral vs. monolateral vs. none) and 'group' (patients vs. controls) as independent variables. The findings are depicted in Figure 7.

For startle magnitude, no main effect for group [$F(1, 51) = 1.1$, $p = 0.296$], but a strong significant main effect for stimulation type [$F(1.7,85.2) = 16.0$, $p < 0.001$] and a significant group x stimulation type interaction effect [$F(1.7, 85.2) = 5.9$, $p < 0.006$] were found: In the control group, there was a significant main effect for stimulation type [$F(2, 58) = 33.8$, $p < 0.001$], i.e., startle magnitude was significantly lower under bilateral stimulation [$MD_{bi\ vs.\ none} = -0.41$, $p < 0.001$, 95% CI (−0.56, 0.27)] and monolateral stimulation [$MD_{mono\ vs.\ none} = -0.28$, $p < 0.001$; 95% CI (−0.42,-0.14)] than under no stimulation. However, the effect of bilateral stimulation was significantly stronger [$MD_{bi\ vs.\ mono} = -0.13$, $p = 0.011$, 95% CI (−0.24,-0.03)]. In the patient group, the main effect for stimulation type was not significant [$F(2, 44) < 1$, $p = 0.385$].

Integrated SCR during the ITIs did not vary following stimulation type. The main effect for stimulation type was not significant [$F(2,100) < 1$, $p = 0.931$]. This corresponds to the results of Gunter and Bodner (2008), who observed a stimulation-induced physiological arousal increase only in the presence of emotional stimuli. The main effect for group [$F(1, 50) < 1$, $p = 0.392$] and the group x stimulation type interaction effect [$F(2, 100) = 2.3$, $p = 0.111$] were not significant.

Visual analogue scales

Before and after the complete script presentation and measurement procedure, mood (ranging from 1, positive, to 100, negative) and arousal (ranging from 1, low arousal, to 100, high arousal) were assessed via Visual Analogue Scales (VAS).

Comparisons between patients and controls (PG vs. CG) were done via univariate ANOVAs (two-tailed). Both groups differed significantly in their subjective mood and arousal (Table 2): Patients with PTSD showed significantly worse mood [$F(1, 51) = 8.6$, $p = 0.005$] and significantly higher arousal [$F(1, 51) = 4.3$, $p = 0.044$] compared to healthy subjects before the experiment. Comparable group differences for mood [$F(1, 51) = 7.0$, $p = 0.011$] and arousal [$F(1, 51) = 6.8$, $p = 0.012$] were found for the post-test rating, indicating that the

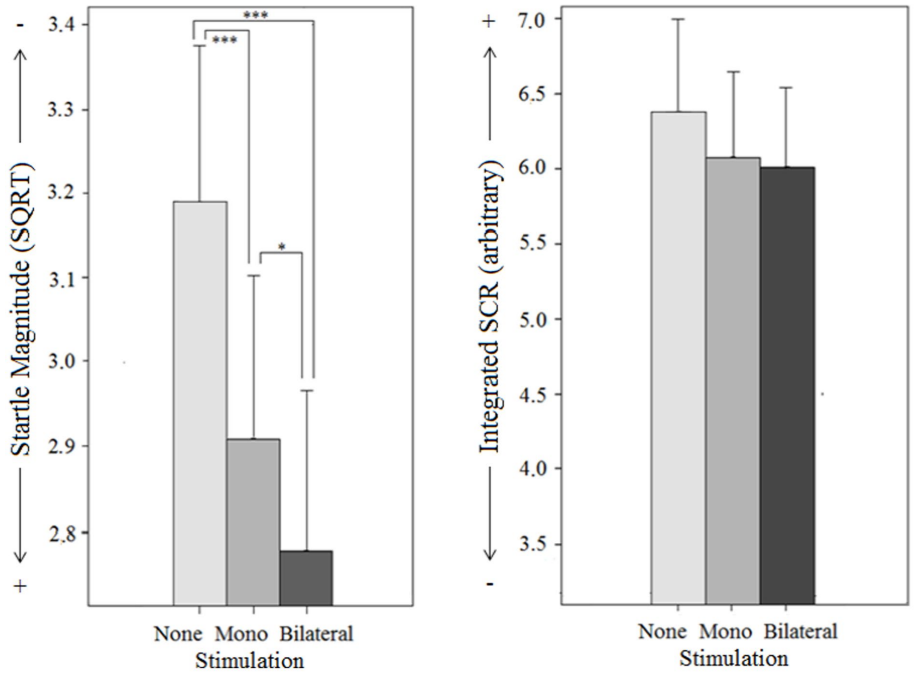

FIGURE 7
Objective effects on Startle reflex magnitude and Skin conductance response (SCR) by different types of stimulation (mono-, bilateral, no stimulation) for both groups (PTSD and controls) in intertrial intervals without emotion induction.

emotion task was experienced as more stressful by the patients. This finding might indicate a limited ability to cope with affective stimuli in patients with PTSD.

Pre- to post-test difference values (i.e., VAS values before and after the complete script presentation and measurement procedure) were compared via univariate ANOVAs (two-tailed). Pre- to post-test difference values for mood [$F(1, 51) < 1$, $p = 0.724$] and arousal [$F(1, 51) = 1.192$, $p = 0.280$] did not significantly differ between both groups. However, separate pre-to post-test comparisons for each group indicated that arousal significantly decreased from pre to post in healthy subjects [$F(1, 29) = 4.2$, $p = 0.049$], whereas no changes in PTSD patients were found [$F(1, 22) < 1$, $p = 0.958$]. Whereas the controls thus showed a habituation effect, the patients were as stressed after measurement as at the beginning of the experiment. Mood was stable over time in both the patient [$F(1, 22) < 1$, $p = 0.633$] and the control group [$F(1, 29) = 2.5$, $p = 0.123$].

Discussion

This study aimed to contrast PTSD patients vs. healthy volunteers in their subjective and objective reaction patterns in an emotional imagination paradigm. Additionally, the effects of bilateral stimulation as applied in EMDR therapy were investigated in both groups.

Group differences in baseline parameters

On the subjective level, patients reported significantly higher arousal and a worse mood than healthy individuals before the testing and missing habituation to the testing situation. That finding is in line with persistent hyperarousal as one criterion of PTSD. However, on the objective measurable level, no increased SCRs during the ITIs as indicators of hyperarousal were observed. This corresponds with previous studies (Metzger et al., 1999; Orr et al., 2003), where the subjectively reported hyperarousal could not be objectively confirmed. Furthermore, patients showed objectively no hyperreactivity as no increased startle reflex response was found.

The observed discrepancy - subjective hyperarousal without a physiological correspondence - in the patients can only be discussed hypothetically here against the background of existing findings and requires further exploration. Two considerations are suggested as preliminary explanatory hypotheses: 1. Dissociation: dissociation is present in many mental disorders and disrupts mental functions (Lyssenko et al., 2018). It affects the integration of consciousness, memory, thinking, emotion, sensorimotor functions, identity, and behavior (APA, 2013). In PTSD, dissociation can serve as a psychobiological defense mechanism to cope with traumatic experiences and avoid emotional distress (Dalenberg et al., 2012). Even if there is explicitly a "dissociative subtype of PTSD" (APA, 2013; DSM-V), however, significantly more PTSD patients suffer from impaired functioning due to milder forms of dissociative phenomena which are experienced regularly, in response to ostensibly minor stressors (Fani et al., 2019). According to this, it can be hypothesized that the lack of physiological responses to emotional stimuli might be the result of autonomic blunting due to a dissociative process (Schäflein et al., 2018; Beutler et al., 2022). 2. PTSD-specific cognitive processing style: evaluating an uncertain situation and being prepared to react immediately to specific learned threats, PTSD patients are operating in a state of possibility thinking using past evidence. Therefore, all possible outcomes or circumstances must be considered in relation to their (traumatic) memory, rather than

the typical probability thinking of the average individual. Instead of trusting that something probably will or will not happen, PTSD patients tend to have in mind distressing worst-case scenarios and consider them. Studies examining information processing in PTSD support such a "sense of current threat" in PTSD patients according to their overestimation of the probability of the traumatic event reoccurring (Ehlers and Clark, 2000; Regambal and Alden, 2012). The resulting constant worrying engagement could be subjectively perceived and interpreted as hyperarousal. A combination of both - subjective hyperarousal as a result of catastrophizing cognitive processes (also in respect to the testing situation) and physiological non-responding as a result of dissociation - is also possible and consistent with the findings.

Group differences in emotional reactivity

According to the results of McDonagh-Coyle et al. (2001), patients experienced the pleasant scripts significantly less positively than healthy subjects, and the negative scripts were more aversive in their subjective judgment. However, the expected physiological effects on the startle did not occur in the PTSD patients: no startle inhibition during the pleasant scripts (non-stimulation condition) and no startle potentiation for unpleasant scripts was observed, even if SCR (i.e., attention) for the scripts was significantly increased (compared to healthy participants). These effects were correlated with the BDI-II score, but not with situational factors such as the negative pre-test mood. For this reason, a dysfunction of the behavioral approach system in the patient group for positive emotions can be assumed here, which may have been influenced by depressive comorbidity. The different reaction patterns to induced negative emotion in healthy individuals and PTSD patients contrast with a previous study where both groups showed similar reactivity to negative, non-trauma-associated stimuli (Tarrier et al., 2002).

Group differences in the various stimulation conditions

The results are first reported for the subjective level: BLS affected the subjectively felt arousal equally in healthy individuals and patients by reducing it in both negative and positive emotion induction. The same was observed regarding valence where BLS reduced negative and positive valence ratings in both groups, whereas no such BLS effects were observed presenting neutral scripts. This should be considered when EMDR is used to install or reinforce positive resources: In accordance with our results, fast BLS could weaken the subjective arousal and valence of positive resources. However, in practice, slow BLS are often used intuitively (as they have not been further validated), as in the "EMDR Resource Development and Installation (RDI)" protocol (Korn and Leeds, 2002).

When comparing the impact of BLS at a physiological level significant differences between the two groups were found: In healthy subjects, BLS reduced startle SCR for positive scripts which can be interpreted as an increase in attention to the positive stimuli. Moreover, a significantly reduced startle reflex response in the absence of affective stimuli potentiation in negative scripts, which can be understood as physiological confirmation of a decrease in negative valence resp. aversiveness. Under BLS healthy individuals also showed an increased was observed during BLS, which represents an effect of a generally reduced affective responsiveness.

In contrast, the patients did - contrary to their subjective assessments - *not* show any corresponding physiological relaxation effects when being exposed to BLS. To interpret this finding, one could refer to the concept of dissociation and/or the above-described information processing model in PTSD: emotion induction via scripts means for patients to find themselves in a new and uncertain situation with emotional content, in which the crucial probability assessment is automatically carried out. This requires the use of higher cognitive processes, which are taxed by the dual task of BLS, in that less attentional capacity is available and therefore the subjective load is diminished.

In the monolateral stimulation variant, increased subjective arousal was found in both groups with neutral scripts, while no effect was found with the presentation of pleasant or unpleasant scripts. Monolateral stimulation had no effect on either subjective valence or physiological parameters (startle reflex, SCR).

These findings of different effects concerning the type of stimulation are consistent with applied studies that report more specific effects in BLS compared to monolateral stimulation (e.g., Stingl et al., 2022).

Implications

This work should be understood as a basic study expanding the knowledge about commonalities and differences between PTSD patients and healthy controls related to subjective and physiological basic parameters and emotional reactivity. In addition, the differential effects of bilateral stimulation on individuals with/without PTSD were examined, where monolateral stimulation and no stimulation served as control conditions.

Applying BLS has several advantages over monolateral stimulation – it helps to reduce subjective arousal, diminishes subjective strain, and enhances positive valence when imagining scrips with emotional content. These effects correspond to the intended application of BLS in EMDR therapy where it is used to process distressing experiences and to reinforce positive mental images and emotions.

Furthermore, the described corresponding physiological effects of BLS could only be demonstrated in healthy individuals, but not in PTSD patients. Since the reasons for this could be comorbidity with depression or dissociative symptoms, which often occur in patients with PTSD, adequate treatment of both should precede or be integrated in EMDR therapy. This might include, for example, applying antidepressant treatment and/or implementing strategies for dealing with dissociation, as preceding steps to avoid attenuation of bilateral stimulation effects.

The reported results may also help to better categorize EMDR therapy within evidence-based psychotherapies. According to the framework for evidence-based psychosocial interventions by David and Montgomery (2011), EMDR has proven its effectiveness in practical application, but the underlying theory of the AIP model is still insufficiently investigated. Therefore, the EMDR therapy can be classified within the framework in category II "intervention-guided psychotherapy." Here, the dismantling study design provides information for further validation of the underlying EMDR theory: consistent with the disease and treatment theory of PTSD, the therapeutic package of EMDR aims to improve emotion regulation

skills in PTSD patients, because dysfunctional emotion regulation skills play a crucial role in the initiation and maintenance of the disorder. As predicted by EMDR theory, the application of BLS reduced subjective stress and increased positive valence, while monolateral stimulation did not. Further studies should examine the assumptions and mechanisms of change of EMDR in order to clarify the scientific level of EMDR therapy and distinguish it from pseudoscientific psychotherapy. Common factors (see Wampold, 2001) that might additionally contribute to therapeutic change should also be considered when investigating the effects of the EMDR therapeutic package.

Limitations

The study was conducted with a relatively small sample size, and some of the effects found in this sample were small. There was no pre-registration, but the authors will provide insight into the raw data upon request. The dismantling design was conducted as a laboratory study with a standardized procedure using a block-wise standardized emotion induction, which is an approximation of a true EMDR therapy. Incidentally, such a direct comparison cannot be performed in the context of a real clinical EMDR study, since a comparable trauma confrontation in healthy subjects is not possible. Regarding the emotion induction used, the positive scripts were less arousing compared with the negative ones, which may have influenced the inhibition of the startle reflex. This problem, also observed in previous studies (Cuthbert et al., 1990; Vanoyen Witvliet and Vrana, 1995; Miller et al., 2002), could be addressed by personalizing the scripts. Stimulation was performed tactilely, in contrast to clinical practice in which horizontal eye movements are preferred. Even though studies for tactile and visual stimulation show comparable effects, the results of this work cannot automatically be transferred to other stimulation types. Another possible limiting factor is the duration of stimulation. In EMDR therapy, stimulation lasts longer, and the end point of stimulation before switching to a new association pathway depends on the valence of the very last memory that emerged. The current stimulation is stopped and a new association pathway is processed only when a neutral or positive memory emerges. This change in emotional valence is often indicated by subtle changes in facial expression or body posture, which the therapist uses for guidance. Stopping the stimulation too quickly without taking these markers into account may result in a lack of the arousal- and valence-modulating effects of the stimulation. For this reason, the stimulation phases should be extended and individualized in future studies. Since the majority of the sample consisted of participants who had not previously been treated with EMDR, the influence of previous EMDR experience cannot be determined here, nor can the question of how differences between (usually more severely disturbed) inpatients and outpatients might affect the results. An important question for future studies is whether the observed stimulation effects are stable over time. For this reason, a follow-up measurement would be helpful. Although previous studies showed no significant differences between tactile and non-tactile stimulation (Nieuwenhuis et al., 2013), the present results are so far limited to the tactile stimulation type.Conclusion

In healthy individuals, bilateral stimulation had a significant influence on emotional reactivity both in subjective and physiological terms: Startle reflex response during imaging negative scripts was reduced, and SCR (i.e., attention) for positive scripts was increased. Monolateral stimulation did not have a comparable effect. These findings are promising, as bilateral stimulation is used for weakening negative (e.g., trauma-related) imaginal scenes and for confirming positive imaginal scenes during EMDR therapy (Shapiro, 2017). For PTSD patients, however, only a subjective arousal-reducing effect, but no concomitant physiological changes were found. This could have resulted from depressive comorbidity, dissociation, or cognitive processing style in connection with the comparably low duration of the stimulation.

Overall the study showed that PTSD patients and healthy subjects were *not* comparable in their subjective (psychological) and objective (physiological) baseline and response patterns to BLS in the emotional imagination paradigm, so the effects observed in one group cannot simply be generalized to the other.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Ethics committe of the faculty of medicine uniyersity of Giessen. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

VP: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. GS: Data curation, Methodology, Writing – review & editing. BH: Writing – review & editing. ES: Writing – review & editing. FR: Writing – review & editing, Methodology. MS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Cost-effectiveness analysis of the treatment of posttraumatic stress disorder related to childhood abuse: comparison of phase-based treatment and direct trauma-focused treatment

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Background: Policymakers, health insurers, and health care providers are becoming increasingly interested in cost-effectiveness analyses (CEA's) when choosing between possible treatment alternatives, as costs for mental health care have been increasing in recent years.

Objective: The current study compared the cost-effectiveness and cost-utility of a phased-based treatment approach that included a preparatory stabilization phase with direct trauma-focused treatment in patients with PTSD and a history of childhood abuse.

Methods: A cost-effectiveness analysis was conducted based on data from a randomized controlled trial of 121 patients with PTSD due to childhood abuse. A phase-based treatment (Eye Movement Desensitization and Reprocessing [EMDR] therapy preceded by Skills Training in Affect and Interpersonal Regulation [STAIR]; $n = 57$) was compared with a direct trauma-focused treatment (EMDR therapy only; $n = 64$). The primary outcome of cost-effectiveness was the proportion of patients with remitted PTSD. Quality-adjusted life years (QALY) were used as the primary outcome measure for cost-utility analysis.

Results: Although the results of the cost-effectiveness analyses yielded no statistically significant differences between the two groups, the mean societal costs per patient differed significantly between the STAIR-EMDR and EMDR therapy groups (€19.599 vs. €13.501; M cost differences = €6.098, CI (95%) = [€117; €12.644]).

Conclusion: STAIR-EMDR is not cost-effective compared with EMDR-only therapy. Since trauma-focused treatment is less time-consuming, non-trauma-focused phase-based, treatment does not seem to be a viable alternative for the treatment of PTSD due to adverse childhood events.

Clinical trial registration: https://onderzoekmetmensen.nl/nl/trial/22074, identifier NL5836.

KEYWORDS

PTSD, CEA, childhood abuse, EMDR, STAIR

Highlights

- One of the first studies to compare the cost-effectiveness and cost-utility of phase-based treatment (STAIR-EMDR) with direct trauma-focused treatment (EMDR) in patients with PTSD due to a history of childhood abuse.
- STAIR-EMDR was not cost-effective compared to EMDR only therapy.

1 Introduction

Post-traumatic stress disorder (PTSD) is a mental health condition that may result from one or more traumatic events and is characterized by intrusive and recurrent memories of trauma, avoidance of trauma-related stimuli, numbing and/or negative changes in mood or cognition, and changes in reactivity and arousal (American Psychiatric Association, 2017). PTSD has been found to have a major impact on work disability and quality of life (Von der Warth et al., 2020), and may therefore lead to functional impairment and reduced societal productivity (Alonso et al., 2004), resulting in economic burden (Von der Warth et al., 2020). This can result in functional impairment and reduced societal productivity (Alonso et al., 2004). However, frequent physical and mental comorbidities also exert a strong socioeconomic influence on individuals with PTSD (Pacella et al., 2013). Owing to the impact of PTSD on societal costs and quality of life, the APA PTSD Treatment Guidelines (American Psychological Association, 2013) and WHO Guidelines for the Management of Conditions Specifically Related to Stress (World Health Organization, 2013) emphasize the importance of cost-effectiveness studies for future treatment guideline recommendations.

Only one study has systematically reviewed economic evaluations and cost analyses, using PTSD as a diagnostic criterion (Von der Warth et al., 2020). Of the 31 included studies, only 13 performed a full economic evaluation with cost-effectiveness and cost-utility analyses, indicating that intervention costs were measured in relation to effectiveness. Only four of these studies were performed in the European healthcare system. Of the 13 studies with a fully performed economic evaluation, only two also calculated costs from a societal perspective, as recommended by international guidelines (Le et al., 2014; Chang et al., 2018), instead of only a mental health payer's perspective. In addition, some evidence-based PTSD treatments, including EMDR therapy, were not included in the review (Von der Warth et al., 2020), whereas EMDR therapy was found to be the most cost-effective PTSD treatment among the 10 different PTSD treatments in another large study (Mavranezouli et al., 2020). Thus, health economic evaluations of PTSD therapies from a societal perspective are lacking in Europe. The latter may even be more true for severe forms of PTSD, for which patients with a history of childhood abuse are at risk (Cloitre et al., 2012; Rink and Lipinska, 2020).

There is an ongoing debate about the treatment of individuals with PTSD due to childhood abuse, which revolves around the question of whether they need phase-based treatment instead of treatment according to international treatment guidelines for PTSD. The recommended evidence-based trauma-focused treatments include EMDR and prolonged exposure therapy, which directly target traumatic memories (Cloitre, 2015; De Jongh et al., 2016). According to the ISTSS expert consensus guidelines published in 2012 (Cloitre et al., 2012) the main focus of Phase 1 of a phase-based treatment protocol should be to ensure patients' safety and teach them emotional and social competencies. The focus of Phase 2 is the processing of traumatic memories whereas that of Phase 3 involves a consolidation of the treatment gains. In response to critical analyses of the ISTSS expert consensus guidelines released in 2012 (De Jongh et al., 2016) a more recent guideline position paper (International Society for Traumatic Stress Studies, 2018), emphasized the importance of personalized treatment by tailoring interventions to the individual needs, instead of using a strict (sequential) treatment program. Nevertheless, it is still unclear whether the addition of a preparation phase (Phase 1) before the trauma-focused treatment is cost-effective compared with direct trauma-focused treatment. Skills Training in Affect and Interpersonal Regulation (STAIR) is the most extensively studied protocol to use as Phase 1 (Cloitre et al., 2002, 2010; Haasija and Cloitre, 2015). The therapeutic objectives of STAIR include: (1) promoting emotional awareness of feelings and their triggers in daily life, (2) teaching emotion regulation strategies, (3) encouraging the adaptive utilization of emotions and enhancing distress tolerance, (4) supporting the identification and modification of dysfunctional interpersonal schemas, (5) facilitating the identification of adaptive and achievable social goals with in various relationships and interpersonal contexts, and, (6) achieving a sense of self-efficacy in both emotional and social domains (Haasija and Cloitre, 2015).

Opponents of the addition of a preparation phase prior to a trauma-focused treatment argue that just targeting traumatic memories of patients with symptoms may lead to similar results and that the addition of a preparation phase delays symptom reduction and thereby may even cause unnecessary suffering (De Jongh et al., 2016), eventually leading to higher costs than immediate trauma-focused therapy.

A recent study examined the cost-effectiveness of prolonged exposure (PE) therapy preceded by STAIR among patients with PTSD related to childhood abuse (Kullberg et al., 2023). Unfortunately, the researchers did not answer the question of whether the addition of STAIR to trauma-focused treatment leads to economic benefits because of the skills gained during the preparation phase. However, they replaced part of the trauma-focused sessions with STAIR (eight sessions of STAIR followed by eight sessions of prolonged exposure versus 16 sessions of prolonged exposure), although STAIR was intended for use in addition to trauma-focused treatment (Cloitre et al., 2012), like we used it in our study (16 sessions EMDR preceded by eight sessions of STAIR versus 16 sessions EMDR only). Hence, a study comparing the cost-effectiveness of phase-based and direct trauma-focused treatments is warranted.

The purpose of this study was to perform secondary analyses based on data from our randomized controlled trial (Van Vliet et al., 2021) to assess the cost-effectiveness of a phase-based treatment protocol (i.e., EMDR therapy preceded by STAIR: Skills Training in Affective and Interpersonal Regulation) compared with direct trauma-focused treatment (i.e., EMDR only) in patients with severe PTSD due to repeated sexual and/or physical abuse during childhood, with STAIR as an actual addition to EMDR therapy.

2 Methods

2.1 Design and participants

Our economic evaluation was focused on the balance between costs and health outcomes of phase-based treatment (STAIR-EMDR;

$n = 57$) compared to direct trauma-focused treatment (EMDR therapy; $n = 64$) in individuals with PTSD due to childhood abuse (Van Vliet et al., 2021). For this randomized controlled trial patients were recruited from two mental health organizations in the Netherlands (Dimence GGZ and GGZ Oost-Brabant). After patients signed a written informed consent form, and were eligible to participate in the study ($N = 121$), they were randomly assigned to one of the two treatment conditions. The power calculation was based on a repeated-measures ANOVA, with the treatment condition as the between-subjects factor and time as the within-subjects factor (Van Vliet et al., 2018). The inclusion criteria were (a) age between 18 and 65 years, (b) PTSD as measured by the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; 21), and (c) PTSD related to repeated sexual and/or physical abuse before the age of 18 years by a caregiver or a person in a position of authority. This was indexed using the LEC-5 (Weathers et al., 2013b). The exclusion criteria were: insufficient mastery of the Dutch language, acute suicidality for which direct crisis intervention was needed (as assessed by item 9 of the Beck Depression Inventory-II; Beck et al., 1996), when patients had received any well-evaluated treatment for PTSD for at least eight sessions in the past year, when they reported being a victim of ongoing physical and/or sexual abuse, in case of severe use of alcohol or drugs, or in case of an intellectual disability. The study design was registered at[1] NL5836 and approved by the medical ethics committee Twente NL 56641.044.16 CCMO. Details regarding the comparison of the effects of the two conditions have been published previously (Van Vliet et al., 2021).

2.2 Interventions

The phase-based intervention involved eight sessions of STAIR and 16 sessions of EMDR therapy, whereas the direct trauma-focused treatment involved only 16 sessions of EMDR therapy. It is worth noting that both interventions were delivered twice a week for 90 min each. Prior to starting treatment, each patient in both treatment arms received a first session of 90 min consisting of psycho-education and determining relevant traumatic experiences to target during the PTSD treatment. STAIR was performed according to the protocol described by Cloitre et al. (2002). EMDR therapy was performed according to the standard EMDR protocol (Shapiro, 2018; De Jongh and Ten Broeke, 2019), which included all eight phases (Shapiro, 2018) with the only exception that the patients did not receive any relaxation or emotion regulation skills training prior to the processing of their memories (for the rationale see De Jongh et al., 2016). To address patients' anticipatory fear and avoidance behavior, the flash-forward protocol (Logie and De Jongh, 2014) was applied to target patients' most scary fantasies about what could happen once starting the EMDR therapy (e.g., losing control, getting overwhelmed by disturbing memories, getting raped by the therapist, or psychotic decompensation). During processing, standard cognitive interweaves to open blocked processing were applied as described by the originator (Shapiro, 2018). After treatment, the patients were not allowed to receive psychological therapy during the months follow-up. For a complete description of these two treatments, see Van Vliet et al. (2018).

2.3 Outcome measures

Two economic analyses were performed; a cost-effectiveness analysis and a cost-utility analysis. The primary outcome measure of cost-effectiveness analysis was the proportion of participants with remitted PTSD. The presence of PTSD was measured using the CAPS-5 (Weathers et al., 2013a). This interview includes 20 items on a 5-point Likert scale, resulting in a total score between 0 and 80. The CAPS-5 has good psychometric properties (Weathers et al., 2017).

Quality-adjusted life years (QALY) were used as the primary outcome measure for cost-utility analysis. A QALY of 1 assumes a year of life lived in perfect health (1 Year of Life × 1 Utility = 1 QALY) and a score between 0 and 1 indicates a year of life lived in a state of less than this perfect health (Drummond et al., 1997). The economic evaluation was conducted from a societal perspective; relevant costs in and outside the healthcare sector were prospectively assessed for 9 months for all included participants. Costs and health outcomes were not discounted due to a follow-up period of less than 1 year, which is in accordance with Dutch guidelines that advise the adjustment of calculated effects and costs from 1 year to the next to consider any changes (Zorginstituut Nederland, 2015b). QALYs were derived from EQ-5D-3L (EuroQol Group, 1990), which is a commonly applied self-administered instrument. The EQ-5D consists of five dimensions; mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, each with three levels (from no problems to many problems concerning the dimension). Subsequently, utilities were calculated using Dolan's algorithm (Dolan, 1997). It also includes a VAS that asks participants to rate their health from 0 (worst imaginable health) to 100 (best imaginable health).

2.4 Cost study

Supplementary Table S1 provides an overview of the various types of costs assessed during the study (including the follow-up time). Cost aspects directly related to STAIR and EMDR therapy were assessed in detail, including the cost of contact between participants and therapists (individual sessions), supervision of therapists during the study, materials, and housing. The various types of costs within the healthcare sector were related to the range of healthcare service participants used during the study. In addition, various types of costs outside the healthcare sector were assessed. The costs of informal care were based on the monetary valuation of the time invested by relatives or acquaintances in helping or assisting participants (such as household work or visiting healthcare professionals). By means of the friction cost method, the costs of productivity losses due to illness-related absence from work were estimated (Koopmanschap et al., 1995). Furthermore, the costs related to changes in the amount of voluntary (unpaid) work conducted by the participants were assessed, as asked in the commonly applied self-administered instrument.

Information on healthcare consumption was collected using a detailed case record form adapted to the context of the current study. The case record form assessed, among others, admissions to hospitals, contacts with healthcare professionals, and absence from work. The

1 https://onderzoekmetmensen.nl/nl/trial/22074

case record form was administered to all participants at baseline, at the end of treatment (2 or 3 months after baseline in the EMDR and STAIR-EMDR groups, respectively), and 6 and 9 months after baseline.

Unit prices (i.e., the price of one unit of each included cost type) were based mainly on Dutch standard prices (Zorginstituut Nederland, 2015a) to facilitate comparisons with other economic evaluations. The true costs of the resources used were estimated when standard prices were not available. All unit prices were based on the price level of the Euro in the year 2020. The reference prices established for previous years were adjusted to the 2020 prices by applying the consumer price index.

The presence of PTSD diagnosis, the EQ-5D-3L and the case record form for health care consumption were administered to all participants at baseline, at the end of treatment (2 or 3 months after baseline in the EMDR therapy and STAIR-EMDR groups respectively), and 6 and 9 months after baseline.

2.5 Economic analyses

The economic evaluation design included cost-effectiveness and cost-utility analyses. In these types of analyses, costs and health outcomes are used to calculate the incremental cost-effectiveness ratio (ICER) relative to one or more alternatives (Drummond et al., 2005). The formula used for calculating the ICER is presented below (with the proportion of participants with remitted PTSD as the outcome measure).

$$\mathrm{ICER} = \frac{\left(C_{\mathrm{STAIR-EMDR}} - C_{\mathrm{EMDR}}\right)}{\left(\mathrm{PTSD}_{\mathrm{STAIR-EMDR}} - \mathrm{PTSD}_{\mathrm{EMDR}}\right)}$$

$C_{\mathrm{STAIR\text{-}EMDR}}$ = mean costs in the STAIR-EMDR group

C_{EMDR} = mean costs in the EMDR group

$\mathrm{PTSD}_{\mathrm{STAIR\text{-}EMDR}}$ = proportion of participants with remitted PTSD in the STAIR-EMDR group

$\mathrm{PTSD}_{\mathrm{EMDR}}$ = proportion of participants with remitted PTSD in the EMDR group

2.6 Statistical procedures

The bootstrap method (Efron and Tibshirani, 1993) was applied to provide information on the uncertainty of the results of the economic evaluation. To deal with participants for whom not all data were available for various measurements, multiple imputation with a bootstrap approach (Oostenbrink and Ai, 2005) was used. In the planned sensitivity analysis, an alternative approach for handling missing data was applied to verify the results.

ICERs were calculated for each of the 2,500 bootstrap iterations and simulated values of the mean estimates for the cost and outcome differences were added to the cost-effectiveness planes (Black, 1990). Finally, cost-effectiveness acceptability curves (CEACs; Fenwick et al., 2004) were calculated. CEACs inform decision makers on the probability that an intervention will be cost-effective, which depends on the willingness to pay per additional unit of health outcome.

Confidence intervals for cost and effect differences were assessed using bootstrap techniques. Cost outcomes in the EMDR group assessed for 2 months between the baseline and the end of treatment were extrapolated to 3 months. The analyses were conducted using SPSS (version 25), R (2022), and CEA-plus (version 2.1).

3 Results

Of the 121 participating patients, 40 completed the entire treatment (15 in the STAIR-EMDR condition and 25 in the EMDR condition), 58 lost their PTSD diagnosis before the end of the maximum number of treatment sessions (i.e., early completers; 29 in the STAIR-EMDR condition and 29 in the EMDR-only condition), and 23 dropped out of treatment before the maximum number of sessions were reached, without losing their PTSD diagnostic status (13 in the STAIR-EMDR condition and 10 in the EMDR-only condition). In the STAIR-EMDR condition, one serious non-study-related adverse event was reported, which included a short hospitalization after a suicide attempt. In the EMDR condition two non-study-related adverse events were reported (one due to increased suicidal ideations during the follow-up, and one due to increased psychotic experiences after changes in medication).

3.1 Costs and healthcare utilization

A selection of the various types of costs (in and outside the healthcare sector) generated by the two groups during the 9 months of the study is presented in Supplementary Table S2. Only the most relevant cost types, or those that contributed considerably to the total costs (≥ 1% of the total costs in at least one group), are presented here. These costs are based on the data of participants for whom at least one cost measurement was available during the study (for participants who did not use specific types of costs or information was missing, and €0 was applied when calculating group means for this overview).

Supplementary Table S2 also displays information on the utilization of healthcare services; the percentage of participants using each cost type is provided. The mean costs directly related to the studied interventions were €2.436 and € 1.686 per participant in the STAIR-EMDR and EMDR groups, respectively. Costs related to hospital admissions, sheltered living, psychologist contacts, and psychotherapist contacts contributed considerably to the overall costs within the healthcare sector. Outside the healthcare sector, costs related to informal care and productivity losses were relatively high.

3.2 Total costs

An overview of the mean total societal costs during the various measurement periods of this study is provided in Table 1. In addition, the number of participants available for each measurement is presented.

The mean total societal costs of the STAIR-EMDR group were significantly higher than those of the EMDR group for the 0–3 months measurement (as demonstrated by the 95% CI). The differences in mean total societal costs between the groups were not statistically significant for the two subsequent measurements. The mean total societal costs during the 9 months of the study were 19.599 and 13.501 for the STAIR-EMDR and EMDR therapy groups, respectively. The

difference between the groups in mean total societal costs during the 9 months was statistically significant.

3.3 Health outcomes

The results of the health outcomes of the participants included in the economic analyses are presented in Table 2.

Analyses of the included outcome measures, remitted PTSD, and QALYs revealed no statistically significant differences between the two groups. PTSD outcomes tended to favor the STAIR-EMDR group; however, QALY outcomes were slightly worse in this group.

3.4 Cost-effectiveness analyses

The cost-effectiveness analyses were based on the data of participants for whom sufficient information was available on both costs and health outcomes (at least 50% of the data available). The results of the cost-effectiveness analysis with remitted PTSD as the primary outcome measure are presented in the cost-effectiveness plane (CEP) in Figure 1. Information is provided on the point estimate of the ICER, and percentage of bootstrap simulations located in each quadrant of the CEP.

The point estimate is located in the northeast quadrant, which indicates higher costs and better PTSD outcomes in the STAIR-EMDR group. Approximately 95% of bootstrap simulations were located in the northeast quadrant. Interpretation of the results of this cost-effectiveness analysis depends on how much decision makers are willing to pay for an additional unit of health outcome (remitted PTSD). The probability that the intervention will be optimal for increasing willingness to pay per additional unit of health outcome indicates that STAIR-EMDR is not likely to be cost-effective compared to EMDR (Figure 2). The probability that STAIR-EMDR is optimal starts at only 0.03 for a monetary threshold of €0, and slowly increases for values up to €25.000. Even at these high monetary values, the probability that STAIR-EMDR is optimal increases to only 0.37.

The results of the economic analysis using QALYs as the primary outcome measure are presented in the cost-effectiveness plane in Figure 3. The point estimate is located in the northwest quadrant, which indicates that costs were higher and QALY outcomes were worse in the STAIR-EMDR group. In total 62% of the bootstrap simulations were in the northwest quadrant. Overall, these results indicate that STAIR-EMDR is not cost-effective when focusing on the QALY outcomes.

3.5 Sensitivity analysis

In the current study, the data were incomplete for a substantial proportion of the participants. In the planned sensitivity analysis, the influence of the applied approach on dealing with missing data was compared to the results of a complete case analysis. The results indicated that the complete case analysis was associated with a lower probability of STAIR-EMDR being optimal compared to the standard analysis. The results of the sensitivity analysis are therefore not presented in more detail here but are available on request.

4 Discussion

To our knowledge, this is the first economic head-to-head comparison of phase-based treatment and direct trauma-focused treatment in patients with PTSD related to childhood abuse, with EMDR as the trauma-focused element and the preparation phase as an actual addition to EMDR therapy. The results indicate that STAIR-EMDR was not cost-effective compared to EMDR therapy alone. The outcome measures of remitted PTSD and QALY's did not differ

TABLE 1 Mean total societal costs (€) during the study.

Measurement (in months)	STAIR-EMDR		EMDR		Mean cost differences (95% CI)[2]
	Mean total costs	*n*	Mean total costs	*n*	
0–3	€12,682	33	€8,261	44	€4,421 (€491, €4,609)
3–6	€4,493	35	€3,126	41	€1,367 (−€562, €2,170)
6–9	€2,734	41	€1,755	38	€979 (−€206, €1,251)
0–9[1]	€19,599	38	€13,501	41	€6,098 (€117, €12,644)

[1]Mean total societal costs during 9 months, estimates based on the multiple imputation plus bootstrap approach used to account for missing data.
[2]95% confidence interval (CI) for the mean cost differences between the groups, Lower and upper boundaries of the CI are presented.

TABLE 2 PTSD outcomes and QALYS during 9 months[1].

Outcome measure	STAIR-EMDR		EMDR		Mean differences (95% CI[2])
	Mean (SD)	*n*	Mean (SD)	*n*	
PTSD[3]	0.83 (0.06)	38	0.64 (0.08)	41	0.19 (−0.01, 0.39)
QALY	0.43 (0.04)	30	0.45 (0.03)	35	−0.02 (−0.13, 0.09)

[1] Estimates were based on the multiple imputation plus bootstrap approach used to account for missing data.
[2] 95% confidence interval (CI) for the mean difference between groups. Lower and upper boundaries of the CI are presented.
[3] Proportion of participants with remitted PTSD (at the last measurement).

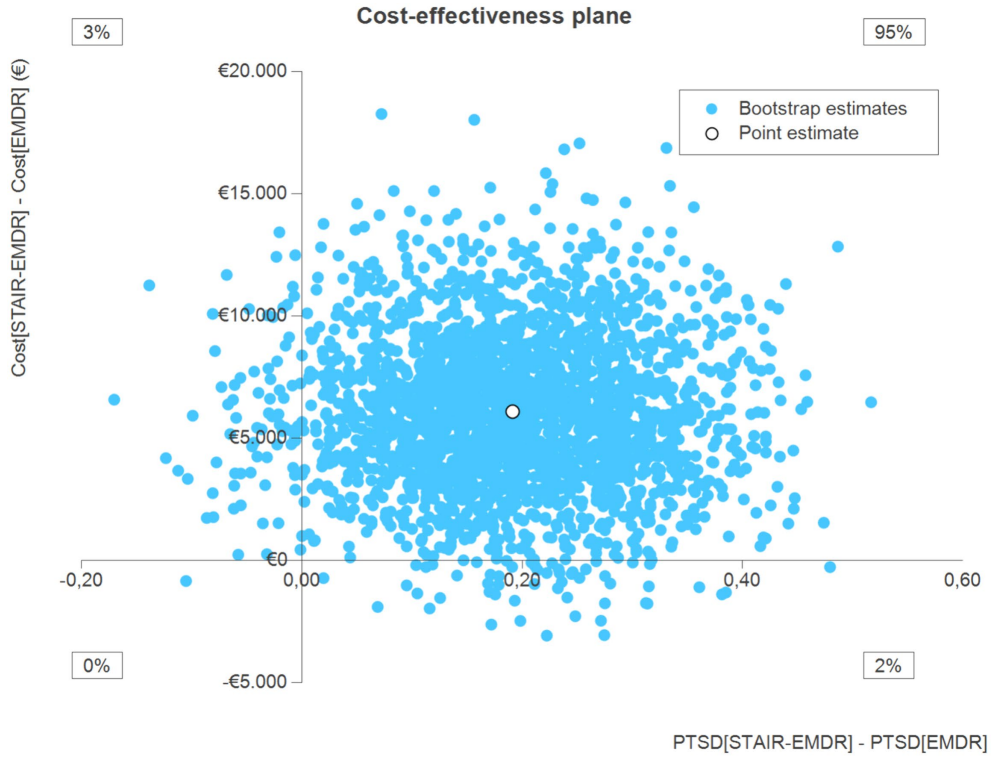

FIGURE 1
Cost-effectiveness analysis with remitted PTSD as outcome measure.

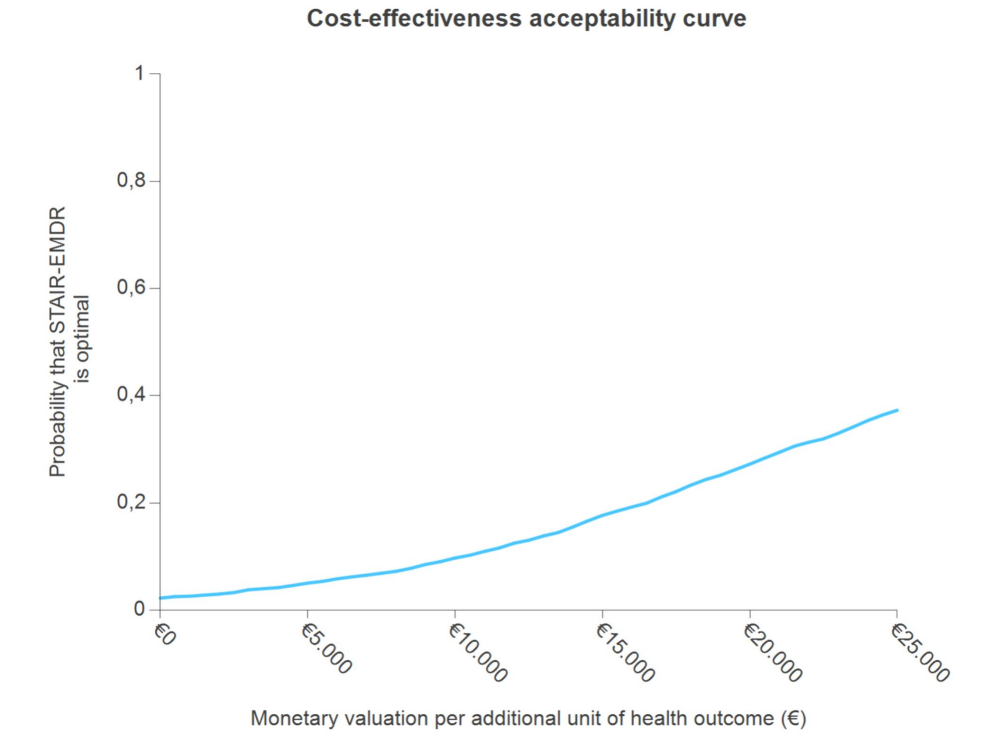

FIGURE 2
Cost-effectiveness acceptability curve (with remitted PTSD as primary outcome).

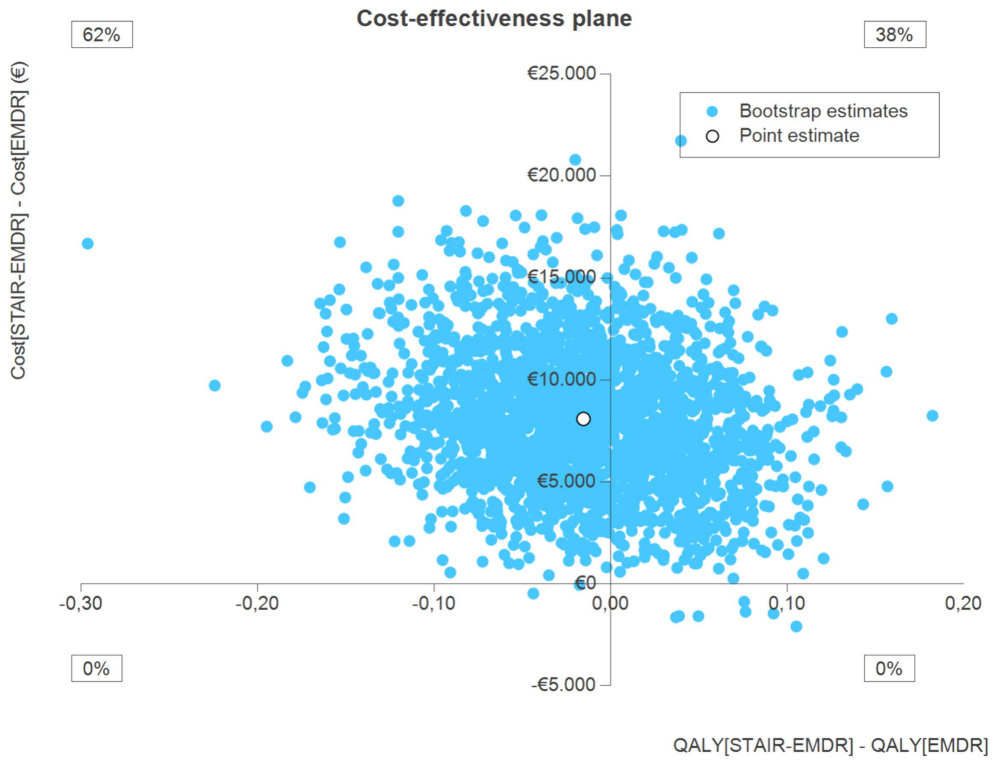

FIGURE 3
Cost-effectiveness analyses with QALY as outcome measure.

significantly between the two treatment conditions, whereas the mean societal costs per patient differed significantly between the STAIR-EMDR and EMDR therapy groups (€19.599 vs. €13.501). The higher societal costs of STAIR-EMDR therapy may be explained by the treatment duration. However, we hoped that these costs caused by treatment duration would have been compensated for by better societal functioning after treatment with STAIR-EMDR, but this was not the case.

In contrast to the purported assumption that STAIR would increase day-to-day functioning by addressing interpersonal and emotion regulation problems (Haasija and Cloitre, 2015), the present results do not show the advantage of adding this treatment to EMDR therapy in terms of cost-effectiveness. In contrast to the study by Kullberg et al. (2023), we found a significant difference in mean societal costs between phase-based and direct trauma-focused conditions, with higher societal costs for phase-based treatment. The costs for PE and STAIR-PE appeared to be much higher (€ 4,479 and € 4,464, respectively) than those for EMDR and STAIR-EMDR (€ 1,686 and € 2,436, respectively). This is consistent with the conclusion of Mavranezouli et al. (2020), who found that EMDR is a less expensive intervention than PE.

We found no difference in treatment effects between the two conditions. These outcomes are comparable to those reported in a previous study (Raabe et al., 2021). The QALY's from the present study for both STAIR-EMDR and EMDR therapies alone were comparable to the QALY's for EMDR calculated by Mavranezouli et al. (2020). However, the QALY outcomes in the study by Mavranezouli et al. were measured over a different period of time (3 years) than in our study (9 months), so in comparing both outcomes, many assumptions had to be made, which leaves much uncertainty. The QALY's gained with EMDR seem somewhat lower than those for Prolonged Exposure from the study by Kullberg et al. (2023); however, also in this case, many assumptions had to be made.

Both operationalizations (loss of diagnosis and increased quality of life) are important intended outcomes, but reducing complaints may be the most import goal, because we can assume that this will lead to an improvement in terms of quality of life, whereas loss of diagnosis (no longer meeting all diagnostic criteria of a mental health condition) will in many cases mean in practice that at least a part of the symptoms persist (Schnurr and Lunney, 2019).

A strength of the present study is that we performed a full economic evaluation with a cost-effectiveness analysis and a cost-utility analysis of both treatment forms, evaluating the costs in relation to the effectiveness of the interventions, as recommended by the national and international guidelines for health cost evaluations (European Network for Health Technology Assessment, 2015; Zorginstituut Nederland, 2015b). Second, in addition to health care costs, societal costs such as productivity losses and care by relatives or acquaintances were assessed. These costs reflect the use of resources from other sectors in society (European Network for Health Technology Assessment, 2015). By considering these costs, we avoided artificially lowering costs by shifting medical costs to informal societal care costs.

One limitation of this study was the number of missing values, which may have limited the power of the statistical calculations, leading to less reliable outcomes. Of the 57 participants in the STAIR-EMDR condition and 64 participants in the EMDR therapy condition, only 38 (66.7%) and 41 (64.1%) participants, respectively, remained in

the cost-effectiveness measurements at the 6-month follow-up. Because we used advanced methods to deal with incomplete data, patient data could still be included in our analyses when at least half of the measurements were available. A second limitation is the relatively short study period (9 months), which precludes the visibility of societal gains in the long term. For decision makers, outcomes assessed over longer periods (at least 1–2 years) may prove more relevant for policy decisions.

In conclusion, although phase-based treatment and EMDR therapy alone demonstrated no difference in effectiveness in achieving remission of PTSD symptoms and improving Quality-Adjusted Life Years, the societal costs of phase-based treatment were found to be significantly higher than those of trauma-focused therapy. Where cost and time are issues, EMDR therapy alone is the treatment of choice. However, some individuals might benefit from a longer treatment period with an additional focus on clinically relevant symptoms, such as dissociative sequelae.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Medical Ethic Committee Twente (merged with the Institutional Review Board United), reference number P16–03. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants/patients.

Author contributions

NV: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. AS: Funding acquisition, Supervision, Formal analysis, Methodology, Supervision, Writing – review & editing. RH: Conceptualization, Funding acquisition, Supervision, Writing – review & editing. MD: Conceptualization, Funding acquisition, Supervision, Writing – review & editing. AJ: Conceptualization, Funding acquisition, Supervision, Writing – review & editing.

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Conflict of interest

AS was employed by Zovon. AJ receives income from published books on EMDR therapy and training of postdoctoral professionals in this method.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1310372/full#supplementary-material

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EMDR and standard psychotherapy for paediatric cancer patients and their families: a pilot study

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Introduction: This study examined the efficacy of eye movement desensitisation and reprocessing (EMDR) therapy compared with standard psychotherapy (SP) in treating post-traumatic stress disorder (PTSD) in paediatric oncology patients and their families in the early stage of cancer treatment. The secondary aim of this study was to assess whether EMDR therapy has a different impact on post-traumatic growth compared to SP.

Methods: Forty patients were randomly assigned to EMDR or SP groups. The Impact of Event Scale – Revised (IES-R) and the Distress Thermometer (DT) were used to assess PTSD symptoms at pre-treatment (at cancer diagnosis) and in the post-treatment stages (after 8 sessions). The Post-traumatic Growth Inventory-PTGI was administered in the post-treatment stage in order to evaluate positive changes.

Results: Both EMDR and SP are effective in reducing PTSD, but EMDR was significantly more effective than the SP in reducing scores on the IES-R, especially regarding the intrusive symptom subscale. Also, in the EMDR group there were higher scores of PTGI than in the standard group.

Conclusion: EMDR thus represents a promising treatment in the paediatric psycho-oncology setting.

KEYWORDS

PTSD, paediatric cancer, EMDR, psychotherapy, paediatric psychology, distress

1 Introduction

Research exploring psychological burden among paediatric cancer patients and their families is not new (Lee et al., 2023). However, the classification of this burden as trauma and stressor-related symptoms has been the main focus of research over recent years. Diagnosis of the disease is probably the highest moment of stress for the family as a whole: disruption of life, pain, fear of death, medical procedure, depression and anxiety may occur. If unaddressed, these psychosocial discomforts may develop into high levels of post-traumatic stress symptoms (PTSS) or post-traumatic stress disorder (PTSD). Specifically, some researchers have highlighted that severe distress, indicating trauma, can exist 5–6 weeks after diagnosis (Landolt et al., 2003) and that these post-traumatic stress symptoms may have a protracted course (Lee et al., 2023).

Also, subclinical PTSS can continue or manifest during survivorship phases by leading to various negative effects on the quality of life of children and adolescents (Marusak et al., 2019). Among parents of children with cancer, research has shown that they typically experience post-traumatic stress symptoms (PTSS), particularly at the initial stage of the diagnosis (Katz et al., 2018; Carmassi et al., 2021). Symptoms among parents can include, for example, intrusive memories about the moment of the diagnosis and of the child's treatment (Tremolada et al., 2016). These symptoms can coexist with depression and anxiety, and may have different trajectories in different ethnic groups, as highlighted in a group of parents of children with acute lymphoblastic leukaemia (Chong et al., 2023). Since a cancer diagnosis is a stressful and potentially traumatic experience for children and their families, a screening of possible PTSS and other concurrent stressors is crucial for optimising dedicated psychological intervention to ensure safe mental health throughout treatment and survivorship. However, among children and adolescents, traumatic symptoms can be more difficult to intercept. They can be manifested, for example, through nightmares, sleep disorders or somatic symptoms, and may sometimes be masked by children due to some fears. Thus, screening and intervention should be proposed earlier, in a preventative manner, in order to avoid the onset of severe issues. Eye movement desensitisation and reprocessing (EMDR) can be an appropriate treatment also among children and adolescents (Civilotti et al., 2021), not only for adult cancer patients (Portigliatti Pomeri et al., 2021). Its efficacy has been demonstrated among paediatric patients who have experienced different trauma such as physical violence, psychological disorders and war scenarios. According to the literature, EMDR therapy could be a valid innovative form of care in reducing symptoms also among children and adolescents with physical illness, especially if they require invasive treatment practices and are disabling or chronic conditions (Meentken et al., 2020; Civilotti et al., 2021). Also, a time-limited EMDR has been proven able to reduce PTSD symptoms, psychological comorbidity, and distress in parents of children with a rare progressive life-limiting illness, in particular mucopolysaccharidosis type III (Conijn et al., 2022). No studies have examined its potentiality among children and adolescents with cancer and their families and, to our knowledge, only one case report has described the clinical benefits of the EMDR in an adolescent with cancer (Ciappina et al., 2024). In this case, the standard protocol was altered to focus on the traumatic experience of dealing with cancer (Faretta and Civilotti, 2016). However, given that the results refer to a single case, it is impossible to infer the efficacy of EMDR treatment in paediatric oncology. Thus, the aim of this current research is to evaluate the relative efficacy of EMDR therapy compared with standard psychotherapy (SP) in paediatric oncology patients and parents during the early stage of cancer treatment, as a pilot study. We sought to evaluate the efficacy of EMDR and SP, using a specific instrument for assessing post-traumatic symptoms and based on positive psychosocial outcomes such as positive emotional growth. For this purpose, several self-assessment questionnaires were administered.

2 Methods and participants

Forty paediatric oncology patients and parents were recruited from January 2023 to December 2023 from the Department of Paediatric Onco-haematology of the Regina Margherita Children's Hospital in Turin, one of the main paediatric hospitals in Italy (Zucchetti et al., 2018). The patients have different types of cancer such as leukaemia, lymphoma, bone sarcoma or solid tumours. Patients and parents were offered the chance to participate in the clinical and research psychological protocol EMDR_ITA_PED, approved by the Ethics Committee of AOU Città della Salute e della Scienza of Turin (Prot. No. 0073656; July 2022). Enrolled patients and parents were then randomly assigned to a group receiving EMDR or to a group receiving standard psychotherapy (SP).

Inclusion criteria were: patient just diagnosed with onco-haematological disease; age range $\geq$ 12 years old; acceptance of informed consent. Exclusion criteria were: patients <12 years old; no acceptance of informed consent. All procedures were performed according to the ethical standards of the institutional and/or national research committee. For both EMDR and SP groups, we proposed 8 sessions of psychotherapy.

For patients and parents in the EMDR group, we followed the EMDR Protocol proposed by Faretta et al. (2016), a specific protocol for cancer focused on difficulties related to different stages of the illness (Shapiro, 2001; Murray et al., 2010). No pharmacological treatment or other types of psychotherapy were provided in advance for either group. The CONSORT flow diagram for patients and parents' enrolment, which has been modified for a non-randomised trial, is shown in Figure 1.

2.1 Measures

For the first psychotherapy session occurring shortly after the diagnosis communication, patients and parents of both groups were screened simultaneously with a battery of standardised questionnaires to assess PTSD-symptoms: the Impact of Event Scale – Revised (IES-R) (Pietrantonio et al., 2003), the Distress Thermometer (DT) (Grassi et al., 2013), and the Post-traumatic Growth Inventory (PTGI) (Prati and Pietrantoni, 2006). DT and IES-R were administered to patients and parents prior to treatment (in the 1st session), with the same questionnaires and PTGI being administered post-treatment (thus, after 8 sessions). All questionnaires used for the assessment of participants in the study were self-administered under the supervision of the psychotherapist.

Specifically, the Impact of Event Scale – Revised (IES-R) (Weiss, 2007) consists of 22 items answered on a Likert scale from 0 (not at all) to 4 (extremely), designed to investigate post-traumatic symptomatology. It consists of three subscales (intrusion, avoidance, and hyperarousal) that assess subjective distress caused by traumatic events. Respondents are asked to identify a specific stressful life event and then indicate how much they were distressed or bothered during the previous 7 days by each "difficulty" listed. The maximum mean score of each of the 3 subscales is 4, so the maximum total mean score of the IES-R scale is 12. A total IES-R score of 33 or higher out of a maximum score of 88 indicates the likely presence of PTSD, but the cutoff point of 24 indicates partial PTSD or at least some of the symptoms while 33 is the best cutoff for a PTSD diagnosis. The Distress Thermometer was used to assess distress and everyday problems. It consists of a thermometer score measuring overall distress (0 = 'no distress' to 10 = 'extreme distress'), accompanied by a problem list (divided over six domains: practical, family/social, emotional, physical, cognitive, and parenting). Problem domain

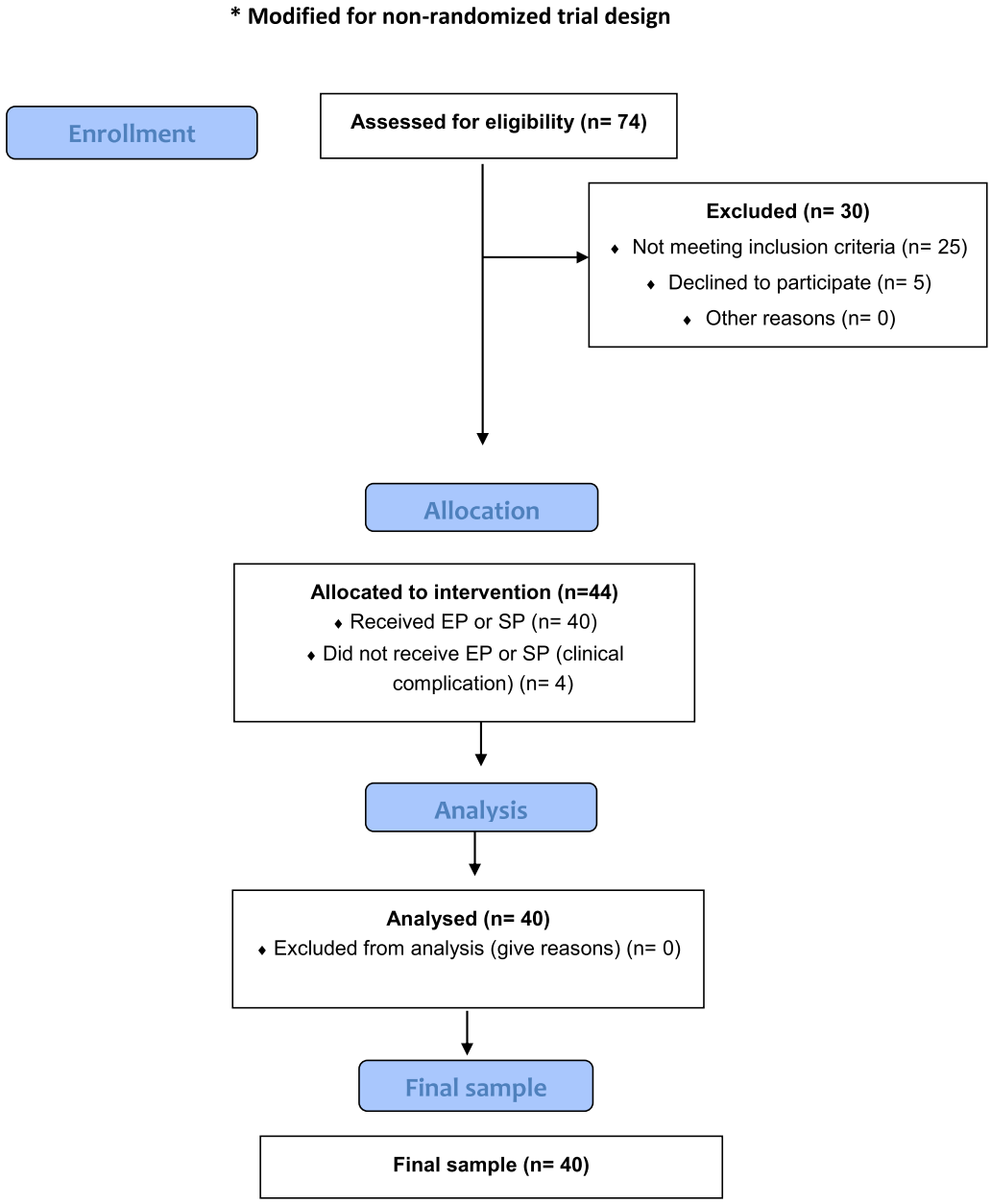

FIGURE 1
Diagram flow for patients and parents enrollment.

scores are the sum of the dichotomous items (0 = 'no' and 1 = 'yes') in each problem domain and a total problem score can be calculated. The Post-Traumatic Growth Inventory (PTGI) (Tedeschi and Calhoun, 1996), is a self-administered questionnaire containing 21 statements concerning personal changes that may occur following a traumatic event. For each statement, the subject must indicate on a grid a response from 0 (no change) to 5 (very important change).

2.2 Procedure

2.2.1 SP protocol

SP corresponds to the third level of the Italian protocol of paediatric psycho-oncological intervention (Zucchetti et al., 2020). During the psychotherapy sessions, a psychotherapist offers emotional advice, strategies, and cancer-related knowledge to the parents or patients by helping them activate their personal resources during the cancer experience. Specifically, standard psychotherapy is aimed at sustaining the positive emotional reactions of patients with cancer and of their parents, their adaptive defence mechanisms, the promotion of optional coping strategies, and redirection when defence mechanisms are maladaptive.

2.2.2 EMDR protocol

This protocol was proposed by Faretta et al. (2016) and is used with cancer patients because it is focused on difficulties related to different stages of the illness (Shapiro, 2001; Murray et al., 2010; Ciappina et al., 2024). It was followed for each participant.

TABLE 1 Means scores from pre-treatment to post-treatment among EMDR and SP groups.

	Pre-treatment		Post-treatment	
	EMDR group *N* = 19	SP group *N* = 21	EMDR group *N* = 19	SP *N* = 21
IES – R total	48 (17.2)	47 (16.1)	24 (9.4)	36 (12)
Intrusion	3.6 (9.8)	3.5 (9.2)	1.7 (6.3)	2.1 (7.4)
Avoidance	3.4 (7.3)	3.3 (7.1)	1.9 (3.8)	2.3 (5.7)
Hyperarousal	3 (8.5)	3 (6.9)	1.9 (5.8)	2.1 (7)
DISTRESS TEST	8.7	8.7	4.5	4.8
PTGI total				
Personal strength	/	/	5	4
Relating to others	/	/	3	2
New possibilities	/	/	5	3
Appreciation of life	/	/	2	3
Spiritual change	/	/	3	2

Subscales data are mean. IES-R, Impact of Event Scale-Revised; PTGI, Post-traumatic Growth Inventory.

- Phase 1: Client history – follows the standard EMDR protocol, with an increased focus on the self/disease relationship and significance of the disease in the patient's history.
- Phase 2: Preparation – follows the standard EMDR protocol, including time dedicated to psychoeducation on pain and oncological illness.
- Phase 3: Assessment – this is the only phase that differs from the standard EMDR protocol. Targets are related to traumatic experience due to illness, and to concerns and current issues (surgical intervention, treatments, hospitalisation, etc).
- Phase 4: Desensitisation and reprocessing – follows the standard EMDR protocol. In this phase, the role of the therapist as a "safe base" for patients is very important.
- Phase 5: Installation – follows the standard EMDR protocol and integrates the installation of positive cognition.
- Phase 6: Body Scan – is identical to standard EMDR procedure.
- Phase 7: Closing the session – includes the imagery of health resources.
- Phase 8: Re-evaluation – follows the standard EMDR protocol.

2.3 Statistical analysis

Data about the possible variable changes from pre-treatment and post-treatment in both groups were analysed using mean values. DELTA values, the mean difference between variables at pre-treatment and post-treatment were also examined. DELTA 1 is the difference between pre-treatment and post-treatment in the EMDR group; DELTA 2 is the difference between pre-treatment and post-treatment in the SP group. An unpaired t-test was used to examine possible significant differences among pre- and post- treatment data.

TABLE 2 Delta values in the IES-R scores (pre-treatment – post-treatment) among groups.

	EMDR group	SP group
	Δ pre-post	Δ pre-post
IES-R total	24	11
Intrusion	1.9	1.2
Avoidance	1.5	1
Hyperarousal	1.1	0.9

Δ = mean difference between variables at pre-treatment and post-treatment.

3 Results

There were 40 patients (80% female) and parents (85% mothers) enrolled in the study: 19 of them were in the EMDR group (10 patients and 9 parents) while the other 21 were in the SP group (10 patients and 11 parents). No patients dropped out from the treatment. The numbers of patients and caregivers do not match for each group because not all parents/caregivers were able to complete all of the sessions, either in the SP group or in the EMDR group, for different reasons (particularly for clinical motives such as severe aplasia or severe side effects of the oncological treatment). So, we excluded data not related to the 8 sessions. The mean age of patients was similar in both groups (13.3 for EMDR group and 13.2 for SP group) and also for caregivers (42.1 for EMDR group and 43.4 for SP group). 30 parents (75%) had a lower secondary level of education and 10 parents (25%) had upper secondary level schooling. Considering employment levels, 28 parents (70%) were white collar employees, 5 parents (12%) were blue collar employees and 7 parents (8%) were middle managers. There were no particular differences in clinical variables between the two groups at baseline (see Table 1). As we noted, the mean value for the total of IES-R at the pre-treatment stage was high in both groups (48 in the EMDR group and 47 in the SP group) which denoted a presence of PTSD immediately after the communication of diagnosis. Also, the means of the 3 subscale scores were high in both groups. A high value was recorded at the pre-treatment stage in both groups regarding distress symptoms (EMDR group 8.7 vs. SP group 8.7). We evaluated whether the different psychotherapy treatments (EMDR or SP) administered to patients and parents had a different impact on the psychological variables involved. After the EMDR therapy and SP, these values went down but a greater decrease between pre-treatment and post-treatment can be noted in the EMDR group, especially concerning the post-traumatic symptoms examined through the IES-R. Specifically, the IES-R total score in the EMDR group decreased until it is no longer frankly pathological (EMDR group pre-treatment 48 vs. EMDR group post-treatment 24). This decrease is particularly clear in the value of intrusion scale (EMDR group pretreatment 3.6 vs. EMDR group post-treatment 1.7). The DELTA values in Table 2 confirm the highest reduction of the psychological variables in the EMDR group, especially for the total score (24 in EMDR group vs. 11 in SP group; $t = 2.5$, $p < 0.05$) and for the intrusion scale (1.9 EMDR group vs. 1.2 in SP group; $t = 1.9$, $p < 0.05$). In the other subscales, a t-test did not show statistically significant differences between pre- and post- treatment.

4 Discussion

The primary aim of this study was to evaluate the relative efficacy of EMDR therapy compared with SP in paediatric oncology patients and their parents after the cancer diagnosis. A child or adolescent cancer diagnosis is a stressful and potentially traumatic experience for the family as a whole, so an earlier intervention is necessary in order to avoid potential post-traumatic symptoms. To our knowledge, no studies have evaluated the efficacy of EMDR therapy on this type of population and none have compared EMDR to standard psychotherapy on specific measures of post-traumatic symptoms and on positive psychosocial outcomes such as positive emotional growth. First of all, our results underline that, immediately after cancer diagnosis, cancer patients and their caregivers suffer from significant post-traumatic symptoms such as reaching a risk value for PTSD. Patients and parents reported intense emotional activation leading to fear, intrusive thoughts, flashbacks and nightmares. Also, they demonstrated general distress, especially in carrying out daily life activities. The most significant result emerging from this study is that most patients and parents treated with EMDR were able to significantly reduce their symptoms of post-traumatic stress. Although this result is shown also in the group of patients who are treated with standard psychotherapy, results showed that the decrease of all symptoms is more evident in the EMDR group. Also, the group treated with EMDR had lower IE-R total scores, with intrusive, avoidance and hyperarousal symptoms after the psychological treatment, as compared with the group of participants treated with SP. These results are in line with the literature about the efficacy of EMDR with oncological adult patients, confirming that EMDR is a more effective and rapid therapy, in particular for reducing stress symptoms such as the intrusive feelings that are typical in the oncology field (Capezzani et al., 2013; Faretta et al., 2016).

Other important findings highlighted that participants feel stronger and seem to glimpse new possibilities; these results are especially high in the EMDR group. This could be linked to recent studies which have suggested that the cancer experience can also lead to positive outcomes, including PTGI (Arpawong et al., 2013). The concept of PTGI can be defined as a positive psychological change, experienced as a result of a struggle with highly challenging life circumstances (Yi and Kim, 2014). In this case, although a diagnosis of cancer in childhood or in adolescence is a traumatic experience, if treated through EMDR therapy as soon as possible after the diagnosis, it could reduce the onset of PTSD symptoms. Future studies should confirm this hypothesis. This current study has several limitations. The number of included patients and parents treated with EMDR and SP is not large and this may limit the generalisability of the findings to all paediatric cancer patients; our future goal is to increase the sample size in order to examine both demographic and clinical (tumour histology) possible differences by reducing potential bias. Future studies should also take into account age differences regarding cognition and emotion regulation strategies that could influence the effects of the technique, and could be designed to examine any differences between patients and parents; they should also include siblings. Also, a future study should provide for a follow-up of at least 6 months after the end of treatment, to prove the stability of the treatment effects. To bypass the methodology limitations, further studies should incorporate a mix of qualitative and quantitative methods (such as semi structured interview) to provide a more comprehensive understanding of the therapies' impact. For this pilot study, our working group agreed on self-administered tests. However, these were always submitted to the participants during the session and filled in under the supervision of the psychotherapist. From our qualitative point of view, we have not observed to date any difference between our observations and what is reported by the patients.

Although our results can only be considered preliminary, this pilot study suggests that, in paediatric cancer patients and parents, EMDR had an advantage over SP in decreasing post-traumatic symptoms. Our study is in line with the most recent literature that suggests EMDR as an effective therapy for oncological patients who have received a cancer diagnosis, and it is innovative in the field of paediatric oncology (Gainer et al., 2020; Abdi et al., 2021; Portigliatti Pomeri et al., 2021; Lee et al., 2023). EMDR therapy can help in quickly reducing post-traumatic symptoms from which they suffer after the terrible news of oncological disease. So, it is crucial that paediatric patients and parents have access to a post-traumatic symptoms screening in order to obtain dedicated psychological support such as EMDR, which has been shown to be effective in helping patients and parents to cope with initial stress symptoms and find the strength to face the new situation. Our data firstly contributes to the knowledge about use of EMDR in the paediatric oncology field and this study opens the door to future research with this type of fragile population.

5 Conclusion

To conclude, our study suggests that both EMDR and SP are effective in treating many stress symptoms in paediatric oncology patients and parents, but our results suggest that EMDR could be a more effective therapy for this population with a high level of post-traumatic symptoms, in particular intrusive symptoms and especially during the early active stage of treatment.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by AOU città della salute e della scienza torino. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

GZ: Writing – original draft, Writing – review & editing. SC: Writing – original draft, Writing – review & editing. ER: Writing – review & editing. DC: Writing – review & editing. MG: Writing – review & editing. CB: Writing – review & editing. TG: Writing – review & editing. CP: Validation, Writing – review & editing. EF:

Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. IF: Conceptualization, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. PQ: Writing – review & editing. FF: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Factors influencing quality of processing in EMDR therapy

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This study presents a preliminary analysis of a new instrument oriented at the analysis of processes in EMDR trauma therapy, the Processing Difficulties Scale (PDS). This scale includes 17 items described by experienced EMDR consultants and practitioners as indicative of problems during memory reprocessing. The proposed factorial solution based on four factors explains a total variance explained of 55% and an adequate goodness of fit, based on the proposed indices: RMSEA = 0.07; TLI = 0.91; CFI = 0.95. Table 1 shows the factorial loads for each of the items. The first factor includes 5 items (7, 8, 9, 10, 11), the second factor includes 6 items (13, 14, 25, 27, 28, 31), the third factor includes 3 items (3, 16, 22) and the fourth factor includes 3 items (19, 23, 24). Confirmatory analysis confirms the factorial solution proposed in the exploratory analysis factor and based on four factors with 17 items. The analysis of internal consistency from Cronbach's alpha and the Omega index shows good internal consistency: Factor 1 (good processing; $\alpha = 0.92$; $\omega = 0.94$), Factor 2 (lack of generalization and/or absence of changes; $\alpha = 0.87$; $\omega = 0.90$), Factor 3 (poor emotional processing; $\alpha = 0.83$; $\omega = 0.85$) an Factor 4 (loss of dual attention; $\alpha = 0.82$; $\omega = 0.83$). In the case of the total scale, both coefficients exceeded 0.90, with an alpha of 0.92 and an Omega of 0.94. The convergent and discriminant validity criteria were estimated by calculating correlations, exploring the relationship between the factors resulting from the final result, the global severity index (GSI) of the SCL-90 and the level of improvement (NGS). These statistical analyses showed good levels of convergent and discriminant validity for all final factors. The PDS may offer a different perspective to analyze the controversy between clinicians and researchers about the need of a preparation phase in patients with complex early traumatization, dissociative symptoms and/or emotion dysregulation, and the different results in specific research around this topic. Exploring the problems in processing in a transdiagnostic way, in a preliminary analysis, we found that the number of early traumatic events measured with the ACE correlates positively with indicators of a loss of dual attention, while emotional dysregulation measured with the DERS does not predict poor processing. Finally, the dissociation measured with the DES seems to correlate positively with the indicators of a loss of dual attention during processing, not seeming to predict poor processing but did show a negative correlation with the indicators of good general processing. These results partially support the findings of some authors on the involvement of certain variables in the processing of traumatic memories, and it may be interesting to evaluate processing styles and their relationship with various indicators, to develop specific interventions in phase 2 of EMDR therapy, thus improving clinical interventions.

KEYWORDS
EMDR, trauma, emotion regulation, emotional processing, symptoms-improvement

1 Introduction

EMDR therapy (Shapiro, 1996, 1998, 2018) is a trauma-oriented treatment that has been recognized as an evidence-based therapy for post-traumatic stress disorder (PTSD) (Bisson et al., 2013). The acronym EMDR stands for Eye Movement Desensitization and Reprocessing, which refers both to the processing of memories, which is the basis on which this treatment is structured, and to the use of eye movements for this purpose. Although the debate on the role of eye movements and their mechanism of action remains open (Landin-Romero et al., 2018), what seems clear is that eye movements are an active ingredient with moderate to large effect sizes (Lee and Cuijpers, 2013).

The EMDR model posits that a relevant part of psychopathology is derived from certain experiences that cannot be processed and remain dysfunctionally stored. The basis of EMDR therapy is to identify and access these experiences. Once the memory becomes active in the nervous system, the eye movement - or other bilateral stimulation (BS) methods, such as tapping or alternating auditory stimulation—are used to unlock that memory and promote its integration into other more adaptive networks (Leeds, 2013; Shapiro, 2018; Hensley, 2020).

There is a growing amount of evidence on the effectiveness of EMDR procedures in Posttraumatic Stress Disorder (PTSD) and, increasingly, in other pathologies (Bisson et al., 2007, 2013; Acarturk et al., 2016; Chiorino et al., 2020; Carletto et al., 2021; Ironson et al., 2021; Yan et al., 2021; Burr et al., 2022; Conijn et al., 2022; Hudays et al., 2022). However, there is also a relevant individual variability in-between subjects, without to date clearly identified factors differentiating between responders and non-responders to EMDR therapy. At the same time, within this area controversy has arisen in recent years about whether a preparation phase prior to memory processing is necessary, and what it should focus on De Jongh et al. (2016). While clinicians have proposed various strategies to improve emotional regulation and work with dissociation, some authors, primarily from the research field, have provided data suggesting that emotional regulation and dissociation do not negatively influence memory processing (Van Toorenburg et al., 2020; Van Der Linde et al., 2023).

We think that part of this controversy may be due to the fact that both clinicians and researchers are working with different patients and observing different elements along the therapeutic process. Subjects who agree to take part in study aimed at working on traumatic memories present a willingness to do so that many patients who attend therapy do not present, mainly in the initial stages. In addition to the fact that many studies focus on analyzing pre-post differences in symptoms but, generally, analysis of the processes in the session are usually lacking.

In this study, we will approach the issue of the individual psychotherapy response from a different perspective. At the clinical level, EMDR therapists usually describe important differences in processing styles, which have been collected on a specific descriptive scale (Processing Difficulties Scale, PDS). The effect of bilateral stimulation usually consists of promoting an associative process, decreasing disturbance, allowing the image to become more distant, blurrier, and/or enhancing thoughts related to gaining perspective or becoming aware of other aspects. When these changes are not observed, it can be an indicator of an unproductive processing. The goal of this study is to operationalize the concept of "unproductive processing." The scores obtained on this scale reflect the difficulties that therapists encounter in phases 4–8 of EMDR memory reprocessing. This processing style scale focuses on process analysis, rather than outcome analysis. Both aspects are complementary and necessary in each psychotherapeutic orientation, with the analysis of processes in EMDR therapy having little development to date. The present study focuses on analyzing the characteristics of the Processing Difficulties Scale (PDS).

The concept of emotional processing has been described (Rachman, 1980) as the process by which an emotional disturbance generated by a stressful life event decreases until the person can reach previous functioning. However, when emotional experiences are not fully integrated or processed, this can lead to the return of fears, or the development of obsessions or intrusive thoughts, symptoms that are included in the description of PTSD (Ehlers and Clark, 2000; Brewin, 2001). For this reason, Rachman (2001) proposed the excessive avoidance or rigid and prolonged inhibition of the negative emotional experience as factors that may prevent its reintegration and resolution.

Recently, a model for psychological trauma has been developed as a transdiagnostic construct in psychopathology, in which emotional processing constitutes a transdiagnostic risk mechanism (McLaughlin et al., 2020). Likewise, Pascual-Leone and Greenberg (2007) point out that it is important to develop the role of emotional processing in different therapeutic approaches because its nuances seem to be applied differently in different therapy models. For example, Foa and Kozak (1986) describe indicators that emotional processing has occurred—related to a gradual decrease in fear and response to the feared object—by stating that, if this curve is not seen, the fact that the object simply does not activate the previous reaction could also be due to an avoidance mechanism. With EMDR, since the underlying mechanism does not appear to be habituation but reconsolidation of memories (Suzuki et al., 2004), the decrease in emotion often occurs completely within a single session. However, when the processing is unproductive this may not occur, and there may be different factors that are influencing said unproductive processing.

Hayes et al. (2007) also notes that, in order to assess its clinical significance, researchers must develop a moment-by-moment emotional processing model that spans all the treatment approaches, including what occurs during the session. Welling (2012) proposes taking into account the sequence of emotional transformation as a common principle of change in psychotherapy, pivoting from this basis on the interventions in different models of therapy, although he points out that when there is avoidance or difficulties identifying certain emotions, it is more reasonable to use exposure therapy. This analysis of processes in psychotherapy has not been deeply discussed

in the EMDR therapy literature, in which hypotheses on what active bilateral stimulation activates or triggers, and why it does, are predominant.

Taking into account what was mentioned above, it could be interesting to evaluate processing styles and their relationship with various indicators, in order to develop specific interventions in phase 2 of EMDR therapy, thus improving clinical interventions. The PDS may offer a different perspective to analyze the controversy between clinicians and researchers about the need for a preparation phase in patients with complex early traumatization, dissociative symptoms, and/or emotional dysregulation.

2 Materials and methods

2.1 Design

This study is a descriptive analysis investigating different factors related with styles of processing in patients from a transdiagnostic perspective.

2.2 Setting

This was a multicenter study, and therefore patients were consecutively recruited between 2019 and 2023 from different EMDR therapists.

This study was approved by the Research Ethics Committee of Galicia 2017/425. Informed written consent was obtained from all participants.

2.3 Participants

The participants in the study consisted of 228 patients with different psychiatric diagnoses (88 subjects presented *anxiety* disorders, 42 *depressive* disorders, 37 *posttraumatic stress* disorder, 29 other *disorders related to trauma and stress factors* and 32 other diagnoses) who were under EMDR treatment for almost 6 months. Participants were assessed using the Mini-International Neuropsychiatric Interview-Plus (MINI-Plus) (Sheehan et al., 1998) clinical interview, in order to confirm the diagnosis.

Inclusion criteria were as follows: (1) diagnosis of some type of mental disorder; (2) aged between 18 and 65 years; (3) having received EMDR treatment for at least 3 months; (4) legal capacity to consent to the treatment.

Exclusion criteria were as follows: (1) a serious, unstable medical condition; (2) inability to understand and fill out the questionnaires; and (3) lack of compliance in the psychotherapy process.

2.4 Recruitment and measures

A group of 25 EMDR experienced therapists participated in the study. A first stage was the definition of the variables on the scale, exploring with different practitioners and consultants which characteristics they considered typical of a "good processing" or a "bad processing." Many characteristics were included in order to analyze this concept and have some preliminary data about factors related to the quality of processing sessions.

The scale for this study was defined for the therapist retrospectively, describing how the patient usually functions when processing traumatic memories. The therapist proposed their participation in the research protocol to patients during a routine clinical visit. The research protocol and aims of the study were explained to patients who met the inclusion/exclusion criteria. They were also told that their therapeutic process would not change whether they took part in the study or not. If they agreed, they signed the consent form, and then were asked to proceed with the psychological assessment.

The following psychological self-report questionnaires were administered:

1. *Questionnaire of general characteristics*: age, sex, educational level, therapist training level and main psychiatric diagnosis.
2. The evaluation of the general symptoms presented by the patients will be carried out using the *Revised 90 Symptom Questionnaire* (*Symptom Chekclist-90-Revised, SCL-90-R;* Derogatis, 2017). A self-administered questionnaire of 90 items that are evaluated according to a 5-point Likert-type scale, from O (absence of the symptom) to 4 (presence total of the same), depending on the discomfort you have experienced in the last week. Its application requires between 10 and 20 min, and with the correction of the test you obtain 9 symptomatic scales: somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism; and 3 global indices: global severity index, positive and total symptomatic discomfort index of positive symptoms. It has good psychometric properties. For its evaluation and quantification, the items corresponding to each symptomatic scale are added obtaining a value for each factor. Regarding the indices, for the Severity Index Globally (GSI), the scores obtained in the nine symptom dimensions and in the additional items are added, and that number is divided by the total number of responses given; in the index of positive symptoms, responses that are different from zero are counted; and the index of positive discomfort. It is calculated by dividing the total sum of the responses given to the items by the value obtained in Total Positive Symptoms.
3. To evaluate the level of global evolution of the participants, since the beginning of EMDR therapy, the therapists, in addition to the subjective assessment, quantified this variable through the use of the Global Assessment of Functioning Scale (GAF) (American Psychiatric Association, 1994), in two moments: at the beginning of EMDR therapy and when completing the questionnaire. GAF is a descriptive scale that provides a single score to assess subjects' level of psychological, social, and occupational functioning along a hypothetical health-illness continuum (1–100). A higher score is interpreted as a better activity level.

In order to explore the process in the therapy session, we have defined a new analytic tool: the Processing Difficulties Scale (PDS) defined, initially, by 32 that are associated with different processing styles: indicators of *poor processing* with lack of generalization (the associations during the intervention they do not generalize to other experiences, there are blockages or "loopings" during processing, difficulty in installing positive beliefs or in connecting the patient with

adaptive information); *good general processing* (adequate installation of positive belief, the memory is processed completely during the session, changes are detected in the subjective meaning of the experience, etc.); *unproductive emotional processing* (avoidance or refusal to experience certain emotions, the therapist's use of weaving does not facilitate processing) and *Indicators of a loss of dual attention* during the session.

3 Data analysis

Based on the minimum recommended criteria for sample size (>200) and following the rule of 10 subjects per variable, a minimum required size of 200 subjects is estimated for the exploratory factor analysis (Martínez-Arias et al., 2007). A prior descriptive and exploratory analysis procedure is carried out with the objective of checking the adequacy of the data to a multivariate normal distribution (Royston test). From the calculation of the Kendall correlation coefficient, the correlation matrix between each of the items is estimated. The Bartlett test of sphericity and the Kaiser-Meyer-Olkin test (KMO) allow us to test the hypothesis of independence of the scale elements and, therefore, verify the suitability for factorization.

The determination of the number of factors to extract is based on the Kaiser criterion for those factors that show eigenvalues above 1, complemented by the scree plot. Exploratory factor analysis (EFA) uses a robust estimation method using the minimum residual (minres) criterion and a Promax factor rotation method. To reduce the scale, the following criteria were established: (a) a factor loading greater than 0.50; (b) when saturation occurs in two or more factors, it will be retained in the factor with the highest saturation, as long as the values of the factor loadings in several factors do not exceed 0.50, in which case it will be eliminated; (c) elimination of factors with less than three items; (d) elimination of factors with less than 5% of explained variance.

The analysis of the goodness of fit of the model to the data was carried out using the comparative fit index (CFI), the Tucker-Lewis index (TLI) and the root mean square error of approximation (RMSEA) as estimators. For the CFI and TLI indices, values above 0.90 are recommended, while for the RMSEA, values below 0.60 are recommended (Hu and Bentler, 1999). The analysis of the internal consistency of the questionnaire is carried out using Cronbach's alpha coefficient and the Omega index, with values greater than 0.70 indicating adequate reliability. The convergent and discriminant validity criteria were estimated by calculating correlations, exploring the relationship between the factors resulting from the final result, the global severity index (GSI) of the SCL-90 and the level of improvement (NGS), which is processed using the following calculation: Final severity—Initial severity/number of sessions. On the other hand, the potential relationship between the variables sex, age, educational level and training of the therapist is evaluated by estimating a multiple regression model. All calculations were performed using R software (R Core Team, 2014).

4 Results

4.1 Preliminary descriptive and exploratory analysis

The sample is made up of a total of 228 people, with an age range between 18 and 66 years (M = 37.65; SD = 10.57), of which, 190 are women (83.33%) and 38 men (16.67%), while 5 have primary studies (2.19%), 40 secondary studies (17.54%) and 183 higher studies (80.26%). The exploratory analysis showed a significant value for Royston's multivariate normality test ($R = 1058.78$; $p < 0.05$) so the use of robust methods in the factorization process is recommended.

The KMO test shows values greater than 0.80 (KMO = 0.93), while Bartlett's sphericity test ($\chi^2 = 5501.74$, $p < 0.01$), shows statistically significant results, which ensures the absence of independence between the items and the adequacy of the correlation matrix for subsequent factorization.

4.2 Exploratory factor analysis

The screen plot allowed us to observe five factors with eigenvalues above 1 (see Figure 1). In the process of retaining items from the scale, those that had factorial weights lower than 0.50 were first eliminated. Additionally, the composition of the emerging factors was reviewed, eliminating any factor that contained less than three items to guarantee the stability and interpretability of each factor. Following this criterion, an entire factor containing only two items was excluded. Consequently, the factor structure was adjusted to four main factors. Therefore, and based on the item retention criteria and refinement of the factor structure, the initial scale composed of 32 items was converted to a final solution of 17 grouped into four factors (see Figure 2), with a total variance explained of 55% and an adequate goodness of fit, based on the proposed indices: RMSEA = 0.07; TLI = 0.91; CFI = 0.95 (see Table 1). As, a description of the items of the resulting scale, their correspondence with the original scale and the factor to which each item belongs is provided (see Table 2).

4.3 Reliability analysis

The internal consistency analysis was carried out using Cronbach's alpha coefficient and the Omega index; both indicators revealed good internal consistency with values greater than 0.70 in all cases. Specifically, Factor 1 showed a Cronbach's alpha of 0.92 and an Omega index of 0.94. Factor 2 recorded values of 0.87 and 0.90 for alpha and Omega, respectively. For Factor 3, values of 0.83 for alpha and 0.85 for Omega were obtained. Factor 4 presented an alpha of 0.82 and an Omega of 0.83. In the case of the total scale, both coefficients exceeded 0.90, with an alpha of 0.92 and an Omega of 0.94.

4.4 Convergent and discriminant validity

In the study of correlations to evaluate the convergent and discriminant validity of the factors with respect to the GSI and the NGS, significant patterns of association were observed. Factor 1 shows a significant negative correlation with the GSI ($r = -0.34$, $p < 0.01$, 95% CI [−0.52, −0.13]), suggesting discriminant validity between these two constructs. In contrast, Factor 1 correlates positively with the NGS ($r = 0.32$, $p = 0.01$, 95% CI [0.11, 0.50]), showing evidence of convergent validity. Regarding Factor 2, a positive correlation is observed with the GSI ($r = 0.32$, p = 0.01, 95% CI [0.11, 0.50]) and a negative correlation with the NGS ($r = -0.36$, $p < 0.01$, 95% CI [−0.54,

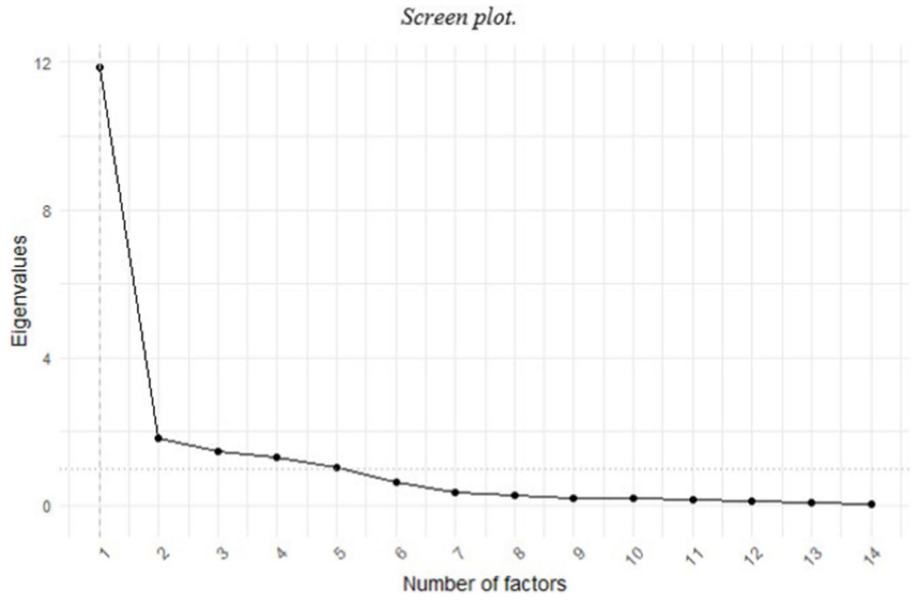

FIGURE 1
Screen plot.

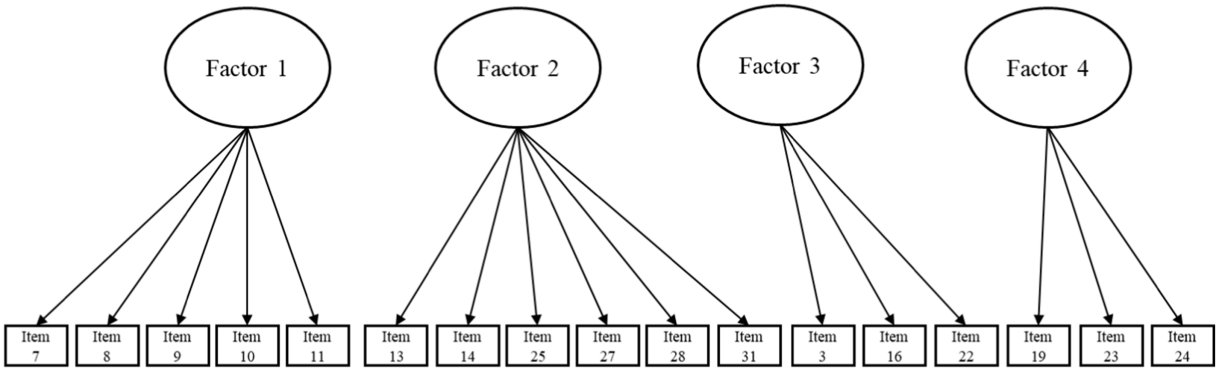

FIGURE 2
Graphical representation of the final factor model.

−0.16]). These correlations indicate evidence of convergent validity with the GSI and discriminant validity with the NGS (see Table 3).

Factor 3 also shows significant positive correlations with both the GSI ($r = 0.34$, $p < 0.01$, 95% CI [0.13, 0.52]) and the NGS ($r = -0.41$, $p < 0.01$, 95% CI [−0.57, −0.21]), reflecting convergent validity with the GSI and discriminant validity with the NGS. Finally, Factor 4 presents positive correlations with the GSI ($r = 0.33$, $p < 0.01$, 95% CI [0.12, 0.51]) and negative correlations with the NGS ($r = -0.33$, $p < 0.01$, 95% CI [−0.51, −0.12]), once again providing evidence of convergent and discriminant validity (see Table 3).

4.5 Instruments scores

Table 4 shows the results of the multiple regression analysis for each factor resulting from the factor solution. Each of the factors resulting from the proposed solution is introduced into the model as a criterion variable. The p value is corrected using the Bonferroni correction. Sex, age, educational level and level of training of the therapists are introduced as predictor variables. While, as criterion variable, the respective factors resulting from the EFA are introduced.

For Factor 1, a significant relationship was found between the level of training in EMDR therapy ($b = -3.83$, $t = -4.91$, se = 0.78, $p < 0.01$, CI [−5.39, −2.27]). This same variable has shown a significant relationship with Factor 3 ($b = 0.78$, $t = 3.63$, se = 0.22, $p < 0.01$, CI [0.35, 1.22]) and with Factor 4 ($b = 1.10$, $t = 2.66$, se = 0.41, $p = 0.01$, CI [0.28, 1.93]). While for Factor 2, no statistically significant effects have been found (see Table 4).

5 Discussion

There is intense debate in the scientific community about the need for a preparation phase previous to the work with traumatic memories,

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TABLE 1 Factor loadings for the final solution based on four factors.

Items	Factor			
	1	2	3	4
7	0.94			
8	0.99			
9	0.65			
10	0.53			
11	0.66			
13		0.55		
14		0.58		
25		0.66		
27		0.71		
28		0.62		
31		0.87		
3			0.53	
16			0.88	
22			0.69	
19				0.57
23				0.76
24				0.78

Factor weights in absolute values.

TABLE 2 Correspondence between PDS scale, initial questionnaire and factor number.

Processing Difficulties Scale (PDS) ítems (17)	Initial questionnaire ítems (32)	Factor
1. Different emotions appear, which the patient allows to arise, flow and evolve	3	3
2. Positive cognition installs easily	8	1
3. The image remains unchanged	25	2
4. He immerses himself completely in the memory, he seems not to realize that he is in the office and in the present	23	4
5. Many rounds are required in relation to other patients to be able to establish the positive belief	28	2
6. The VOC upon reaching the installation phase of the positive belief is 5 or more	7	1
7. The therapist must carry out interventions to maintain dual attention	24	4
8. In phase 6, the body check presents a mild disturbance that can be easily processed, a total absence of disturbance, or a clearly positive body sensation	9	1
9. Marked depersonalization/derealization or intrusions of dissociative parts appear	19	4
10. Associative chains are extremely long and take time to connect with adaptive information, or do not connect with this information	13	2
11. Has difficulty connecting emotionally with the memory or disconnects during processing	22	3
12.The patient states that his belief will never change, or seems to cling to it	27	2
13. In phase 8 it is verified that the memory is completely processed	11	1
14. The subjective meaning of the experience remains similar to the beginning of the session	31	2
15.There are certain emotions that the patient avoids or rejects, or specific emotions that would make sense to appear due to the characteristics of the memory do not appear	16	3
16. The associations do not generalize to other experiences, emotions or sensations, they remain very directly connected to the target event	14	2
17. When processing a memory, the subjective meaning of the experience changes	10	1

The clinician evaluates the work with EMDR, following the standard protocol, answering the ítems of the PDS questionnaire according to the scale: 0 = Never; 1 = Almost Never, 2 = Sometimes; 3 = Quite a few times and 4 = Always.

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TABLE 3 Means, standard deviations, and correlations with confidence intervals.

Variable	*M*	*SD*	1	2	3	4	5
1. Factor 1	11.55	6.45					
2. Factor 2	9.20	5.45	−0.64**				
			[−0.75, −0.49]				
3. Factor 3	5.63	1.69	−0.45**	0.55**			
			[−0.60, −0.25]	[0.37, 0.68]			
4. Factor 4	3.50	3.06	−0.48**	0.32**	0.31**		
			[−0.63, −0.29]	[0.11, 0.50]	[0.10, 0.49]		
5. GSI	1.48	0.78	−0.34**	0.32**	0.34**	0.33**	
			[−0.52, −0.13]	[0.11, 0.50]	[0.13, 0.52]	[0.12, 0.51]	
6. NGS	1.58	2.77	0.32**	−0.36**	−0.41**	−0.33**	−0.18
			[0.11, 0.50]	[−0.54, −0.16]	[−0.57, −0.21]	[−0.51, −0.12]	[−0.38, 0.04]

M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). *$p < 0.05$. **$p < 0.01$. GSI, Severity Index Globally; NGS, The level of improvement.

especially in patients with complex trauma, usually derived from early and severe interpersonal adverse situations. Some authors stress the importance of this preparation phase (Cloitre et al., 2012a) while others argue that the evidence does not support this claim, and that traumatic memories can be addressed from the very beginning of the therapeutic process (De Jongh et al., 2016; Van Vliet et al., 2021). The same debate has been established around working with dissociative disorders (Cloitre et al., 2012b; Bae et al., 2016; Zoet et al., 2018; Van Der Linde et al., 2023), and with regard to emotional dysregulation (Van Toorenburg et al., 2020). Some results support the notion that the severity of emotion regulation difficulties is not associated with worse trauma-focused treatment outcomes for PTSD. Further, emotion regulation difficulties improved after trauma-focused treatment, even for individuals who had been exposed to early childhood sexual trauma and individuals with a dissociative subtype (Van Toorenburg et al., 2020).

This debate has become more polarized among researchers and clinicians, the latter claiming that research studies do not reflect the reality of consultations with their patients and the first ones considering the clinicians opinions as subjective and against the empirical data. In general, clinicians are more favorable to progressive approaches to the treatment of patients with early traumatization, emotional dysregulation and dissociation. These discrepancies may be due on the one hand to the fact that the scientific studies usually work on samples with well-established diagnoses, while in consultation there are patients with less clear diagnoses and high comorbidity. Another element that can explain these different perspectives is the one we analyze in this article: it is possible that clinicians are more aware of the difficulties that arise in processing than the global evolution of their patients.

Process analysis can be an interesting avenue within EMDR therapy research, which can help establish specific interventions in the preparation phase with the aim of improving the processing of traumatic memories, in addition to better understanding what factors may be involved related to the difficulties that may appear during reprocessing. This perspective may fit with Hayes et al. (2007), who point out the need to carry out an analysis of what happens moment by moment in the session. That is why we believe that the scale we are trying to study can shed light in this area.

In the present study, exploratory factor analysis (EFA) of the Processing Difficulties Scale (PDS) yielded four factors that reflect different difficulties that can occur during the processing of traumatic memories in EMDR therapy: (Factor 1) indicators of good processing; (Factor 2) indicators of a lack of generalization and/or absence of changes during processing; (Factor 3) indicators of poor emotional processing; (Factor 4) indicators of a loss of dual attention.

We consider it important, in turn, to include patients with diverse diagnoses in our study patients with diverse diagnoses, exploring the problems in processing in a transdiagnostic way. In a preliminary analysis of the present scale, which will be presented in a poster at the European EMDR Congress (Ramallo-Machín et al., 2024), we carried out a correlational analysis between the four factors of the present study and the following scales: Difficulties in Emotion Regulation Scale (DERS) (Gratz and Roemer, 2004); Dissociative Experiences Scale (DES) (Bernstein and Putnam, 1986); Adverse Childhood Experiences International Questionnaire (ACE-IQ) (World Health Organization 2018).

From the results obtained in the correlational analysis between the four factors and the scales used, it seems that emotional dysregulation measured with the DERS does not predict poor processing. On the other hand, the number of early traumatic events measured with the ACE is only related to the indicators of a loss of dual attention (Factor 4), in the sense that the greater the number of early traumatic events, higher the probability of a loss of dual attention and dissociation during processing. Finally, the dissociation measured with the DES is related to the general indicators of good processing (Factor 1), in the sense that the lower the levels of dissociation, the greater the probability of good processing during the session. However, it does not seem to be related to indicators of a lack of change or generalization (Factor 2) during processing. Likewise, it is related to the indicators of a loss of dual attention (Factor 4), in the sense that the higher the level of dissociation, the greater the probability of a loss of dual attention during processing. These results partially support the findings of the aforementioned authors, and may provide a new perspective from which to analyze this controversy.

It could be interesting to evaluate processing styles and their relationship with various indicators, in order to develop specific interventions in phase 2 for EMDR therapy, as well as during the processing of traumatic memories, improving clinical interventions. The PDS may offer a different perspective to analyze the controversy between clinicians and researchers about the need for a preparation

TABLE 4 Regression results using the factors as the criterion.

Predictor	*b*	*b* 95% CI [LL, UL]	*Beta*	*Beta* 95% CI [LL, UL]	sr^2	sr^2 95% CI [LL, UL]	*r*	Fit
Factor 1								
Sex	−0.87	[−4.51, 2.76]	−0.05	[−0.26, 0.16]	0.00	[−0.02, 0.02]	−0.07	
Age	0.04	[−0.09, 0.17]	0.07	[−0.14, 0.28]	0.00	[−0.02, 0.03]	0.07	
Education level	−1.75	[−4.47, 0.97]	−0.14	[−0.35, 0.08]	0.02	[−0.03, 0.07]	−0.07	
Training level	−3.83**	[−5.39, −2.27]	−0.52	[−0.73, −0.31]	0.26	[0.09, 0.44]	−0.50**	
								$R^2 = 0.278$**
								95% CI [0.08, 0.40]
Factor 2								
Sex	−1.03	[−4.53, 2.47]	−0.07	[−0.31, 0.17]	0.00	[−0.03, 0.04]	−0.08	
Age	0.05	[−0.07, 0.18]	0.10	[−0.13, 0.34]	0.01	[−0.04, 0.06]	0.11	
Education level	−0.18	[−2.80, 2.45]	−0.02	[−0.26, 0.22]	0.00	[−0.01, 0.01]	−0.05	
Training level	1.45	[−0.05, 2.95]	0.23	[−0.01, 0.47]	0.05	[−0.05, 0.15]	0.23	
								$R^2 = 0.071$
								95% CI [0.00,0.16]
Factor 3								
Sex	−0.02	[−1.02, 0.99]	−0.00	[−0.23, 0.22]	0.00	[−0.00, 0.00]	0.01	
Age	−0.01	[−0.05, 0.02]	−0.09	[−0.31, 0.14]	0.01	[−0.03, 0.04]	−0.08	
Education level	−0.06	[−0.82, 0.69]	−0.02	[−0.24, 0.21]	0.00	[−0.01, 0.01]	−0.07	
Training level	0.78**	[0.35, 1.22]	0.41	[0.18, 0.63]	0.16	[0.01, 0.32]	0.41**	
								$R^2 = 0.176$*
								95% CI [0.01, 0.30]
Factor 4								
Sex	0.76	[−1.16, 2.69]	0.09	[−0.14, 0.32]	0.01	[−0.03, 0.05]	0.10	
Age	−0.02	[−0.09, 0.05]	−0.07	[−0.30, 0.16]	0.00	[−0.03, 0.04]	−0.07	
Education level	−0.43	[−1.87, 1.02]	−0.07	[−0.30, 0.16]	0.00	[−0.03, 0.03]	−0.10	
Training level	1.10**	[0.28, 1.93]	0.31	[0.08, 0.54]	0.09	[−0.03, 0.22]	0.32**	
								$R^2 = 0.121$
								95% CI [0.00, 0.23]

A significant b-weight indicates the beta-weight and semi-partial correlation are also significant. b represents unstandardized regression weights. Beta indicates the standardized regression weights. sr^2 represents the semi-partial correlation squared. r represents the zero-order correlation. LL and UL indicate the lower and upper limits of a confidence interval, respectively. Intercept values are ignored. *$p < 0.05$. **$p < 0.01$.

phase in patients with complex early traumatization, dissociative symptoms, and/or emotional dysregulation.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Opinion of the Research Ethics Committee of A Coruña Ferrol Department of Health, Xunta de Galicia. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AR-M: Conceptualization, Data curation, Investigation, Resources, Writing – original draft, Writing – review & editing. FG-S: Conceptualization, Data curation, Investigation, Resources, Writing – original draft, Writing – review & editing. FB-J: Conceptualization, Formal analysis, Methodology, Resources, Software, Validation, Writing – original draft, Writing – review & editing. MS-G: Investigation, Resources, Writing – original draft, Writing – review & editing. AG-V: Conceptualization, Formal analysis, Investigation, Project administration, Resources,

Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

AG-V receives income for published books on EMDR therapy and for the training of professionals in this method.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Towards international collaboration of clinical research networks for EMDR: the EMDR Pain Network Germany

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Background: Eye Movement Desensitization and Reprocessing (EMDR) is an evidence-based treatment, primarily established for post-traumatic stress disorder (PTSD). While it is increasingly being applied to chronic pain, its efficacy in this area is not yet supported by the same level of evidence as that which exists for PTSD. Studies in this area often show heterogeneous results with small case numbers, and the potential side effects of EMDR in the treatment of chronic pain are not well understood. Systematic documentation of treatment effects, potential predictors of treatment response and non-response, and side effects is crucial for progress in this field.

Aim: The primary aim is to establish a research framework to systematically investigate the delivery of EMDR therapies by outpatient clinicians in the field of pain. This study aims to provide a comprehensive analysis of treatment outcomes, side effects and determinants of treatment effectiveness, whether positive response or non-response.

Methods: This framework will oversee the documentation and evaluation of EMDR interventions delivered in outpatient settings using an Embedded Continuous Cumulative Evaluation Design (ECCED). It will focus on detailed characterisation of positive and negative therapeutic effects. It will also identify and analyse prognostic factors that influence individual variability in response to treatment. Treatment materials, standardised assessments and an intervision platform for regular exchange will be provided.

Discussion: The establishment of the EMDR Pain Network Germany and an interdisciplinary scientific-clinical platform is essential to promote clinical exchange and understanding of the effects of EMDR in pain therapy. This platform offers standardised treatment protocols, an online data collection system with anonymised data, comprehensive baseline assessments and an intervision platform for regular exchange. The knowledge gained is intended to personalise future therapies and serve as a basis for large randomised clinical trials.

KEYWORDS

chronic pain, eye movement desensitization reprocessing, EMDR, therapy, network

1 Introduction

Worldwide, pain represents a significant health problem affecting millions of people. Demographic changes and the increasing prevalence of chronic diseases have led to a rise in pain cases, resulting in a growing societal burden (Vos et al., 2020; Wettstein and Tesarz, 2023). It is estimated that more than 20% of adults worldwide suffer from chronic pain, and the number of new people suffering from this condition is increasing every year. This makes chronic pain one of the leading causes of long-term disability worldwide (Gatchel et al., 2007). Despite various effective therapeutic approaches for treating acute pain, therapy for chronic pain often remains insufficient, leading to significant impairments and reduced quality of life for those affected (Vos et al., 2020). The persistence of these pain conditions highlights the limitations of current treatment methods and the need for innovative approaches that address pain as a complex biopsychosocial phenomenon (Pinto et al., 2023).

A promising approach in the treatment of chronic pain is Eye Movement Desensitization and Reprocessing (EMDR), a method originally developed for treating post-traumatic stress disorder (PTSD). In recent years, the scope of EMDR has expanded beyond PTSD therapy, particularly in the treatment of chronic pain syndromes. This expansion is due to the potential of the method to target not only the pain symptoms themselves but also the associated psychological and emotional components such as anxiety, depression, and avoidance behaviour (Gilam et al., 2020; Hashmi et al., 2013; Matthijssen et al., 2020; Pinto et al., 2023).

Several randomised controlled trials have demonstrated the effectiveness of EMDR in various chronic pain syndromes, including musculoskeletal pain (Gerhardt et al., 2016), back pain (Gerhardt et al., 2016), headaches (Konuk et al., 2011), phantom pain (Rostaminejad et al., 2017), fibromyalgia (Borst et al., 2024; Friedberg, 2004; Zat Çiftçi et al., 2024), and rheumatoid arthritis (Matthijssen et al., 2020; Tesarz et al., 2019). The results of these studies indicate that EMDR can significantly reduce pain intensity and lead to a decrease in pain-related impairments and psychological distress (Leisner et al., 2014).

A key aspect that distinguishes EMDR from traditional pain therapeutic approaches is its direct analgesic effect. While conventional approaches often achieve only indirect effects by reducing anxiety and depression, more recent studies suggest that EMDR significantly reduces both pain symptoms and the extent of pain-related impairments. Additionally, the results indicate partially stable long-term effects of up to 2 years after the completion of therapy (Tesarz et al., 2014). These positive effects are attributed to the modulation of neural processes involved in both emotional and pain-related processing.

Research shows that in chronic pain, an "emotional shift" often occurs, where pain is no longer processed in the classical pain-processing regions of the brain but rather in the emotion-processing areas (Hashmi et al., 2013).This mechanism has parallels to the "flashbacks" experienced by trauma patients, making the use of EMDR in chronic pain particularly plausible.

At the same time, studies in this field also show heterogeneous results, often due to small sample sizes and a limited understanding of potential side effects (Matthijssen et al., 2020; Tesarz et al., 2013). These challenges underscore the need for a systematic approach to documenting and analysing treatment outcomes. Establishing regional networks to promote information exchange and systematically analyse the implementation of EMDR therapies in practice could significantly contribute to optimizing the use of EMDR in chronic pain.

The complexity of psychotherapeutic interventions and their outcomes in clinical studies also presents a significant challenge, particularly in terms of the reproducibility and generalisability of results (Lutz, 2003). Conventional randomized controlled trials often do not fully capture the nuances of psychotherapy, leading to a gap between research findings and clinical practice. Close collaboration between researchers and therapists could bridge this gap and ensure that research findings are practical and patient-centred (Asay et al., 2002).Given the time and cost constraints of psychotherapy research, which often lead to studies with small sample sizes (Williams et al., 2012), a collaborative research network promotes a continuous dialogue between researchers and therapists. This could help integrate new insights into clinical practice more quickly and improve the treatment of chronic pain through EMDR.

1.1 Objectives

The 'EMDR Pain Network Germany' was founded with the aim of promoting and further developing the quality and scientific evidence of EMDR in pain therapy in accordance with the current state of research and to support the exchange between clinicians and thus promote and scientifically accompany the implementation of EMDR in the therapy of chronic pain. This network is a scientific cooperation project under the direction of the Department of General Internal Medicine and Psychosomatics at Heidelberg University Hospital in collaboration with the professional association EMDRIA Deutschland e.V. and the EMDR Institute Germany. It aims to facilitate (1) longitudinal research into the therapeutic effects of EMDR in the treatment of chronic pain at an individual level, including adverse effects, (2) the identification of potential predictors of individual response/non-response to treatment between participants, and (3) the facilitation and scientific monitoring of the implementation of EMDR in pain therapy.

Abbreviations: ARM, Agnew Relationship Measure; BSI, Brief Symptom Inventory; CMSP, chronic musculoskeletal pain; CPG, Chronic Pain Grade Scale; CQR5, Compliance Questionnaire for Rheumatology; CTQ, Childhood Trauma Questionnaire; EMDR, eye movement desensitization and reprocessing therapy; FABQ, Fear Avoidance Belief Questionnaire; FPQ, Fear of Pain Questionnaire; FSS, Fatigue Severity Scale; HADS, Hospital Anxiety and Depression Scale; INEP, Inventory for Assessing Negative Effects of Psychotherapy (Inventar zur Erfassung negativer Effekte von Psychotherapie); MPI, Multidimensional Pain Inventory; NEQ, Negative Effects Questionnaire; PATHEV, Patients' Therapy Expectations and Evaluations (Therapieerwartung und Therapieevaluation von Patienten); PDS, Posttraumatic Diagnostic Scale; PGIC, Patient's Global Impression of Change; PRSS, Pain-Related Self Statement Scale; PSQI, Pittsburgh Sleep Quality Index; PSS, Perceived Stress Scale; RS-11, Resilience Scale (Resilienzskala); SAE, severe adverse effects; SCID-5, Structured Clinical Interview for the Diagnostic and Statistical Manual for Mental Disorders; SES, Pain Sensation Scale (Schmerzempfindungsskala); SF-12, Short Form 12; SSD-12, Somatic Symptom Disorder – B Criteria Scale; SSS-8, Somatic Symptom Scale; TGIC, Therapist's Global Impression of Change; TICS, Trier Inventory of Chronic Pain (Trierer Inventar zum chronischen Schmerz); WI-7, Whiteley Index; WOMAC, Western Ontario and McMaster Universities Arthritis Index; WPI, Widespread Pain Index.

2 Design and procedure

This research initiative will thoroughly assess the implementation of Eye Movement Desensitization and Reprocessing (EMDR) therapies by outpatient clinicians. We will conduct a detailed follow-up that evaluates treatment results, documents adverse events, and identifies key factors influencing treatment effectiveness, which encompasses both positive responses and non-responses. Furthermore, we will promote the broad implementation and practical use of EMDR in managing pain. The 'EMDR Pain Network Germany' provides therapists with the resources they need to deliver effective EMDR treatments. Our standardised protocols, training materials and platform for professional interaction ensure uniformity and excellence in therapeutic practices, improving the effectiveness of EMDR treatments across diverse clinical environments.

In accordance with the ethical principles governing human research, all participants and therapists are required to provide written informed consent prior to enrolment. Ethical approval for data collection was obtained from the Research Ethics Committee II of the Medical Faculty of the University of Heidelberg (approval number S-696/2023), ensuring compliance with the ethical standards of the Declaration of Helsinki.

2.1 Material

This study is an accompanying evaluation conducted in conjunction with the establishment and expansion of a national network for EMDR therapy focused on chronic pain management. Utilizing an Embedded Continuous Cumulative Evaluation Design (ECCED), the core scientific objective of this network is to carry out a comprehensive, real-time assessment of EMDR therapy as delivered by independent therapists in private healthcare settings. The ECCED represents an innovative research framework designed to seamlessly integrate evaluation into routine clinical practice. Developed as part of the PerPAIN research network (Beiner et al., 2022), it draws inspiration from existing cumulative assessment models, particularly those used in educational research (Kerdijk et al., 2013). This approach allows for ongoing and cumulative data collection throughout the therapeutic process, without a predetermined endpoint. The ECCED is crafted to ensure minimal disruption to the therapeutic process while facilitating continuous monitoring of both therapeutic outcomes and any adverse events that may occur.

In practice, ECCED embeds evaluation mechanisms directly into the everyday clinical activities, ensuring that data collection is a natural part of the therapy rather than an external add-on. Data is collected continuously, allowing for real-time tracking of patient progress and the identification of trends and patterns over time. This cumulative data collection provides a thorough understanding of treatment efficacy and safety. The design of ECCED emphasizes standardized procedures to maintain consistency and comparability across different settings and patients. Detailed descriptive analysis of therapeutic outcomes and adverse events is a key component, alongside systematic research into prognostic factors that may influence treatment responses. This approach enables the differentiation between positive responses and non-responses to therapy.

To guide future research and enhance comparability, a core assessment framework is proposed (see Table 1). This framework aims to standardize evaluations and facilitate data pooling, ultimately contributing to improved research quality and the optimization of EMDR therapy for chronic pain.

2.2 Pain focused EMDR therapy

EMDR therapy is a stress-reducing intervention that combines proven trauma intervention elements such as imaginal exposure, cognitive and self-control techniques with specific techniques such as bilateral sensory stimulation (e.g., left–right eye movements or bilateral tapping with the therapist's hand). This is done according to the principle of dual focus of attention (Schubert et al., 2011). This principle describes how patients simultaneously focus on distressing memories and an external bilateral sensory stimulus (Laliotis et al., 2021). This process appears to facilitate the processing of emotionally distressing memories (e.g., traumatic events or pain sensations) and reduce or even eliminate the emotional distress associated with these memories (Laliotis et al., 2021). During each EMDR session, the patient deals with distressing traumatic or pain-related memories and the associated feelings, cognitions and body sensations while focusing on a series of external bilateral stimuli. In the subsequent phase, the patient's attention is directed towards the emergence of new associations, which are then subjected to further scrutiny through a series of dual attention exercises. This process of dual attention and personal association is repeated throughout the session until the original target (trauma or pain-related memories) is no longer a significant source of distraction. The duration of a single session typically ranges from 50 to 90 min. All additional treatments are recorded in detail (Table 2, for more details see also Supplementary material). The therapists are afforded considerable flexibility in the organisation of their EMDR sessions, with the respective contents and potential deviations being briefly documented. However, in order to standardise case conceptualisation and treatment implementation, all participating therapists receive a treatment protocol and manual for orientation. The treatment protocol for this study is based on a standardised manual (Tesarz et al., 2015), and the possible goals for treatment include disturbing memories, current pain perceptions and pain-related fears and cognitions.

The proposed case conceptualisation in the treatment of chronic pain follows a three-stage approach according to the standard model of past, present and future, distinguishing between pain-related and non-pain-related trauma.

The classic protocol provides for a systematised target selection, in which, in cases in where the pain is associated with traumatic and (even today!) stressful experiences, desensitisation and reprocessing of these experiences should be started first (Borst et al., 2024; Tesarz et al., 2015). In cases where either no traumatic experience can be identified as the trigger or where the traumatic event has been reprocessed more successfully in the meantime, the distressing memories and thoughts associated with the pain should be processed. After processing distressing memories and thoughts, and in cases where no distressing memories or thoughts can be identified initially, the pain can also be focussed on directly using the specific pain protocol. In cases where patients gain access to new, previously repressed experiences during pain processing, reactivated memories

TABLE 1 Measures applied at different points of data acquisition.

Instruments	Description (number of items, time for completion)	Time for completion		
		T_0	T_1	T_2–T_4
Baseline characterization				
Basis sociodemographic data (Bado)	Assessment of basic sociodemographic data on age, gender, nationality (German/ other), marital status (living with a partner; yes/ no), educational level (International Standard Classification of Education, ISCED ≤2 and professional life (paid employment/ disability pension/ old-age pension) (Heuft et al., 1998)	X		
Pre-treatment assessment	Standardized assessment of previous and current analgesic treatments	X		
Patients' Therapy Expectations and Evaluations (PATHEV)	Questionnaire on therapy expectation and evaluation (11 items) (Schulte, 2005)	X		
Baseline assessment of overall level of stress and illness experience, Evaluation of psychosomatic symptoms				
Somatic Symptom Disorder (SSD-12)	12-item questionnaire to assess patient's perceptions of symptom-related thought, feelings and behaviours (Toussaint et al., 2016)	X	X	
Symptom Severity Scale (SSS-8)	8-item inventory to assess the burden of somatic symptoms (Gierk et al., 2014)	X		
Short-Form-Health Survey 12 (SF-12)	Measure of impact of physical and mental health status on everyday life (12 items) (Gandhi et al., 2001)	X	X	X
Perceived Stress Scale (PSS)	Assessment of perceived stress (10 items) (Klein et al., 2016)	X	X	
Childhood Trauma Questionnaire (CTQ)	Questionnaire to assess early adversities specifying 5 dimensions (emotional, physical and sexual abuse, physical and emotional neglect) (28 items) (Bernstein et al., 1998)	X		
Resilience Scale (RS11)	11-item questionnaire to identify the degree of individual resistance (Kocalevent et al., 2015)	X	X	
Pittsburgh Sleep Quality Index (PSQI)	Questionnaire to assess sleep quality (19 items) (Buysse et al., 1991)	X	X	
Psychological comorbidities				
Hospital Anxiety and Depression Scale (HADS)	Assessment of the level of anxiety and depression (14 items) (Zigmond and Snaith, 1983)	X	X	X
Positive and Negative Affect Schedule (PANAS)	20-item assessment to measure positive and negative affects (Watson et al., 1988)	X	X	
Somatoform disorders, unclear physical complaints				
Whiteley Index-7 (WI-7)	Measure of the level of illness anxiety to assess somatization and hypochondriasis (Glöckner-Rist et al., 2007)	X	X	
Fatigue Severity Scale (FSS)	Questionnaire to assess the impact of fatigue (9 items) (Krupp et al., 1989)	X	X	
Chronic pain				
Fear-Avoidance Beliefs Questionnaire (FABQ)	Questionnaire to assess fair of pain and avoidance of physical activity (16 items) (Pfingsten et al., 2000)	X	X	
Fear of Pain Questionnaire (FPQ)	Measure to assess fear of different stimuli usually causing pain (30 items) (McNeil and Rainwater, 1998)	X	X	
Widespread Pain Index (WPI)	Assessment of the spatial extent of pain (distinguishing between 19 body areas and 5 body regions) (Galvez-Sánchez et al., 2020)	X	X	
Multidimensional Pain Inventory (MPI-D)	12-scale inventory to assess important dimensions of chronic pain experience (52 items) (Kerns et al., 1985)	X	X	X
Chronic Pain Grade Scale (CPG)	7-item measure designed to evaluate pain intensity and pain-related disability in adults with chronic pain conditions (7 items) (Dixon et al., 2007)	X	X	
Pain-Related Self Statement Scale (PRSS)	Measure to assess situation-specific aspects of patients' cognitive coping with pain (18 items) (Flor et al., 1993)	X	X	
Western Ontario and McMaster Universities Arthritis Index (WOMAC)	Assessment of pain, stiffness and functional impairment (24 items) (Bellamy, 2005)	X	X	
Trier Inventory of Chronic Pain (TICS)	The questionnaire measures six aspects of chronic stress (57 items) (Schulz et al., 2004)	X		
Brief Symptom Inventory (BSI)	Questionnaire to record subjective impairment due to physical and psychological symptoms (53 items) (Geisheim et al., 2002)	X		

(Continued)

TABLE 1 (Continued)

Instruments	Description (number of items, time for completion)	Time for completion		
		T_0	T_1	T_2–T_4
Pain Sensation Scale (Schmerzempfindungsskala, SES)	24-item questionnaire to measure and differentiate description of subjectively perceived pain (Geissner, 1995)	X	X	
Past stress experiences and post-traumatic distress				
Critical life events and life crises (Kritische Lebensereignisse und Lebenskrisen, KLL)	32-item inventory to assess critical life events and life crises (Tennant and Andrews, 1976)	X		
Posttraumatic Diagnostic Scale (PDS)	Measure to assess PTSD symptom severity in the last month (24-items) (Foa et al., 1997)	X		
Somatic illnesses and high psychological stress				
Oswestry-Disability Inventory (ODI)	Questionnaire to assess pain-related functional restrictions in patients with back pain (10 items) (Fairbank and Pynsent, 2000)	X	X	X
Compliance Questionnaire for Rheumatology (CQR5)	5-item questionnaire measuring compliance with rheumatic disease treatment (Hughes et al., 2013)	X	X	
Study-specific evaluation form				
Negative Effects Questionnaire (NEQ)	Questionnaire to assess unwanted and negative effects of the treatment (32 items) (Rozental et al., 2016)		X	
Inventory for Assessing Negative Effects of Psychotherapy (INEP)	Questionnaire to assess unwanted and negative effects of the treatment (21 Items) (Ladwig et al., 2014)		X	
Patient's global impression of change (PGIC)	Patient's global impression of change (1-items) (Hurst and Bolton, 2004)		X	X
Additional Patient-Reported Outcome Measures (PROMs)	Assessment of Change in medication after treatment (1-item) (Weldring and Smith, 2013)		X	X
Agnew Relationship Measure Patient (ARM-5)	5-item questionnaire about client-therapist alliance (Cahill et al., 2012)		X	

can be revisited and further processed during the course of therapy using the standard protocol or a modified standard protocol. Finally, or in addition, it is possible to use the standard protocol, modified standard protocol, the absorption exercise or the flash-forward protocol to alleviate dysfunctional fears of illness, future pain crises and potential pain triggers.

In practice, however, it has been shown that other targets are relevant in the treatment of patients with pain in addition to classic traumas and the pain itself.

For example, interpersonal conflicts and maladaptive health fears often play also a central role in patients with chronic pain. Thus, in contrast to patients with post-traumatic stress symptoms, the focus of treatment for patients with chronic pain is often initially on the present. This includes processing the current pain as well as dealing with pain-related fears, with a particular focus on dysfunctional health fears. Health fears reinforce the perception of the threat posed by one's own body, whereby it is not only about the fear of possible illnesses, but also about frightening 'misconceptions' about one's own body (e.g., 'damaged intervertebral disc' or 'worn joint surface'). It is of the utmost importance to ascertain the patient's individual understanding of the illness, to identify defect-oriented perceptions of their own body and, if necessary, to correct them so that the patient can regain confidence in their own body. Furthermore, relevant interpersonal conflict situations of the patient are considered in treatment planning. The network deliberately avoids standardised guidelines for case conceptualisation in order to reflect the real-world setting as well as possible and at the same time not to restrict the therapists too much. Instead, systematic documentation of the target selection by the therapist is planned in order to be able to explore possible peculiarities in the case conceptualisation in greater depth.

2.3 Procedure

Outpatient therapists will identify patients with chronic pain conditions for whom they would like to provide an EMDR intervention as part of their regular psychotherapy. In a first step, these patients will be informed by the therapists and will give their written consent to be contacted by the study team at the University Hospital of Heidelberg. There will be no specific recruitment; rather, therapists will decide which patients to admit for outpatient therapy and which to report to the EMDR network. Within a further diagnostic appointment, the Structured Clinical Interview for the Diagnostic and Statistical Manual for Mental Disorders (SCID-5) (First et al., 2015) will be conducted by trained research assistants via telephone. Figure 1 illustrates the subsequent steps of data acquisition, which will be conducted online using the web application REDCap (Harris et al., 2019). First, eligible patients undergo a comprehensive baseline assessment (T_0), including a broad range of self-rating instruments on various domains of relevant symptomatology, physical and emotional functioning, and other potential mechanistic and predictive factors. When patients and therapists decide to end the therapy, we will conduct a post-treatment outcome assessment (T_1) including main outcomes, relevant measures from the baseline assessment, therapeutic alliance, therapy evaluation, and potential adverse effects associated with the treatment. Finally, three follow-up assessments (T_2–T_4) will be implemented 4 weeks and 3 months and 12 months post-treatment.

TABLE 2 Therapists' documentation.

Measures for therapists		Time for completion
Standardized EMDR treatment documentation	Standard case report forms for therapists (e.g., change in subjective level of distress during session, treatment targets, adverse events, etc.)	For each session
Severe adverse events (SAE)	Assessment of severe adverse events and their relationship to therapy (6 items)	For each session
Therapist questionnaire	6-item questionnaire about therapists' experience with EMDR	T_0
Therapists' global impression of change (TGIC)	2-item questionnaire about therapists' global impression of change of their patients (Ferguson and Scheman, 2009)	T_1
Agnew relationship measure therapist (ARM-5)	Questionnaire about client-therapist alliance (5 items) (Cahill et al., 2012)	T_1

During the treatment period, therapists will meticulously document each therapy session to ensure comprehensive data collection and analysis. This documentation includes recording severe potential adverse events (e.g., hospital admissions, suicidality) and specific features of the EMDR treatment, such as the therapeutic target, the bilateral stimulation technique used, and the subjective units of distress. Additionally, therapists will complete a questionnaire regarding their prior experience with EMDR and the frequency with which they treat patients with chronic pain.

The documentation process involves capturing detailed information on critical aspects of each EMDR session, including the patient's distress levels and beliefs about their symptoms before and after the session. Therapists will also assess and record the patient's acceptance of the psychological model and provide a brief summary of the session's content.

By systematically documenting these elements, therapists will create a comprehensive data set that facilitates detailed analysis of the processes and outcomes of EMDR therapy. This rigorous approach enhances the validity of the trial and contributes to the growing evidence base for EMDR therapy in the treatment of chronic pain and associated psychological conditions.

2.4 Sample

The network includes both patients and therapists, each meeting specific inclusion and exclusion criteria to ensure the reliability and validity of the study outcomes.

2.4.1 Inclusion criteria

- Therapists: Must have completed formal training in psychotherapy and possess an officially recognized certification in EMDR therapy. Only therapists who meet these stringent professional qualifications are included to ensure the consistency and quality of EMDR delivery.
- Patients: Eligible patients are those who have sufficient proficiency in the German language, as effective communication is essential for the therapeutic process and for providing informed consent. Patients must report experiencing chronic pain and must be commencing therapy with a therapist participating in this network. The prerequisite is that the patients have already started psychotherapy, but the planned EMDR treatment has not yet taken place as part of this therapy but is planned in the further course of therapy. Completed previous therapies, including EMDR, are not an exclusion criterion, but will be documented systematically. Patients must be at least 18 years old, with no upper age limit, and be able to give informed consent.

2.4.2 Exclusion criteria for patients

- Severe Psychiatric Comorbidity: Patients exhibiting severe psychiatric conditions that impair their ability to provide informed consent, including suicidality and psychosis spectrum disorders, are excluded. These conditions can significantly interfere with the patient's ability to participate effectively in the study and can complicate the assessment of EMDR's efficacy.
- Language Proficiency: Patients lacking sufficient proficiency in the German language are excluded to ensure clear communication and accurate understanding of the therapy and study requirements. This criterion is critical for maintaining the integrity of the therapeutic process and the reliability of the study data.

By establishing these inclusion and exclusion criteria, the study aims to create a representative sample of patients with chronic pain that can provide robust and reliable data on the efficacy of EMDR therapy in treating chronic pain. The dual focus on therapists' qualifications and patients' characteristics ensures a high standard of therapeutic intervention and data collection. This methodological rigour is essential for drawing valid conclusions about the therapeutic benefits of EMDR in this specific patient population.

2.5 Sample size calculation

The sample size calculation for the present exploratory and feasibility evaluation within the 'EMDR Pain Therapy Network' is primarily based on the need to obtain meaningful data on the feasibility and efficiency of the network structures. Considering the aim of assessing the feasibility of a possible future randomised controlled trial, a minimum number of 20 therapists will be recruited, each of whom should enrol at least 10 patients in the trial. This results in a total of at least 200 patients.

This sample size is appropriate for the following reasons:

- It enables a comprehensive assessment of the efficacy and side effect profiles of EMDR therapy for chronic pain.
- It is suitable for testing the feasibility of an accompanying evaluation in the outpatient setting, including documentation quality and patient satisfaction.

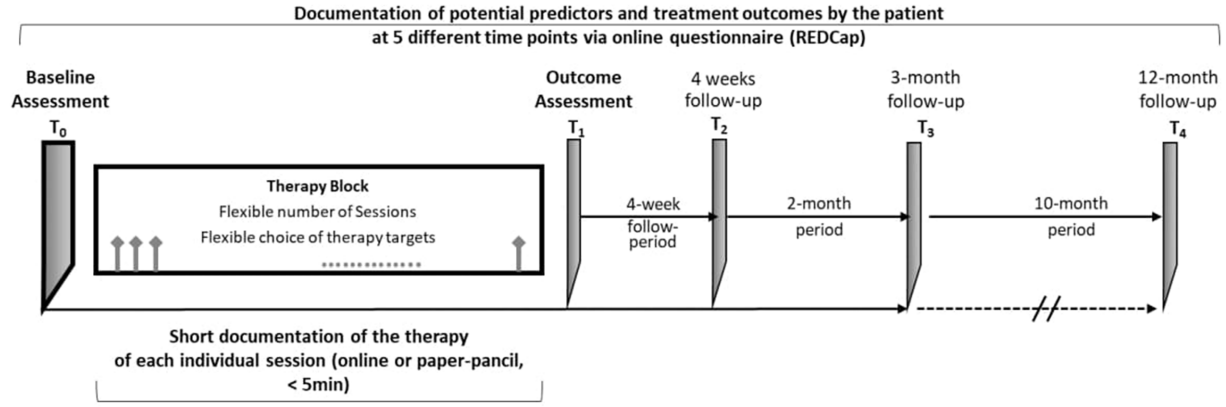

FIGURE 1
Flow chart of data acquisition. T_0, baseline assessment; T_1, post-treatment outcome assessment; T_2–T_4, 4-month follow-up assessment.

The results of the evaluation of the initial sample of 200 patients will be crucial in planning a larger multicentre trial. They should show whether the network is able to recruit enough patients and provide high quality data, and whether the therapeutic practices within the network are sufficiently standardised to conduct a randomised controlled trial.

It is important to note that this number of cases does not have to be the definitive end of the trial. Rather, once this initial target number has been reached, an interim analysis should be carried out to assess the logistical and administrative aspects of the study implementation, in addition to the scientific aspects. On this basis, an adapted or expanded recruitment strategy can be developed for the next phase of the study.

3 Advancing implementation of EMDR in clinical practice

Therapists participating in the study will be recruited via the EMDRIA Germany or will be referred by other participating therapists. Additionally, the project will presented at national and international conferences, gaining exposure to a broader audience, and an article about the project has been published in the EMDRIA journal. The study is open to all psychotherapists and physicians with formal psychotherapeutic training and accredited EMDR certification.

To promote the implementation of EMDR in pain therapy, the network emphasises supporting the application of EMDR in pain management according to scientific standards. This is achieved by providing validated EMDR treatment protocols free of charge (see Supplementary material) and offering practical working materials for therapists. These measures not only enhance the appeal of network membership but also encourage the standardisation of treatment approaches and facilitate the specialisation of EMDR therapists in treating patients with complex pain disorders.

Additionally, the network has launched a virtual platform where therapists can connect, share experiences, and participate in bimonthly online peer supervision meetings. During these meetings, they discuss complex patient cases and receive supervisory feedback. The platform is supplemented by a regularly updated newsletter that informs about the latest developments, research findings, and relevant events in the field of pain therapy. The newsletter provides lay-friendly summaries of current scientific studies and contextualises them within the clinical setting, thus aiding the translation of scientific knowledge into clinical practice.

4 Outcomes

4.1 Patients variables

4.1.1 Treatment outcomes and efficacy

In this study, we aim to identify factors that predict a significant treatment response to EMDR therapy for chronic pain. We will follow established recommendations for outcome measures in clinical chronic pain trials and recommendations for interpreting clinical importance of group differences [Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials, IMMPACT (Dworkin et al., 2008; Turk et al., 2003)]. Core outcome domains include pain intensity, physical functioning, emotional functioning, stress experience, and both patient and therapist ratings of patients improvement and satisfaction.

The effectiveness of EMDR therapy will be quantified by determining effect sizes and response and non-response rates on various outcome variables.

4.1.2 Patient perception of change

Global ratings of change of the overall situation due to treatment was evaluated using the Patient Global Impression of Change (PGIC) scale, which is a single-item rating on a 7-point scale ranging from "very much improved" to "very much worse" (Ferguson and Scheman, 2009). Changes of "much improved" and "very much improved" are considered as clinically relevant. Similarly, therapists should perceive that at patients show at least 60% of improvement, as measured by a score of greater than or equal to 5 on the Therapist Global Impression of Change Scale (TGIC).

4.1.3 Predictors of treatment outcome

A multidimensional phenotyping of patients will be performed, including various aspects such as clinical symptoms, psychological comorbidity, personality factors, therapy expectations and functionality. The aim is to identify predictors that can be used to predict treatment success or failure.

4.1.4 Evaluation of feasibility and practicability

The EMDR Pain Network will evaluate the structures and processes of the network for conducting larger multi-centre clinical trials. This will include the assessment of inclusion rates per therapist, the quality of documentation of outcome variables, and patient satisfaction with the adjunctive evaluation.

4.1.5 Adverse effects associated to EMDR therapy and safety outcomes

1. Negative Effects: These are intended to be captured using the Negative Effects Questionnaire (NEQ) and the Inventory for Assessing Negative Effects of Psychotherapy (INEP).

2. Severe Adverse Events (SAEs): These will be documented and examined for potential causal relationships with EMDR therapy.

4.1.6 Comprehensive assessment

Table 1 shows all measures used during the different points of data acquisition. In addition to the assessment of core-outcome domains, an extensive baseline assessment is performed using standardised and validated questionnaires (see Table 1). The aim is to identify possible predictors in the areas of psychological comorbidity (anxiety, depression, somatization and sleep disorders), catastrophizing, fear of illness and fear avoidance behaviour, past stress experiences and post-traumatic distress, therapy expectations and therapy experience, as well as individual coping and resilience factors.

These defined criteria should not only capture the direct benefits and tolerability of EMDR therapy in chronic pain patients, but also contribute to the optimization of therapeutic approaches and the improvement of treatment quality.

4.2 Statistical analyses overview

The primary aim of the 'EMDR Pain Therapy Network' is to generate a high-quality dataset that facilitates the investigation of future effectiveness measures, response rates, and potential predictors for both response and non-response. This dataset will provide broad opportunities for exploratory analyses to address future research questions. Within the network, specific questions and analyses are pre-planned:

Descriptive Analysis: To characterise the sample, descriptive statistics will be employed, covering demographic data, clinical characteristics, and outcome criteria. Continuous variables will be described using means, standard deviations, medians, and interquartile ranges. Categorical variables will be presented through frequencies and percentages.

Effectiveness Outcome Analysis: The effectiveness of EMDR therapy will be evaluated by calculating effect sizes using Cohen's d, with t-tests to determine these values. Response and non-response rates will be analysed using binary logistic regressions, with the PGIC and TGIC scales as dependent variables.

Adverse effect Outcome Analysis: Adverse effects will be quantified through frequency analysis for each item of the NEQ questionnaire, and serious adverse events (SAEs) will be described using descriptive statistics, analysing their correlation with EMDR therapy.

Therapist Influence: The impact of therapists on treatment outcomes will be explored using multivariate models or regression analyses, considering various contextual factors such as different therapy approaches, therapist experience.

Analysis of predictors: Predictors for therapy success will be identified through multivariate regression analyses, using data from multidimensional phenotyping as independent variables.

Feasibility and Practicability Assessment: The practicability of the evaluation process will be assessed by analysing dropout rates, missing values, and the variability of inclusion rates per therapist. An intention-to-treat analysis will be conducted, and satisfaction with the evaluation will be measured using z-scores.

5 Discussion

The establishment of the 'EMDR Pain Network Germany' is a significant step towards promoting clinical exchange and deepening the understanding of EMDR in pain therapy. This interdisciplinary scientific-clinical platform includes standardised treatment protocols, an online data collection system with anonymised data and suggestions for a comprehensive core assessment set. It also enables regular professionals and promotes collaboration. These components are intended to personalise future therapies and create the basis for large-scale randomised clinical trials to enable systematic research into the mechanisms and effects of EMDR in pain treatment.

The network structure integrates scientists, therapists, and patients and is organised into three main levels: 1. a steering group that leads and organises the network; 2. participating therapists and associated scientists, who keep the network active; and 3. the patient group, which provides outcome data and forms the foundation of the network. This structure serves as a guide and an open system that promotes the continuous expansion of the network and the long-term exchange of experiences and expertise. The integration of these levels introduces considerable complexity, but it is crucial for gaining in-depth and long-term insights into treatment effects and paves the way for the discussion of analytical challenges.

The principle of opening the network to all interested scientists and therapists requires clear inclusion and exclusion criteria. To ensure a balance between the widespread use of EMDR and the maintenance of high-quality standards, basic therapeutic training and an officially recognised training certificate for EMDR (e.g., from the professional association) should be required. This ensures therapeutic standards and the generation of high-quality data for valuable analyses.

The planned analyses, especially predictor analyses, are challenging and require large sample sizes and longer study durations. These requirements fit with current big data initiatives that require early and systematic data collection. A proposed core assessment model will guide future research initiatives and studies, improve comparability and facilitate meta-analytical syntheses. Through continuous data collection and analysis, the network will provide valuable insights into the effectiveness of EMDR in pain management, deepen the understanding of this method and drive future research and clinical trials.

The network not only investigates the effectiveness and prediction of treatment response to EMDR in real clinical settings but also establishes a robust foundation for future randomised controlled multicentre studies. The systematic training and experience of therapists in the use of EMDR, along with standardised data collection

methods, facilitate the development of a pool of qualified professionals essential for further clinical research. This pool of therapists will be a valuable resource for future studies aimed at testing the efficacy of EMDR on a larger scale and advancing its implementation in the treatment of complex pain disorders in clinical practice.

The network promotes the use of EMDR in pain therapy without commercial interests. Free working materials and free participation in the network support open science and patient-centred treatment. This approach aims to remove barriers to access and facilitate the dissemination of this effective therapy. This promotes a collaborative and inclusive model that benefits therapists and patients alike.

In summary, the developed framework promises to improve the understanding of the therapeutic effect of EMDR on chronic pain. It enables longitudinal analyses that describe the course of treatment success and identify individual differences in outcomes. This provides the basis for personalised treatment strategies that are tailored to the individual needs of patients with chronic pain in order to optimise therapeutic outcomes and improve quality of life.

Ethics statement

In accordance with the ethical principles governing human research, all participants and therapists are required to provide written informed consent prior to enrolment. Ethical approval for data collection was obtained from the Research Ethics Committee II of the Medical Faculty of the University of Heidelberg (approval number S-696/2023), ensuring compliance with the ethical standards of the Declaration of Helsinki.

Author contributions

SV: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. AH: Writing – review & editing, Supervision, Resources, Methodology, Funding acquisition, Conceptualization. ML: Writing – review & editing, Resources, Funding acquisition. KB: Writing – review & editing, Resources, Funding acquisition. SW: Writing – review & editing. GS: Writing – review & editing, Supervision. EB: Writing – review & editing, Methodology, Data curation, Conceptualization. MH: Writing – review & editing. H-CF: Writing – review & editing. WE: Writing – review & editing. JT: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1449150/full#supplementary-material

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Case report: Online eye movement desensitization and reprocessing approach in children: a case series

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Objective: The aim of this study was to examine the use of Eye Movement Desensitization and Reprocessing (EMDR) in online counseling for children with single-incident trauma.

Method: A qualitative case study method was employed. The research was conducted with two volunteering children and their parents. The sessions were transcribed by the authors, and code names (Ipek and Eylül) were assigned to protect the participants' identities. İpek's traumatic memory was explored through drawing pictures with tactile bilateral stimuli and Eylül's traumatic experience was addressed using tactile bilateral stimuli during the EMDR therapeutic story technique. The Child Revised Impact of Events Scale (CRIES-8) was used for pre-test, post-test, and follow-up testing to support the session descriptions.

Results: The results indicated that post-traumatic symptoms were reduced and remained at a low level for an extended period in both clients.

Conclusions: It is suggested that future studies should explore various bilateral stimulation methods in online EMDR, conduct larger-scale studies with children who have experienced different types of traumatic events, and investigate the impact of various EMDR protocols on children.

KEYWORDS

EMDR, trauma, psychological counseling, online, case study

1 Introduction

Childhood is a vulnerable and impressionable stage in life, making it susceptible to external influences. Research has shown that traumas such as parental divorce, loss of a loved one, natural disasters and child abuse can have a lasting impact on individuals (1–3). While there have been several studies on the effects of childhood problems on adolescents

and adults, there is limited research specifically focused on problems experienced by children as a result of childhood experiences (4–6).

The 7 recommended EMDR therapy as an effective approach for psychological interventions related to traumatic experiences. Eye Movement Desensitization and Reprocessing is an 8-stage protocol used to alleviate the effects of traumatic experiences. The approach is based on the idea that traumatic events disrupt the normal processing of memories, leading to anxiety and negative self-perception. EMDR helps to change negative self-ideation and reduce the impact of disturbing traumatic images (8).

EMDR was first used for treating trauma in children by 9, called the 'Developmental Protocol.' It adapts the 8 stages of EMDR to the age and developmental level of the child (10, 11).

1.1 EMDR phases in children

The first phase, which includes gathering detailed information about the child's developmental history, parental background, and any trauma they may have experienced, is called history taking and therapy planning (9). In the next stage, referred to as preparation, the child's stability is assessed, and techniques such as safe place visualization, muscle relaxation, and breathing exercises are implemented to help those who are unable to process traumatic memories (12, 13). Phase three focuses on assessing trauma-related symptoms that involve vivid visual imagery associated with traumatic memories, positive and negative believe about self, relevant emotions, and bodily sensations. The worst image of the target memory is identified and the subjective discomfort level (SUD) is rated on a scale of 0-10. In EMDR, it is commonly used prior to the start of bilateral stimulation (BLS), and later to quantify the client's report of reduced or eliminated disturbance and other treatments to measure baseline emotional or physical pain, as well as to assess progress being made (14). The validity of positive cognition (VOC) is also evaluated on a 7-point Likert type scale. The positive cognition is rated while thinking about the traumatic experience, with 1 = feeling totally false and 7 = feeling totally true. Additionally, somatosensory and emotional associations with the worst image are noted (12). The fourth phase, desensitization, can take a few minutes in one session or multiple sessions spanning several months. Desensitization involves a unique procedure where the therapist exposes the patient to bilateral visual (eye movement), auditory, or sensory stimulation (e.g., tactile stimulation) that includes BLS. Techniques such as drawings or stories may be used during this phase, tailored to the child's developmental level (15). The installation phase is the fifth stage in EMDR therapy. Installation stage is initiated when the SUD level of the child is 0 during the desensitization phase and is used to ensure that the child has positive beliefs after the desensitization phase. The body scan stage, which is the sixth phase, is initiated when the child's level of distress is low and involves the child scanning their body for any discomfort while thinking about the traumatic event in a positive way. If discomfort is present, the process continues with BLS, otherwise the debriefing and closure stage is initiated (12). This seventh phase aims to leave the child in a positive mental state and with self-confidence (8). The final phase is reevaluation, where the memories and symptoms are evaluated and a healthy future is planned. New symptoms should be assessed in interviews with parents using a holistic approach (12).

1.2 Online EMDR

EMDR is a unique therapy method that typically involves following rhythmic eye movements or tactile stimuli, making it difficult to conduct online. However, the COVID-19 pandemic has made online counseling an essential option, due to quarantines and curfews. A systematic review on the use of online EMDR for treating post-traumatic stress disorder during the pandemic showed that it can be effective for both adults and children. However, considering the limitation that the study findings are based on a single research, the results should be interpreted with caution (16). The current study aims to provide insight into the therapy's effectiveness by describing actual cases of online EMDR sessions. Previous research has shown that online psychological counseling can be effective for treating depression, anxiety disorders, behavioral problems and phobia in children (17, 18). However, research on online EMDR therapy for children is relatively new. One of these studies, McGowan et al. (19), reported that EMDR therapy administered online to 93 clients during the COVID-19 pandemic was clinically effective in both adult and child/adolescent populations. Bursnall et al. (20) collected data on the online use of EMDR through surveys and interviews from a group of EMDR therapists (n=562) and their clients (n=148). Although the study results noted that internet connection interruptions could hinder the therapy process, 88% of the clients reported being extremely satisfied with receiving EMDR therapy online. Additionally, therapists expressed greater willingness to implement online EMDR therapy by the end of the year. Studies on the online use of EMDR indicate a need for more research to support whether EMDR is as effective as face-to-face therapy (21, 22). The current study aims to contribute to the literature by describing the effectiveness of online EMDR therapy for children, which may not have been considered a suitable candidate for online application. The purpose of this study is to examine the impact of online "Eye Movement Desensitization and Reprocessing (EMDR)" on children.

2 Methods

2.1 The research model

The current article uses the qualitative case study approach to examine the relationship established and interventions employed during counseling, as well as the client's perceptions of these interventions. This approach emphasizes the uniqueness of individuals and is useful for analyzing the internal experiences of individuals without the limitations of measurable variables. The direct involvement of the individual in the research is a key strength of this method, and it is also well-suited for studying rare

occurrences in psychological health. Additionally, this approach can be used to illustrate counseling practices, demonstrate the adopted psychological counseling approach in depth, and guide future studies. The differences between interventions can also be described using this method (23, 24). After obtaining ethical approval from the İnönü University Research and Publication Ethics Committee (Approval No: 2020/18-3), EMDR sessions started.

2.2 The clients

The study involved two children. One 6-year-old and another 8-year-old, who were both identified as at risk of PTSD by psychological counselors at their schools using the diagnostic criteria from the DSM-V. They were later confirmed to have PTSD by a psychiatrist and then were included in the study.

2.2.1 First client

An 8-year-old girl named Ipek. Three years prior to the study, Ipek was traveling with her family when their car collided with a boar, resulting in an accident. Ipek was asleep at the time of the crash and woke up to the sight of her sister bleeding and the car being severely damaged. Since the accident, Ipek has been unable to travel in cars without experiencing severe distress and crying halfway through the trip. She also cannot stay home alone. Her parents sought psychological counseling to address her symptoms. Ipek's score on the Child Revised Impact of Events Scale (CRIES-8) was 22 (High PTSD symptoms).

2.2.2 Second client

A 6-year-old girl named Eylül. When she was 4 years old, Eylül learned that her grandmother had cancer and witnessed her grandmother's chemotherapy treatment for 9 months, including the adverse effects of the treatment. Eylül was not told about her grandmother's passing and only learned of it at her grandmother's wake. Since then, Eylül has stopped talking about her grandmother, cries when someone mentions her, and avoids the topic altogether. She also has difficulty sleeping alone and is anxious about her parents growing old. Her mother sought psychological counseling to address Eylül's symptoms such as introversion, silence, and insomnia due to the loss of her grandmother. Eylül's score on the Child Revised Impact of Events Scale (CRIES-8) was 21 (High PTSD symptoms).

2.3 Data collection instruments

2.3.1 Child Revised Impact of Events Scale

The Child Revised Impact of Events Scale (CRIES-8) was used in this study to assess the persistence of traumatic experiences and their effects after counseling sessions. CRIES-8 is a self-rating scale that uses a 4-point Likert-type system (Never=0, Rarely=1, Sometimes=3, Often=5) to screen for symptoms of post-traumatic stress disorder in children. It has been reported that a cut-off score of 17 on the CRIES-8 provides maximum sensitivity and specificity in detecting PTSD (25). Çeri et al. (26) stated that the scale yielded valid and reliable results in the Turkish culture. It has two sub-dimensions: intrusion (sample item: "Images about that event suddenly appear before my eyes") and avoidance (sample item: "I try to stay away from places and situations that remind me of those events") and the total scale score ranges from 0 to 40 (27).

2.3.2 Diaries

In this study, diaries were used as a method of collecting qualitative data. This method is flexible and can be used to address various research problems. Keeping a diary is considered important in the analysis of clients' emotions and thoughts in psychology (28). The parents of the children who received psychological counseling were asked to keep a diary, in which they recorded the emotions and positive/negative experiences of their children, as well as their own self-awareness as parents, after the sessions until the next interview. The researcher also kept a diary, the Psychological Counseling Diary (PCD), in which she recorded her own experiences, observations of problems and solutions encountered during the preparation for sessions or during online sessions and their relationship with the clients.

2.4 Data analysis

The current study focuses on describing the use of online EMDR therapy in two separate children diagnosed with PTSD. Diagnoses were made through an online interview by a psychiatrist. Also, sessions with the children were conducted via the Zoom platform, recorded, and transcribed by the researcher. During the writing of the findings, the article format categorized the data according to the eight phases of EMDR, and the transcripts were used to describe these phases. Since the phases were addressed in the introduction section, they were not repeated here. Parent diaries and psychological counselor diaries were also collected in Word documents created specifically for the participants. While parent diaries were used to gain in-depth insights into the participants' perspectives, the psychological counselor diary provided observations, particularly regarding the implementation of EMDR over the internet. Additionally, CRIES-8 was used as a quantitative data tool in the study. Scores obtained from this scale were compared for each client based on pre-test, post-test, and follow-up test results. The aim was to support client statements and parent diary data rather than relying solely on numeric data.

2.5 Validity and reliability

2.5.1 Validity

In this study, participating clients were observed and direct quotes from the clients were included to enhance the credibility of the findings. The transferability of the results, or their potential applicability in similar settings, was improved through detailed description and the use of purposive sampling (29). Additionally,

session transcripts were shared with the participating parents to ensure accurate representation of the clients' views and consent was obtained from the parents confirming that their statements matched the transcripts.

2.5.2 Reliability

In the study, one-to-one counseling sessions (including silences and minimal prompts) were transcribed to provide a rich and detailed context. However, external reliability was low due to the uniqueness of each client and the fact that even if their problems are similar, the sessions are not identical. To improve external reliability, data collection limits were established and inclusion criteria were defined to control for client characteristics. To minimize bias, expert opinion from a supervisor was sought out in the study.

3 Findings

In this section, the EMDR sessions conducted with Ipek are described in detail. To avoid technical repetition, only detailed descriptions of the preparation and desensitization stages of the EMDR sessions conducted with Eylül are provided, while the remaining sessions are briefly mentioned.

3.1 Ipek's sessions

The contents of the sessions are summarized in the relevant tables before describing İpek's EMDR therapy process.

3.1.1 History taking and therapy planning

Before moving to the preparation phase of EMDR with İpek, both parents were invited for an interview to gather the history taking. However, due to the father's busy work schedule, he could not participate in the process. Instead, the mother attended a 60-minute online session. The session was conducted using the Zoom program. Table 1 provides a summary of the process, followed by a description of the process.

When collecting Ipek's history, I focused on the history of the trauma, reasons for seeking counseling, when and how the traumatic event occurred, and the coping methods that have been used so far.

TABLE 1 İpek's first session.

Session Name	Session Summary
1st Session: History Taking and Therapy Planning	According to the EMDR developmental protocol, the family-development-trauma history was obtained with the participation of the mother. This stage lasted for one session (60 minutes).
	For the desensitization phase, which will continue online, İpek's 23-year-old sister was designated as the family member who will support her.
	The traumatic memory was identified as the moment of the car accident for the therapy plan. It was noted that triggers would also be addressed if necessary.

Ipek's mother, Saniye (codename), was visibly tense as she recounted the trauma. She spoke quickly while describing the car accident and seemed confused about the order of events. It was clear that she was still affected by the incident. Therefore, it was decided that in subsequent sessions, when a family member needed to accompany her, her 23-year-old sister would attend the sessions. Ipek's developmental history revealed that she had never slept alone since infancy. She was the youngest child and was born as a desired baby after a 15-year gap between siblings. Her mother expressed self-blame for Ipek's sleep issues, stating:

> *"We tried to make her sleep alone, the child could have done it, but I guess we could not let her go. For example, when she was sleeping, I checked on her, wondered if she was tucked in, or if something has happened, and slept with her."*

At the end of the meeting, I asked to meet Ipek. During our meeting, I noticed that when I asked Ipek open-ended questions, she struggled to answer and seemed to be deep in thought. Her facial expression also seemed dull. I recorded the following notes about the online meeting

> *"It was my first online session, and I was excited, similar to how I feel during face-to-face counseling sessions. I looked forward to meeting the individual. It was nice to know that I was recording, as I was not occupied with problems such as the battery or the camera angle. Without these concerns, I could focus further on my preliminary interview questions after the first few minutes. However, poor internet connection could be a serious problem. I think I will be better able to determine this in future sessions." (PCD, December 2nd, 2020)*

3.1.2 Preparation phase

In the previous session, İpek was informed that she could attend the sessions with her sister if she wished. During this session, she mentioned that she decided to attend alone because her sister had to be at work. A summary of İpek's second session is provided in Table 2. Before the exercise, I taught İpek the butterfly hug to help her discover the BLS rhythms. The butterfly hug is used for the client to provide bilateral stimulation to themselves. Therapists guide the rhythm. When the client performs the BLS rhythms at a slow pace and focuses on positive feelings and sensations, the

TABLE 2 İpek's second session.

Session Name	Session Summary
2nd Session: Preparation Phase	İpek attended the preparation phase alone.
	The butterfly hug was taught.
	The Bond of Love exercise was performed.
	The type of BLS was tactile.

exercise itself can be used as a relaxation technique during the preparation phase (30, 31).

In the preparation session with Ipek, I wanted to focus on stabilization through the "bond of love" exercise (32). I asked the parents to provide materials such as crayons and blank sheets or a picture book. To begin the exercise, I asked Ipek to draw a heart in any size and color, and in any location on the page. Then, I asked her to draw another heart for people or things she loves. These could be places where she feels safe, things that are good for her, or things that provide comfort. Lastly, I asked her to draw the bonds of love between these hearts. I emphasized that she could include not only safe people but also safe places in the exercise. However, Ipek chose to only draw family members (Figure 1).

When I asked İpek how she felt when looking at the picture she drew, she answered, "Good and happy." When I asked where in her body, she felt these emotions while focusing on them, she replied, "In my heart and arms." Following this, I asked her to focus on all these positive feelings and perform BLS at a slow rhythm. After 4-5 sets of BLS, she paused, took a deep breath, and said she felt better.

> *"The most challenging aspect of the preparation phase in the online process was not being able to use my materials in the office. If İpek had not been able to do the bond of love exercise, I needed to have a plan B. I think it's very important to consider the materials, communicate with the family beforehand, and control the process to ensure there are no deficiencies."*

These PCD notes highlight the importance of involving the family in the preparation phase in the online process.

3.1.3 Assessment, desensitization, installation, body scan and closure phases

Including a family member in sessions during the desensitization phase is important when working with children one. This family member acts as a co-therapist during bilateral stimulation and the exchange of drawing papers (33). In Ipek's case, her older sister, mother, and father were present during the accident. Ipek's older sister, Oya (code name), had previously received adult EMDR therapy for depression after the accident. When the details of the study were announced, Oya applied on behalf of her younger sister, believing that EMDR would be helpful for her sister's healing process. When discussing family members to accompany Ipek during the desensitization phase, Oya volunteered. Even though they were together during the accident, the researchers determined that it would be appropriate for them to do the session together as Oya had completed her own EMDR therapy sessions previously.

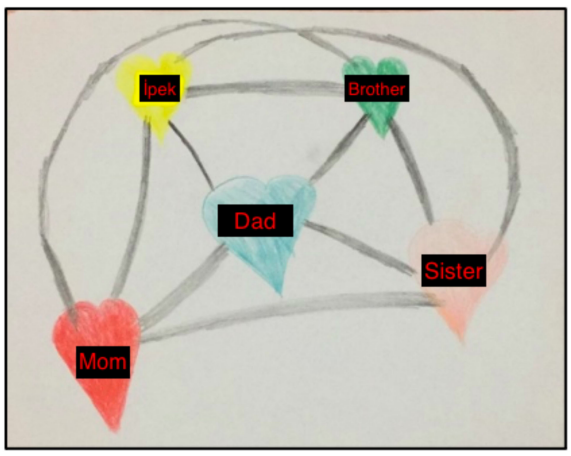

FIGURE 1
Ipek's Bond of Love Drawing – Second Session, December 4 2020.

TABLE 3 İpek's closure sessions.

Session Name	Session Summary
4th Session	The SUD levels of the triggers were reported as zero.
	Her future dreams and hope.
5th Session	Termination session She attended with her sister.

During the assessment stage, Ipek drew the most distressing image related to the accident on a piece of paper smaller than A4 size and made other evaluations based on her drawing. I instructed her to write down any negative thoughts and feelings about the event as she began to draw, in order to determine her current disturbing emotions and negative cognitions (NCs) related to the traumatic memory. Ipek was unable to identify any NCs and instead stated "I am safe, it was not my fault" as positive cognitions (PCs). She reported feeling afraid and sad, and experiencing itching sensations in her arms. Her Subjective Units of Disturbance (SUD) score was 5. Once the initial drawing was ready, I instructed Oya, "While Ipek focuses on and looks at the drawing and concentrates on the distressing feelings, body sensations, and other aspects, you will perform BLS with a fast rhythm, one on the right shoulder and one on the left shoulder." I also told Ipek, "If you feel too distressed and feel you can't continue, you can make a stop sign with your hand," and then we started the BLS.

BLS touches continued for about 30 seconds. This means approximately 16 bilateral touches were completed. When the first set was completed, I asked Ipek what she felt and instructed her to draw whatever came to mind. After the drawing was finished, I instructed Oya to begin BLS again. After 30 seconds of BLS touches, the second BLS set was completed, and Ipek drew whatever came to mind again. Then Ipek stopped the process and reported a SUD score of zero. The installation phase was conducted based on her positive beliefs of "I am safe" and "it was not my fault." Focusing on the memory and positive beliefs, her sister continued with BLS touches for another 30 seconds. After 2 sets, her beliefs were stronger, and her VoC score was 7. During the body scan phase, Ipek expressed feelings of happiness in her arms and toes. The change in her itching sensations in her arms before the traumatic memory indicated the success of the process (Figure 2).

Furthermore, during the sessions, Ipek was able to name her emotions without much hesitation when asked how she was feeling, indicating that changes were taking place during the sessions. I was able to conclude that the third counseling session with Ipek was a

completed EMDR session, as we had finished the installation and body scan stages. The diary entry after this session read:

> *"Ipek slept alone for the first time. That is incredible" (Sister's diary, December 11th, 2020)*

showing a reduction in post-traumatic symptoms.

The PCD notes addressed the following regarding the use of EMDR with children online:

> *"In the online use of EMDR with children, it is quite meaningful to have a reliable guardian from the family participate in the sessions, as it provides both a relational resource and the structured progression needed, requiring the parent to act as a co-therapist. It is essential to ensure that the internet does not freeze or disconnect during the desensitization session. Testing beforehand will be valuable. I asked them to arrange the screen so that I could see both the sister and Ipek. It was important for me as the therapist to be able to control both the speed and the sets of BLS, with the sister providing the stimulation by touching Ipek's shoulders and performing the BLS."*

3.1.4 Closure sessions

In the fourth session with Ipek, we reviewed the progress made during previous sessions and focused on future work. Table 3 provides a summary of the termination sessions.

White cars and traveling by car were triggers for Ipek. Since the SUD scores Ipek assigned to both triggers were zero, a session focused on Ipek's dreams for the future and a sense of hope was conducted before ending the meetings. It was considered important to develop Ipek's sources of positive emotions. I believed that it would be beneficial to focus on her future goals and aspirations, and we continued to work on this issue. Ipek shared her dreams of becoming a better violin player, having a pet bird, and improving her jumping rope skills through drawings. In the fifth session, we ended the counseling sessions. Ipek attended the session alone, her older sister joined later, and we said our goodbyes. Ipek reported feeling good and not thinking about the accident since our last session, and her facial expressions seemed happier. They had been unable to travel due to the COVID-19 pandemic, but her dreams of traveling no longer troubled her.

The PCD notes identified the following as the main challenges in the online EMDR sessions with Ipek:

> *"It was difficult not being able to see the client's drawing when using the drawing method. Since the computer screen can only look at a fixed place, it was also hard to observe the client's body sensations. If the client had joined the session through a tablet, it might have been easier to show the drawing or she wouldn't be limited by the camera's field of view when she wanted to move."*

3.1.5 Follow-up session (one month later)

After completing five EMDR-based counseling sessions with Ipek, I wanted to evaluate whether she had changed. In the follow-

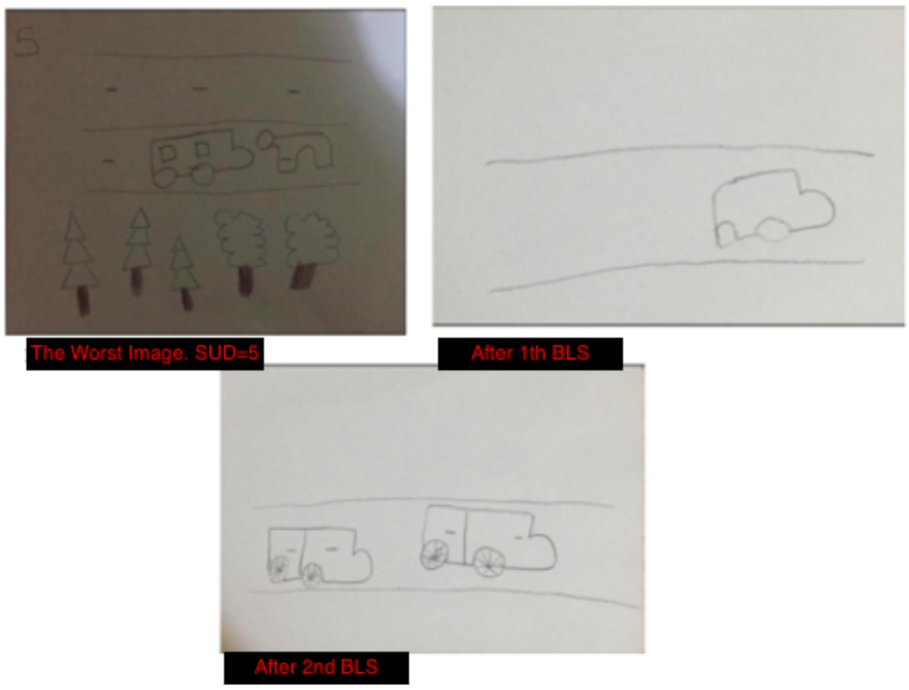

FIGURE 2
Ipek's Drawings in the Desensitization Stage.

TABLE 4 CRIES pretest-posttest and follow-up item scores for Ipek.

Item	Pre-test	Post-test	Follo-up test (one month)
I1- Do you think about it even when you don't mean to?	Rarely	Rarely	Not at all
I2- Do you try to remove it from your memory?	Sometimes	Not at all	Not at all
I3- Do you have waves of strong feelings about it?	Rarely	Not at all	Not at all
I4- Do you stay away from reminders of it (e.g. places or situations)?	Rarely	Not at all	Not at all
I5- Do you try not talk about it.	Sometimes	Not at all	Not at all
I6- Do pictures about it pop into your mind?	Often	Rarely	Not at all
I7- Do other things keep making you think about it?	Rarely	Not at all	Not at all
I8- Do you try not to think about it?	Often	Rarely	Rarely
Total score	22	3	1

* Not at all =0, Rarely=1, Sometimes=3, Often=5

up session, I first asked Ipek's mother to share her observations of Ipek and the process. The session transcript was as follows (Follow-up Interview, January 31st, 2021):

> *Counselor: Can you share what you have observed in Ipek, both about our process and Ipek's changes?Mother: I have observed that nothing has regressed, in fact, things have improved. For example, Ipek can now stay alone at home. I used to never leave her alone, but I was able to leave her alone for an hour and she was fine. She used to always need to stay with our downstairs neighbor, but now she can stay by herself. Also, she can sleep alone in her own bed now, which is great. We were also able to travel in our own car for 1.5 hours without any problems. I am very happy with the progress we have seen and want to thank you for your help.*

After discussing with the mother, I met with Ipek. She looked happier than ever and in her latest drawing practice, she included her pet bird and violin as hearts, unlike her previous drawings.

Ipek's CRIES pre-test and post-test and follow-up item scores are presented in Table 4. By comparing Ipek's pre-test and post-test and follow-up scores on the Child Revised Impact of Events Scale (CRIES), I observed that the scores for all 8 items decreased in the follow-up test. Before the psychological counseling sessions, Ipek was not able to travel in others' vehicles, preferred not to talk about the incident, and had difficulty calming down due to images of the accident in her mind. After the psychological counseling sessions, she no longer had unwanted memories of the traumatic event and did not have to actively try to push them out of her mind. The fact that Ipek responded "not at all" to these items in the follow-up test demonstrates the permanence of the changes.

3.2 Eylül's sessions

3.2.1 History taking and therapeutic planning

Only Eylül's mother, Gülşah (codename), attended the history taking session. She appeared attentive and focused. I began taking Eylül's history of traumatic life events, and after Gülşah recounted her experiences, I asked about Eylül's development history. While discussing Eylül's infancy, Gülşah seemed pleasant and smiled. However, when I asked about her relationship with her husband and Eylül, I noticed that Gülşah's speech became more subdued. Her description of herself as a "person of duty" when talking about their relationship indicated that she may have had difficulties expressing her feelings towards her husband and child. I met Eylül during the last ten minutes of the session. She learned that I had spoken with her mother and that I would be speaking with her as well. It was identified as a goal for Eylül to overcome the feelings of withdrawal she experienced after her grandmother's death. However, since Eylül did not have a clear memory of the loss, the therapy plan included the storytelling of the loss and the desensitization phase using EMDR's healing story technique. The participation of the mother was also requested for all sessions.

3.2.2 Preparation stage

The preparatory phase for Eylül was planned to be conducted over two sessions. A summary of these sessions is shown in Table 5. A 15-minute video call with the mother was conducted the day before the preparation phase sessions. During this call, the exercises to be performed in the sessions were introduced, information about BLS was provided, and how to perform shoulder taps for Eylül when needed was explained. It was considered that 10-15-minute pre-session meetings with family members, conducted after the sessions with İpek, would contribute to the process and facilitate online meetings.

In the first session, I asked Eylül to get out crayons and paper for the bond of love exercise. During the exercise, she was able to communicate and express herself better. The butterfly hug was taught to Eylül so she could perform tactile BLS. After drawing her picture, Eylül focused on the positive feelings and bodily sensations she experienced and performed the butterfly hug with 5-6 bilateral

TABLE 5 Eylül's preparation phases.

Session Name	Session Summary
1th Session	Butterfly Hug for BLS The Bond of Love Exercise She attended with her mother
2nd Session	Memory Sack Exercise She attended with her mother
3rd Session	Auditory BLS Circle of Loving Exercise

taps. The Figure 3 was drawn by Eylül. The entries in her mother's diary summarized the first session with Eylül:

> *"She was a little nervous before the session, but after getting to know you and starting the activity, she was happy. After the session, she told me, 'I felt my grandmother. When I was hugging the butterfly, my grandmother was on my mind.' I think the session was good for Eylül. During the week, she asked me 4-5 times: 'Can we do a butterfly hug?' She said, 'Mom, this relieves me' during the butterfly hug" (Mother's diary, January 26th, 2021).*

In the second session, I began by reviewing the previous week with Eylül. Knowing she had used the butterfly hug, I wanted to ensure she was doing it correctly. When working with children, it is essential to use resource development/installation activities during the preparation phase (34). Here, we used positive memories between Eylül and her grandmother as a relational resource. Eylül was asked to think of positive memories of her grandmother and imagine or draw them as if she was collecting them in a sack. Then, I helped Eylül develop resources by focusing on the positive thoughts, emotions, and body sensations associated with each memory and by doing 2-4 sets of self-administered BLS (butterfly hug). I started the memory sack exercise by referring to the bond of love exercise, since she thought about it during the butterfly hug (Figure 4).

> *Counselor: Now I want you to think about it, let's find the memories that make you feel happy and pleasant when you remember your grandmother and let's draw a picture or figure for each of these in the sack. If you don't want to draw a picture, you can write a word or a sentence that describes that memory, however you want, so that you can easily remember it. When you decide, you can share it with me.*
>
> *Eylül: I will tell you when I am done (Starts drawing something) (Second Session, January 27th, 2021).*

During the online EMDR study, I shared my notes on resource development and installation on the PCD:

> *"Eylül and her mother joined the Zoom sessions using a computer. I believe the greatest challenge of the online sessions was the difficulty in following the drawings. To address this, I asked Eylül to describe what she was drawing while she worked on her sketches."*

> *"Today's session was a lot of fun and it was very nice to put the good memories about my grandmother in the sack. I have good memories about my grandmother and that makes me happy. It was very nice when I went on a picnic with my grandmother, she taught me the Qur'an and she hugged me like my own mother, and when I think about this, I am happy" (Mother's Diary, Eylül's words, January 27th, 2021).*

After the client's feedback, I once again realized the value of the memory sack exercise during the preparation stage.

In the third session, the Circle of Loving exercise was conducted (Table 6). This exercise is used in attachment-focused trauma and for clients dealing with feelings of grief to help them feel peace, safety, and reconnect with a sense of bonding. While Eylül was performing this exercise, she didn't want to draw; she preferred to imagine instead. As an alternative to tactile BLS that her mother could provide or the butterfly hug that she could do herself, I had an auditory BLS as a backup plan for the sessions. For this, I asked her mother to have a working pair of headphones available during the sessions. I also had instrumental music on my computer, known as

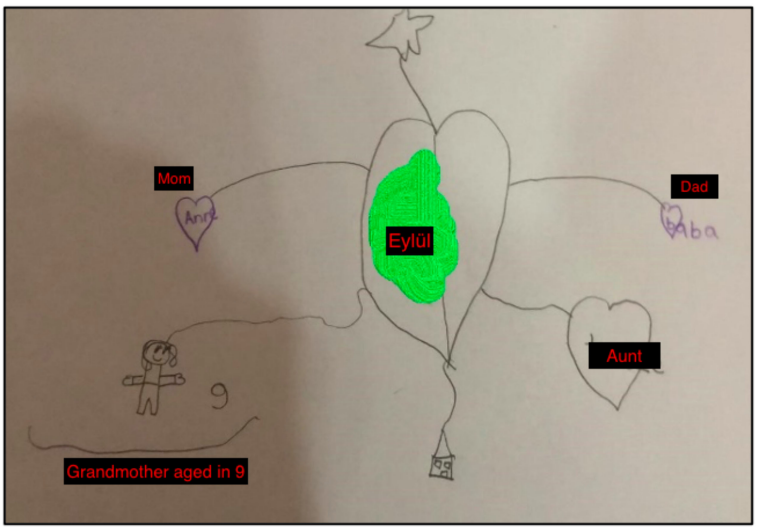

FIGURE 3
The Bond of Love Drawing by Eylül.

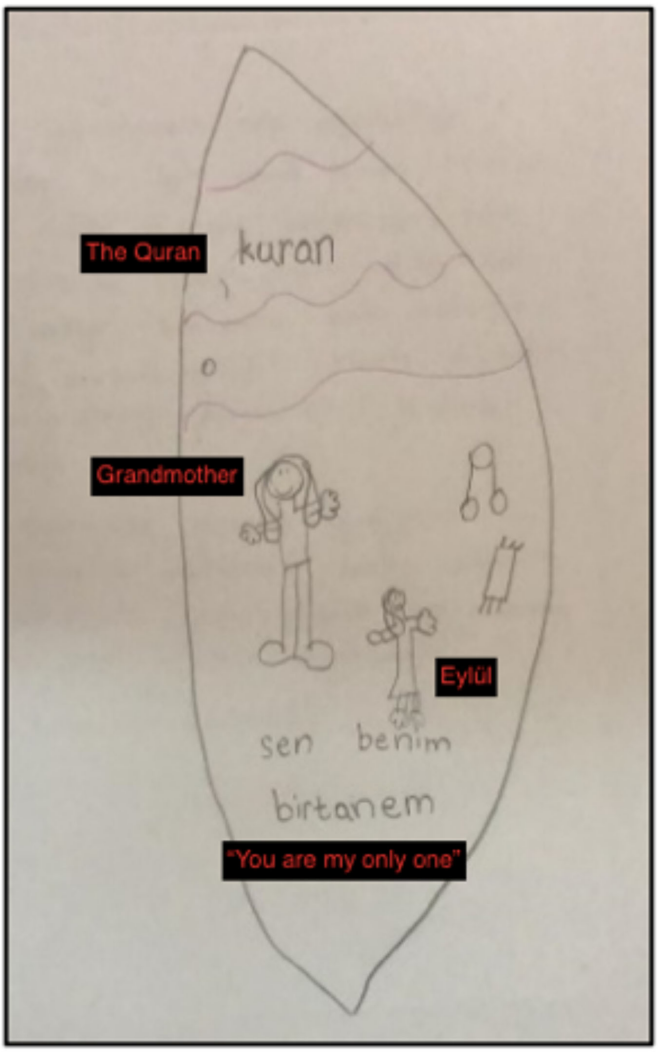

FIGURE 4
Memory Sack Drawing by Eylül.

TABLE 6 İpek's third session.

Session Name	Session Summary
3th Session: Assessment, Desensitization, Installation, Body Scan and Closure Phases	Target Image: Moment of the Accident NC: Unable to Identify SUD: 5 PC: It's Not My Fault VoC: 4 Emotion: Fear Body Sensation: Tension
	Desensitization was carried out by İpek's sister with compassionate touches on İpek's shoulders, thus using tactile BLS.
	When SUD reached 0, the PC "It's not my fault, I am safe" was installed. During the body scan, no negative sensations were reported, and the emotional expression was described as relaxation.

8D music, where the sound rises in one ear and then the other, providing bilateral stimulation. Since we were going to do resource work, I started the process with a slow-paced piece of music. Eylül could hear both me and the music, so we didn't encounter any difficulties during the online exercise.

3.2.3 Desensitization and installation stages

When working with children, it is important to prioritize a focus on the developmental protocol, the developmental needs of the child, and develop a treatment plan accordingly (35). Eylül was more suitable for EMDR due to her improved storytelling technique and her age. The healing story is based on the narration of the traumatic event experienced by the child with an animal/figure that the child can identify with. Past, present and future are discussed in the story. It is important to start the story with a positive note based

on strong and safe sources from the past. Then, the traumatic event could be described. The narration of the traumatic event ensures the assignment of new meanings to neural networks. Thus, it could also include the installation stage. In the conclusion stage, the positive perceptions about the future are emphasized. The story is read to the child with bilateral stimulation. In order to include a healing story with children, the story should be read to the parent with bilateral stimulation and the parental SUD is expected to be below 5 (36). Gülşah's story SUD was 3.

Eylül could not remember certain events related to the loss of her grandmother. However, she had difficulties in understanding the loss and exhibited introverted behaviors as a result of having lived in the same house during her grandmother's illness but not being told of her passing. In the desensitization and installation stages of working with Eylül, we used EMDR with a healing story approach. This approach is based on the narration of the traumatic event experienced by the child with an animal/figure that the child can identify with. The story is designed to start positively, include traumatic events, negative emotions, and sensations, and then end positively with coping strategies and expressions of hope (10, 33).

A healing story titled "The princess who learnt to grieve" was written by the researcher and read to Eylül while her mother performed bilateral stimulation by touching her shoulders. Eylül's level of distress as measured by the Subjective Unit of Disturbance (SUD) was 7 before the story was read, but decreased to 1 after the story was read. She reported feeling relaxed and longing for her grandmother instead of unhappiness. She also noted that she will always miss her grandmother, even though she is no longer alive. After I finished reading the story, I wanted to determine whether Eylül identified with it. The related transcript is presented below:

> *Counselor: You can stop now. How was the story Eylül?*
> *Eylül: I realized that, like me, it happened to my grandmother as well, now I realized it.*
> *Counselor: So, is there anything in this story that you would like to change or add?*
> *Eylül: I mean, since my grandmother died and also her grandmother died in the story, and now that I think about it, I do not want to add anything because the story is beautiful.*
> *Counselor: So, what I'm asking you to do is to draw a picture of whatever was the best for you in the story. If more than one thing was good, you can draw what was the best, or you can divide your page, you can draw more than one thing.* [1]
> *Eylül: Huh, I fold it once so I could draw two. (She points to the paper).*
> *Counselor: Great, good idea.*
> *Mother: She wrote a few things, she wrote a butterfly hug, she wrote love. Now she's drawing something. On the top, it reads butterfly hug. It reads love at the bottom.*
> *Counselor: Who are those below, there are two drawings?*
> *Eylül: These are my grandmother and me, I dyed our hair the same color to look a little bit similar.*
> *Counselor: Which one is you and which one is your grandmother?*
> *Eylül: The small one. The little one is me; the big one is my grandmother. (Figure 5, Fourth Session, February 20, 2021).*

The healing story is a unique approach for addressing trauma in children, as it helps them integrate their implicit and verbal memories. According to Lovett (37), the healing story can aid in resolving trauma, strengthening the bond between the child and caregiver, and developing emotion regulation skills. This technique was successful in helping Eylül distance herself from her trauma, confront her loss, and improve her coping skills.

After completing the desensitization and installation stages, Gülşah recorded positive developments in Eylül's sleep in her diary as follows:

"After the session, Eylül did not want to talk about the story anymore. She was a little nervous but wanted to sleep together before going to her room. I went to her room and kissed her, she slept alone and never woke up until morning. She did not wake up for 2 days at night." (Mother's Diary, February 22nd, 2021).

> *"I believe that involving Eylül's mother in the session made the online process smoother, particularly during the desensitization with the story. The mother had no difficulty with the process as she understood how to do BLS. However, it was challenging to read the story on the screen and to follow the postures and movements of Eylül and her mother simultaneously. In such cases, it may be important to devote more time to the body screening phase." (PCD, February 22nd, 2021).*

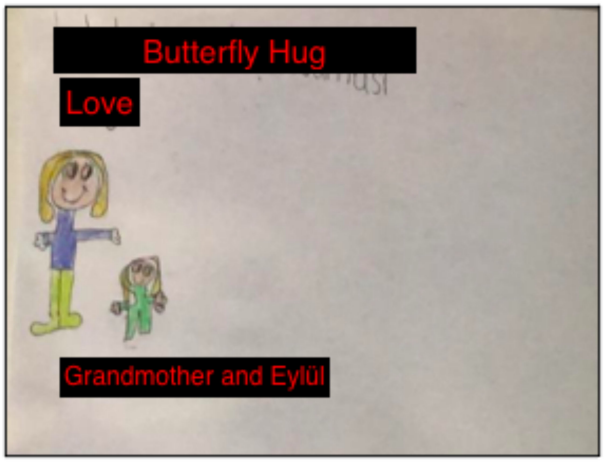

FIGURE 5
Post-Healing Story Drawing.

1 (Researcher's Note: Here, the researcher interprets Eylül's unwillingness to change anything as her realization that she can identify with the story and cope with the grief. It would have been beneficial to ask Eylül where she was most affected by the story to further understand her perspective and encourage her to talk more about her feelings related to the story).

3.2.4 Closure sessions

Fifth session: The closure stage of EMDR therapy with Eylül lasted for four sessions. In this section, two sessions are described to illustrate the assessment of the EMDR process. In the fifth session, Gülşah noted that one of the reasons they sought psychological assistance for Eylül was her reluctance to speak about her grandmother, her reluctance to share her thoughts and her introversion. In this session, Eylül reported that she now felt more comfortable speaking. The therapist also assessed Eylül's progress by repeating the bond of love exercise. The Figure 6 was drawn by Eylül.

The changes in Eylül's bond of love drawing were significant. The most striking change was the larger size of the drawing of her grandmother. In the first exercise, she had drawn her grandmother as a nine-year-old child, but now she was able to depict her in adult form. This change was seen as a sign of the therapy's success. Another notable change was the inclusion of friends' names in addition to family members, indicating that her social resources had begun to improve. Additionally, the inclusion of a doll her grandmother had made for her among the hearts, or positive memories, indicated that her resources had become stronger. The only aspect that was confusing was the inclusion of her grandmother's grave within a heart.

Although Eylül's statement that "When we visit her grave, I feel peaceful there" did not convey a negative message, the therapist was unsure of how to interpret the drawing. The therapist also discussed this with her supervisor:

> *"If the grave has a positive meaning in the child's life, it may be appropriate to leave it in the drawing, but if it has negative connotations, it may be beneficial to suggest an alternative. It is important to discuss this with the child and consider the impact of the image on their life. The fact that the grandmother grew in size in subsequent drawings is an indication of progress in therapy" (Supervision Notes).*

Ninth Session. Eylül's expressions of change during this session were noteworthy. Her statements, such as "they converge in my head", "they match with me", "they seem to enter my heart" confirm that there was activation between her right and left brain.

> *Eylül: I did not write my mother, father and grandmother on purpose because they are inside me. My grandma may be far away, but she is inside of me (Figure 7).*
> Counselor: Come on then, look at those hearts once more and do the butterfly hug.
> *Eylül:* (She does, she takes deep breaths). *I want to say something. It is like the pieces match up in my brain. Parts matched. When I said everyone matches with me, I said, it was like they entered my heart (Ninth Session, March 26, 2021).*

3.2.5 Follow-up session (one month later)

During the follow-up session, Eylül was visiting her grandmother's hometown with her parents, grandfather, and aunt. Being at the location of her grandmother's grave provided an opportunity to assess any changes or triggers Eylül may have experienced. During the session, Gülşah reported on the improvements she and Eylül had made and the coping skills Eylül had retained:

> *Mother: "We are doing better now. For example, we never used to play together and build things, but now we play games more, or when I am with her, we can build a house or play in her tent.*

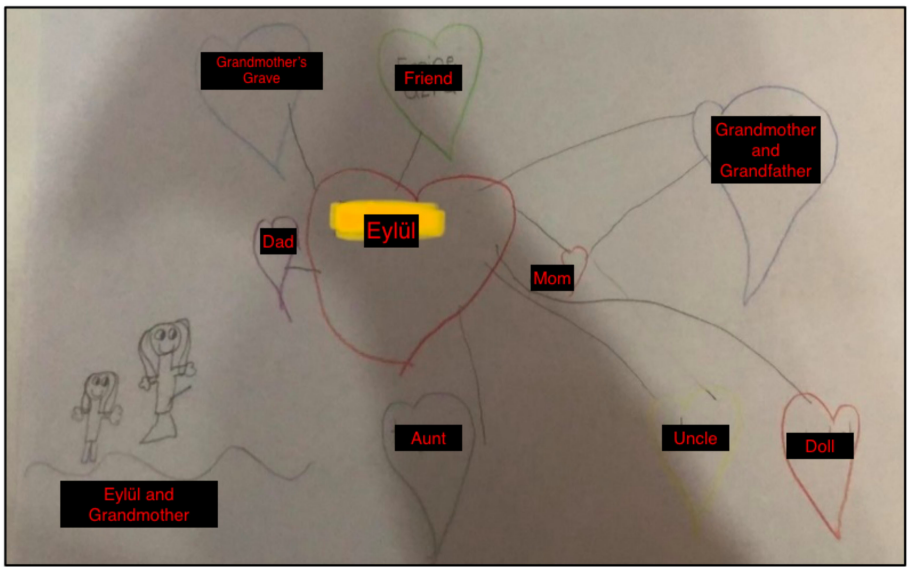

FIGURE 6
Eylül's Bond of Love Drawing in the Fifth Session.

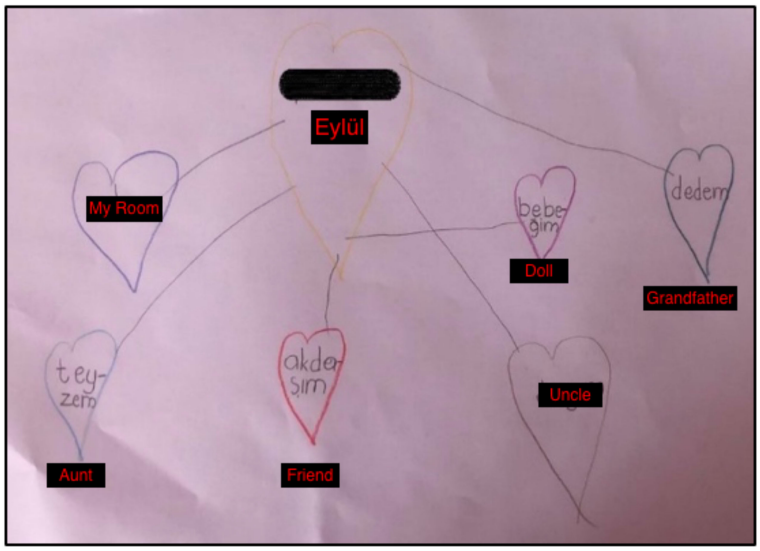

FIGURE 7
The Bond of Love Drawing by Eylül (Final Session).

> *After the sessions, I can honestly say that the process was beneficial for me as well. Eylül once said, 'Mom, I was so bored, I was so nervous, I did a butterfly hug,' but I did not see her do it, she did it on her own. She told me later." (Follow-up session, May 1, 2021).*

Before ending the session, the therapist wanted to repeat the bond of love exercise to observe the changes after the closure session. Eylül remembered the bond of love exercise, so the therapist briefly repeated the instructions and gave her some time to draw. The Figure 8 was drawn by Eylül.

In this session, Eylül was able to draw her grandmother not as a figure in a grave, but as a loved one. She also depicted the tent, which symbolized her family, friends as social resources, and calming skills as internal resources. This suggests that her coping skills with her grandmother's death have improved and she is enjoying social relationships. Despite her high cognitive abilities, it was important for her to be social, have fun, and be a child. The inclusion of her friends in the hearts was a positive sign. The therapist is proud of Eylül for her courage and dedication since the first session.

The comparison of Eylül's pre-test, post-test, and follow-up Child Revised Impact of Events scores revealed that her scores in all 8 items continuously decreased in the follow-up test. Eylül's CRIES-8 pre-test total score was 21, her post-test score was 6, and her follow-up test score was 4. The analysis of the item scores showed that she responded often (5 points) in item 3 (Do you have waves of strong feelings about it)?, item 5 (Do you try not talk about it.), and item 7 (Do other things keep making you think about it)?, however, her responses to these items were not at all in the follow-up test. As

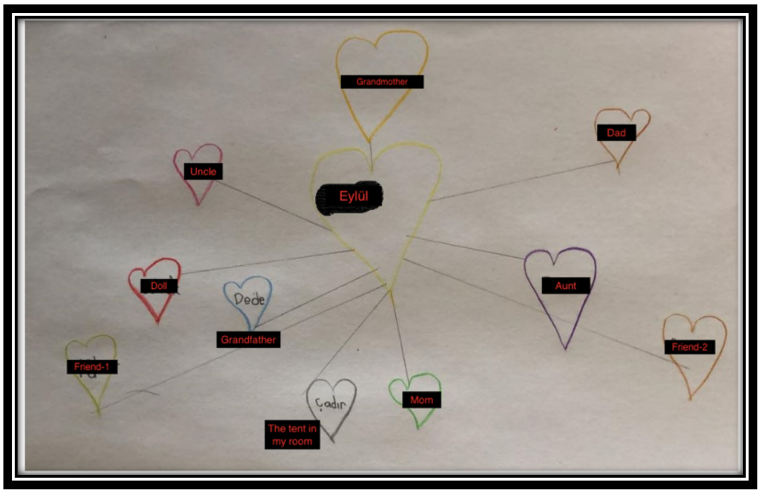

FIGURE 8
The Bond of Love Drawing (Follow-up Session).

Gülşah mentioned in her diary, calming skills and butterfly hug may have helped Eylül to deal with intense emotions. Additionally, due to the desensitization stage, Eylül's pre-test scores in item 6 (Do pictures about it pop into your mind)? and item 4 (Do you stay away from reminders of it) changed from Sometimes=3 to not at all=0 in the follow-up test."

4 Discussion and conclusion

The present study aimed to investigate the use of online EMDR in children with single-incident trauma and evaluate its impact. The study detailed the online EMDR sessions conducted with two children, aged 6 and 8.

I conducted five EMDR-based counseling sessions with Ipek, including the initial session, the session with her mother, and the follow-up session. Although Ipek initially exhibited poor facial expressions and emotional responses, she actively participated in the sessions and successfully overcame her difficulties. She can now sleep comfortably alone and even joke about the memory of the accident. Teaching bilateral stimulation techniques, resource development, and the desensitization phase were crucial during the EMDR sessions with Ipek. The observation of Ipek's weak emotional expressions and her potential difficulty in following instructions during the initial session highlighted the critical importance of having a family member actively participate in the sessions. This family member worked as a co-therapist during the BLS touches, which proved to be crucial for the online EMDR sessions. I conducted ten EMDR-based counseling sessions with Eylül, struggled to cope with her grandmother's death. She was behaving older than her age, had sleep difficulties, and avoided discussing death. After undergoing EMDR-based psychological counseling, her sleep problems were resolved, and she became more comfortable discussing her emotions and thoughts about her grandmother's death. She gained insight into the grieving process and found answers to her questions about death. Through the use of calming skills, she also strengthened her relationship with her parents.

A systematic review of online EMDR applications for post-traumatic stress disorder by Lenferink et al. (16) found only one study conducted during the COVID-19 pandemic and highlighted the need for further research. Although this study does not aim to measure the effect size, it serves to describe how online EMDR sessions are conducted with children. It can be said that the most significant challenge of online EMDR sessions is deciding how to incorporate BLS into the process. Spence et al. (38) investigated the effectiveness of a 6-week therapy program that combined a web-based EMDR device and cognitive behavioral interventions. Bilateral stimulation was conducted with a web-based EMDR device controlled by the client, but the study acknowledged the uncertainty of its effectiveness compared to face-to-face EMDR due to limited therapist involvement. Waterman and Cooper (39) conducted a meta-analysis on the use of EMDR as a self-help method and found that individuals used not only visual EMDR devices for bilateral stimulation but also audio files and tactile stimuli such as butterfly hugs. In this study, the use of tactile BLS methods stands out. The butterfly hug was used as a self-BLS method for children. Additionally, family members participating in the sessions performed BLS by touching the children's shoulders. Auditory bilateral stimulation was also used in the EMDR sessions with Eylül's preparation phase. Herkt et al. (40) found in a study that EMDR stimulation facilitated emotional access through neurological means, and auditory stimuli led to an increase in the activation of the right amygdala, suggesting a positive effect on the treatment of traumatic memories similar to visual stimuli. This demonstrated that the preference of bilateral stimulation in the study was consistent with the literature. According to AIP, the human brain and nervous system have an innate ability to process emotions, cognitions, and bodily sensations that arise in response to potentially traumatic events. However, when the trauma exceeds this capacity, unprocessed memories are stored in the brain in a dysfunctional format, causing ongoing distress in the child's life. EMDR therapy addresses this by having clients focus on specific traumatic memories while the therapist applies eye movements or other forms of bilateral sensory stimulation to facilitate adaptive processing (41–43). We believe it is very important for therapists to use forms of BLS other than eye movements when conducting online sessions with children to facilitate processing. Fun and resourceful methods like bilateral tapping on the chest like a gorilla or bilateral jumping on both feet can be incorporated into the preparation phase. Civilotti et al. (44) also recommend more frequently changing different types of BLS during the desensitization phase to keep the child actively engaged.

In the research series in which they presented the effectiveness of EMDR therapy, Manzoni et al. (45) pointed out that EMDR is used more frequently with children and adolescents. Nevertheless, it is noteworthy that there is no study conducted online in the research series. Online EMDR interventions can be effective when a strong therapeutic relationship is established with clients, similar to other forms of therapy. Although there are studies showing that online EMDR interventions are as effective as face-to-face therapies (46), there is a need for more research specifically proving the effect size in this area.

In this study, online EMDR-based counseling sessions with two mid-childhood clients who experienced single-incident trauma were described using the qualitative case study method. Future research could investigate the effectiveness and permanence of EMDR sessions through various empirical methods. Additionally, further studies using neuroimaging techniques are needed to gain a more comprehensive understanding of the effects of EMDR on the brain. Further research should also be conducted with children of similar age groups to the participants in this study but with different traumatic experiences, and with larger sample sizes using group EMDR protocols for individuals experiencing similar issues. In this study, the developmental EMDR protocol was applied online; therefore, future studies could explore the online application of different protocols that could be conducted with children. Finally, in addition to the tactile and auditory BLS methods used in this research, studies utilizing web-based EMDR devices and/or smartphone applications should also be conducted.

5 Limitations

The study's main strength and limitation both stem from its nature as a case study. Case studies can provide a rich contextual

understanding of the information. However, they are quite weak in terms of effect size. The study found that online EMDR was effective for the presented cases, and this effect might be primarily due to the inclusion of bilateral stimulation (BLS) in the online process. This study is limited in its use of tactile and auditory BLS in online sessions. Although all sessions were conducted under the therapist's guidance, a limitation is that the BLS was not performed directly by the therapist. Additionally, the fact that the clients participated in the sessions via computer can be noted as a limitation.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by İnönü University Research and Publication Ethics Committee (Approval No: 2020/18-3). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin. Written informed consent was obtained from the individual(s), and minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article.

Author contributions

CCA: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. MK: Supervision, Writing – review & editing. ÜK: Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The therapeutic relationship in EMDR therapy—A survey

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The history of EMDR therapy goes back to 1987, when it was introduced as EMD, a novel treatment for PTSD by Francine Shapiro. Over the course of time EMD developed into the comprehensive therapy approach named EMDR therapy. The development of the Adaptive Information Processing (AIP) Model, the model of pathogenesis and change of EMDR therapy, was a milestone in this development from technique to psychotherapy approach. Lately a description of the therapeutic relationship in EMDR therapy has been proposed based on attachment theory. The therapeutic relationship has been described as a core element of EMDR Therapy, and seems to be related to the structure of EMDR Therapy. An internet-based survey of EMDR therapists in several waves was used to evaluate whether EMDR therapists support the above mentioned description of the therapeutic relationship in EMDR therapy. The self-experience of the EMDR therapists in EMDR therapy as elicited in the survey seems to support the description of the therapeutic relationship in EMDR therapy. Even if the survey was only conducted with EMDR therapists, thus limiting the informative value on the patient population in general, it offers valuable insights into the therapeutic relationship in EMDR Therapy. Implications for treatment, training and research will be discussed.

KEYWORDS

EMDR therapy, adaptive information processing, therapeutic relationship, attachment theory, training, research

Introduction

Eye Movement Desensitization and Reprocessing therapy (EMDR) consists of a structured set of treatment plans and procedures based on the Adaptive Information Processing (AIP) model (Solomon and Shapiro, 2008). EMDR was introduced as EMD in 1987 (Shapiro, 1989) as a treatment for PTSD and was developed into the comprehensive therapy approach named EMDR therapy over the following years. Shapiro intended EMDR therapy to be compatible with all major orientations of psychotherapy.

The theory currently used to guide EMDR Therapy treatment effects is called the Adaptive Information Processing (AIP) model. The AIP model was developed to explain the rapid change toward positive resolution that can be seen in the EMDR memory reprocessing (Shapiro, 1995, 2001, 2018). The AIP model assumes "the physiological systems of the brain that attend to the assimilation of experience are no different from other systems" and "The movement toward health and balance is sustained unless there is a block or repeated traumatization" (Shapiro, 2002, p. 8). The term information as used in EMDR therapy refers to affect, cognition, sensory, somatosensory or other internal or external input as perceived at the time of the event leading to memory formation. In EMDR therapy, it is presumed that the activity of the adaptive information processing system leads to the integration of dysfunctionally encoded information toward functional encoding and adaptive state of

memory, in consequence contributing to reduction in distress and/or negative emotions. The AIP system may be hindered or blocked by trauma, other severe stress, or other like the influence of psychoactive drugs in consequence leading to formation of the maldaptively stored memory, which is assumed to be foundational for psychopathology. Shapiro described the adaptive information processing system an 'innate' system. But even if we assume that the adaptive information processing system is active from birth, we should take into account that every system like speech, movement, e.g., needs to develop. A developmental perspective of the adaptive information processing system is still missing in EMDR therapy.

In contrast to a common, but limited perception of EMDR therapy that the AIP model is only a model of inadequately processed memories, it also involves adaptive information, or to say of resilience (Solomon and Shapiro, 2012). Reprocessing procedures promote the linking in of positive, adaptive information into the maladaptively stored information, promoting adaptive resolution and integration into the wider memory network.

Shapiro stressed the fact that the client would need sufficient positive memory networks, which are present and accessible, for successful memory reprocessing (Shapiro and Laliotis, 2017). When there is a lack of adaptive information or integrative capacity, it seems straightforward that we need to install adaptive information prior to reprocessing. Common procedure are Resource Development and Installation (RDI) (Korn and Leeds, 2002) and the Instant Resource Installation (IRI) procedure (Hase, 2021).

Regarding posttraumatic stress disorder (PTSD), memory deficits, negative beliefs concerning the self, avoidance or suppression of memories, and negative interpretation of memory symptoms could explain impairment of access to adaptive memory networks (Brewin, 2011). The mere activation of malaptively stored memory could initiate a stress response altering the brains capacity to access adaptive memory or resulting in the loss of dual attention (Shapiro, 2018; Brewin, 2018). But it is not only PTSD, which can be the cause behind impaired access to adaptive memory. Survivors of early neglect show impaired capacities to tolerate and integrate moments of shared positive interpersonal experience. Into positive emotional states and positive self-concepts. They tend to make use of overt or covert avoidance strategies and minimization responses to avoid the discomfort, anxiety, or confusion connected to positive experiences. This defensive avoidance significantly contributes to symptom maintenance. EMDR therapy includes a preparation and stabilization Phase (Phase 2 of EMDR therapy) and involves providing interventions to enable to meet readiness criteria for EMDR memory work, such as the ‚Positive Affect Tolerance and Integration Protocol (Leeds, 2022). In general EMDR therapy preparation and resourcing interventions aim to expand the brain's integrative capacity and strengthen adaptive memory networks (Shapiro and Laliotis, 2017, p. 10, 18). Further, it is important to build a strong enough therapeutic relationship in preparation for the upcoming reprocessing of maldaptively stored information.

Shapiro was even more precise regarding the importance of the ability to access adaptive memory networks for reprocessing to occur. The 2017 edition of the EMDR Institute Basic Training Manual, and the current 2023 edition, emphasize the necessity of present and accessible adaptive memory networks and the importance of the therapeutic relationship as an source of adaptive information. "Adaptive memory networks need to be present and accessible for reprocessing to occur. Therapeutic relationship is part of an adaptive memory network" (Shapiro and Laliotis, 2017, p. 13).

Interestingly Shapiro (2007) discussed the therapeutic relationship in her textbook (2018), even more explicitly than in the EMDR Basic Training Manual, and advised that the therapist behavior be "optimally interactive (p. 76)," but refrained from describing the therapeutic relationship in EMDR therapy in detail or on how to establish a secure therapeutic relationship prior to memory reprocessing in detail. As the therapeutic relationship is of great importance regarding the outcome in psychotherapy (Orlinsky et al., 1994) this issue needs to be addressed. Hase and Brisch (2022) provided a description of the therapeutic relationship in EMDR therapy based on attachment theory (Bowlby, 2005). Predictability of the attachment figure is a good basis for the development of the infant. One could assume, that the predictability of therapist behavior in the manualized procedures of EMDR therapy contributes to the development of the therapeutic relationship in EMDR therapy.

According to Brisch (2002) the development of attachment between the infant and caregiver is related to the sensitivity of the caregiver. The caregiver with the most sensitive properties will become the primary attachment figure of the infant. Sensitivity facilitates the development of attachment. How could one define sensitivity? Brisch (2002) outlined that sensitivity shows in speech, rhythm, eye contact and touch. Most important the caregiver has to be able to perceive the infants' signals while not misinterpreting them, and react immediately and appropriately. This is only possible if the caregiver is emotionally available for the needs, affects and signals of the infant. In EMDR therapy as therapists we offer speech, but even more important, rhythm. We keep eye contact, while being not intrusive. Sometimes we offer touch. But most important, we perceive our clients' signal, being aware not to intrude, while reacting promptly and appropriately, which will certainly facilitate the development of a secure therapeutic relationship. The therapeutic relationship not only results from the above-mentioned behaviors, but also develops through procedures and protocols within EMDR therapy. Given the therapeutic relational factors described above, EMDR can be described as a ‚sensitive'psychotherapy approach. Table 1 shows EMDR therapy actions in relation to sensitive behavior.

These actions can explain at least to a great extent the specific therapeutic relationship in EMDR therapy, which often develops rapidly and provides a safe shared space, allowing our clients to reprocess, to grow and to get past their past. This article describes the results of an internet-based survey eliciting information on the self-experience of therapist during their training in EMDR therapy in

TABLE 1 Sensitivity and EMDR therapy.

Sensitive behavior	EMDR therapy
Speech	Help to elicit cognition; verbal support during set
Rhythm	Bilateral stimulation; timing of sets and breaks
Eye Contact	Aware of facial expression; Eye Movements
Touch	Tactile Stimulation
Perception of client	Awareness during BLS
Not misinterpreting	Refraining from comments; ‚stay out of the way'
Prompt and appropriate	Keep client in stimulation and react promptly to affective stress of client

order to evaluate the sensitivity factors facilitating the development of the therapeutic relationship in EMDR therapy.

EMDR therapy basic training as offered by the EMDR Institute Inc. or following the standards of EMDR Europe (website) consists of 52 h. These are divided into 22 h of theory and 20 h of a supervised practical self-experience, the so-called practicum, followed by 10 h of clinical case consultation. The 42 h of theory and practicum are mostly offered in two blocks of 3 days each. Within the practicum the attendees are advised to rotate through the roles of client, therapist and observer. In the role of client, the attendee is asked to bring up his own distressing memories which will be reprocessed with the help of the therapist. The attendee should experience the therapeutic action of EMDR therapy procedures, mostly the standard EMDR protocol, including the reprocessing on their own memories. This self-experience is an important part of the EMDR therapy basic training. For successful completion of the basic training an attendee is expected to be at least in the role of client and therapist once on each block. One can assume that after completion of the 42 h of theory and practicum each attendee has provided self-experience as a client in EMDR therapy memory reprocessing at least two times. In addition, the attendee has been in the role of client regarding diagnostic and preparatory procedures in the practicum. This is a minimum of self-experience in EMDR therapy basic training. Attendees are encouraged to engage in additional self-experience, but this not mandatory. As a result, the therapist practicing EMDR therapy after attending an EMDR therapy basic training could be questioned regarding their experience.

Methods

We made up a questionnaire describing core elements of the therapeutic relationship according to the above-mentioned sensitive factors in EMDR therapy. The EMDR therapist was asked to rate if they would disagree or agree on a five point scale. Responses were scored on a 5-point scale (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*) regarding a statement describing their experience as client in EMDR therapy. In addition, we asked for the number of EMDR sessions in the role of client and some demographic information as age and gender. The questionnaire was distributed in a pilot run and two waves in a modified Delphi-approach (Niederberger and Spranger, 2020). The results of each wave were used as feedback in order to modify the questionnaire. The results of wave one were also analyzed statistically contributing to another modification which led to the final version called BET 5.2. BET stands for „Beziehungserleben in der EMDR Therapie "which could be translated as „Relational Experience in EMDR therapy". The BET 5.2 was tested in the second wave of the survey. Even if the survey was only conducted with EMDR therapists, thus limiting the informative value on the patient population in general, it could offer valuable insights into the therapeutic relationship in EMDR therapy. One has to keep in mind, that psychotherapist are of course suffering from mental health problems. In a study on clinical, counseling, and school-psychology faculty and trainees overall rates of mental disorders were similar to or greater than those observed in the general population (Victor et al., 2022). With more than 80% of respondents (n = 1,395 of 1,692) reporting a lifetime history of mental-health difficulties, and nearly half (48%) reporting a diagnosed mental disorder the burden of mental-health problems seems high. Among the reported concerns the most common were depression, generalized anxiety disorder, and suicidal thoughts or behaviors. A recent study suggested a better overall mental health profile for Austrian psychotherapists compared to the population in general (Schaffler et al., 2024). Still quite a number of psychotherapists in this study exhibited scores beyond the cut-off for clinically significant mental disorders like depression, anxiety or insomnia. A survey among UK-based psychologist revealed, that Two-thirds of the participants had experienced mental health problems themselves (Tay et al., 2018). Disclosing and help-seeking were impaired by concerns about negative consequences for self and career. The reported rates of mental-health problems seem to make the psychotherapists in our sample a reasonably representative group, though most likely not representing the severly disordered, multiply traumatized client.

A preliminary version of the questionnaire was distributed in a pilot trial as an online survey (implemented via surveymonkey.com) to 16 experienced therapists who had participated in an online seminar on the therapeutic relationship in EMDR therapy. This version consisted of 13 descriptive items plus the additional demographic items. Feedback from this group of experts led to a questionnaire of 12 items describing the experience in the role of client. This questionnaire was then used in the following two survey waves to optimize the questionnaire using statistical methods.

Participants

The first author used an e-mail list of EMDR therapists. The minimum requirement to become member of this list is completion of the first part of the EMDR Therapy basic training. There were 1,348 therapists registered on the email list. Out of the 1,348, 118 responded in the first wave. The first wave of the survey comprised 118 individuals (82.2% female) who had experienced between one and five EMDR sessions (M = 2.28, SD = 1.15). Participants' age ranged from 26 to 80 years, with the majority (61.2%) being between 40 and 59, 32.8% between 60 and 79, and 6.0% between 20 and 39 years old.

Materials

We tested in the beginning 12 descriptive items to measure the experience of the therapeutic relationship in EMDR therapy. These items were developed by a senior EMDR trainer with 25 years of experience in EMDR therapy and had been tested in a pilot study. Responses were scored on a 5-point scale (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*). Table 1 presents item contents and descriptive statistics. According to results in the trial run and first wave the number of items was reduced to nine.

Procedure

After the trial run the preliminary descriptive items were distributed in an online survey (implemented via surveymonkey.com)

to the participants via an email list. Participants at first responded to 12 core survey items in the first wave. The statistical analysis suggested reducing the number of items to nine. In the second wave of the survey, the nine descriptive items and other information about the number of EMDR sessions experienced and demographics were acquired. The second wave of the survey was sent out via the same email list and 149 individuals responded. Table 2 shows the item content and descriptive statistics.

Statistical analysis

All statistical analyses were conducted in RStudio, version 2023.12.1. We used the fa.parallel() function of the *psych* package to conduct exploratory parallel analysis to determine the recommended number of factors and create scree plots (Revelle, 2024). We then used the base R function fa() with the maximum-likelihood factor analysis factoring method, varimax rotation, and a maximum of 100 bootstrap iterations to assess the underlying factor structure and corresponding fit indices in an exploratory factor analysis specifying the previously recommended number of factors. We visualized the factor structure of the recommended model in factor loading plots using the fa.diagram() function of the *psych* package. We applied a significance level of $\alpha = 0.05$.

Results

Figure 1 presents scree plots from the parallel analysis, which recommended a one-factor solution. The exploratory factor analysis for the one-factor solution showed a satisfactory fit for the recommended model, TLI = 0.912, RMSEA = 0.054, 95% CI: < 0.001, 0.097. The factor score adequacy was acceptable with a regression score-factor correlation of 0.88 and a multiple R^2 of scores with factors of 0.77. Figure 2 presents the factor loading plot for the recommended one-factor solution.

Wave two

The aim of wave two was to validate the one-factor solution identified in wave one. We hypothesized that the one-factor model would be confirmed in an independent sample and exhibit acceptable psychometric properties.

Method and participants

To validate the factor structure found in the first study, the modified nine core item version of the questionnaire was sent out via the same email list. A total of 149 individuals (81.0% female) participated in the second wave. Participants' age ranged from 26 to 80 years, with the majority (51.7%) being between 40 and 59, 41.6% between 60 and 79, and 6.7% between 20 and 39 years old. The experience in the role of client with EMDR therapy was rather balanced, with most participants having experienced a moderate number of sessions (38.3% between 5 and 12 sessions, 30.2% between 0 and 4, 20.1% between 13 and 24, 8.7% between 25 and 50, and 2.7% more than 50 sessions).

Procedure

The questionnaire data collection process was the same as in wave one. There was no missing data on any of the questionnaire items.

Material

We used the revised nine core item questionnaire. There was no missing data.

Results

A total of 77.19% agreed or strongly agreed to item 1 "The therapist controls the process through my eye movements, touch, or sounds. I find that pleasant in the relationship."

A total of 76.51% agreed or strongly agreed to item 2 "I experience the neutral feedback from the therapist during an EMDR session as pleasant."

A total of 87.25% agreed or strongly agreed to item 3 "That the therapist reacts immediately to changes within the EMDR session is agreeable."

A total of 81.88% agreed or strongly agreed to item 4 "The repetitive questions or statements (e.g., 'What do you get now?,' 'Follow my fingers …') by the therapist induce a sense of safety."

A total of 87.25% agreed or strongly agreed to item 5 "During an EMDR session with stimulation by eye movements, touch or tones I feel myself as being in the awareness of the therapist.

A total of 85.93% agreed or strongly agreed to item 6 "The structure in the EMDR reprocessing (working through a memory) given by the therapist (briefly talking about the memory - followed by eye movements, e.g., – short feedback – eye movements, e.g., - …) induces a sense of safety" 6.

A total of 81.11% agreed or strongly agreed to item 7 "I developed confidence in EMDR therapy faster than expected."

86% disagreed or strongly disagreed to Item 8 "Over the course of EMDR therapy, the relationship with my therapist deteriorated." Item scoring was reversed in the statistical analysis. This item checks if the person carefully read and understood the proposed item.

A total of 91.28% agreed or strongly agreed to item 9 "During an EMDR session patient and therapist are working together in collaborative manner."

Summarizing the answers we found very good support for a concept of a collaborative therapeutic relationship which develops faster than clients expected and seems robust (items 7, 8, 9). In addition we found very good support for the core items describing sensitive therapist behavior (items 1–6).

Table 3 presents the number of answers on the five point scale in %.

Statistical analysis

The next was to analyze the data. Table 4 presents descriptive statistics for the individual items as well as the entire scale, which showed good internal consistency, $\alpha = 0.84$, 95% CI: (0.80, 0.88).

We used the cfa()function of the *lavaan* R package (Rosseel, 2012) to perform confirmatory factor analysis on the factor solution identified in the first wave data. We calculated Cronbach's alpha and

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TABLE 2 Item contents and descriptive statistics.

Item	Content	*M*	*SD*	*Min*	*Max*
1	"The therapist controls the process through my eye movements, touch, or sounds. I find that pleasant in the relationship."	4.12	0.76	2	5
2	"I experience the neutral feedback from the therapist during an EMDR session as pleasant."	3.90	0.77	2	5
3	"That the therapist reacts immediately to changes within the EMDR session is agreeable."	4.12	0.84	1	5
4	"The repetitive questions or statements (e.g., 'What do you get now', 'Follow my fingers …') by the therapist induce a sense of safety."	4.13	0.80	2	5
5	"During an EMDR session with stimulation by eye movements, touch or tones I feel myself as being in the awareness of the therapist."	4.19	0.89	0	5
6	"The structure in the EMDR reprocessing (working through a memory) given by the therapist (briefly talking about the memory - followed by eye movements, e.g., – short feedback – eye movements, e.g., - …) induces a sense of safety."	4.22	0.68	2	5
7	"I developed confidence in EMDR therapy faster than expected."	4.25	0.79	2	5
8	"Over the course of EMDR therapy, the relationship with my therapist deteriorated."	4.33	0.90	1	5
9	"During an EMDR session patient and therapist are working together in collaborative manner."	4.42	0.63	2	5
Scale		4.21	0.45	0	5

corresponding confidence interval values using the *psych* package (Revelle, 2024). We visualized the confirmatory factor analysis results using the *semPlot* package (Epskamp, 2022).

Results

The confirmatory factor analysis showed an acceptable fit for the one-factor model, CFI = 0.914, TLI = 0.886, RMSEA = 0.094, 95% CI: 0.064, 0.125. Figure 3 presents the factor loading plot for the recommended one-factor solution containing 9 items.

Discussion

The results of the pilot survey and two consecutive survey waves testing a description of the therapeutic relationship in EMDR therapy as laid out by Hase and Brisch (2022) led to a nine-item solution forming the BET questionnaire, which exhibited acceptable psychometric properties. In addition to the core survey items describing the therapeutic relationship, we also acquired demographics data.

The descriptive items contain the elements of sensitive and predictable behavior, which is considered to be the basis of attachment between infant and caregiver. We assumed that sensitive and predictable therapist behavior could explain the specific therapeutic relationship in EMDR therapy to a great extent. This therapeutic relationship seems to develop rapidly and offer a safe shared space, which allows clients to reprocess, grow, and get past the past. To test this hypothesis, we gathered data by polling therapists trained in EMDR therapy according to an EMDR Europe-based standard, as the basic training requires self-experience in the role of the client. In following, we discuss the results of an internet-based survey eliciting information on the self-experience of therapists during their training in EMDR therapy to evaluate the above-mentioned description of the therapeutic relationship in EMDR therapy.

The demographic data acquired in waves one and two showed that the therapists participating in the survey were mostly in the second half of their professional career. Wave two revealed that the majority (93.3%) of EMDR therapists responding to the survey were between 40 and 79 years of age. This seems to indicate that at least in Germany, therapists begin to practice EMDR Therapy in the middle of their professional career; and in a way continue to practice or remain somehow affiliated to EMDR Therapy, as 41.6% of those who responded to the survey were in the age range between 60 and 79.

Regarding the experience in the role of the client, 30.2% of the surveyed therapists in wave two reported a maximum of 4 sessions in the role of client, which is in accordance with the minimum requirements of an EMDR Europe-accredited EMDR training. Astonishingly, more than two thirds reported more experience in the role of client. This seems to indicate that the therapists sought more self-experience in EMDR therapy than officially required; potentially for other personal benefits. 11.4% reported more than 25 sessions, which could more likely be called therapy.

Regarding the core survey items, the statistical analysis of wave one showed a satisfactory fit for a one-factor model. The factor score adequacy was acceptable with a regression score-factor correlation of 0.88 and a multiple R^2 of scores with factors of 0.77. The reduction of the list of core survey items to 9 items was tested in the second wave. The confirmatory factor analysis showed an acceptable fit for the

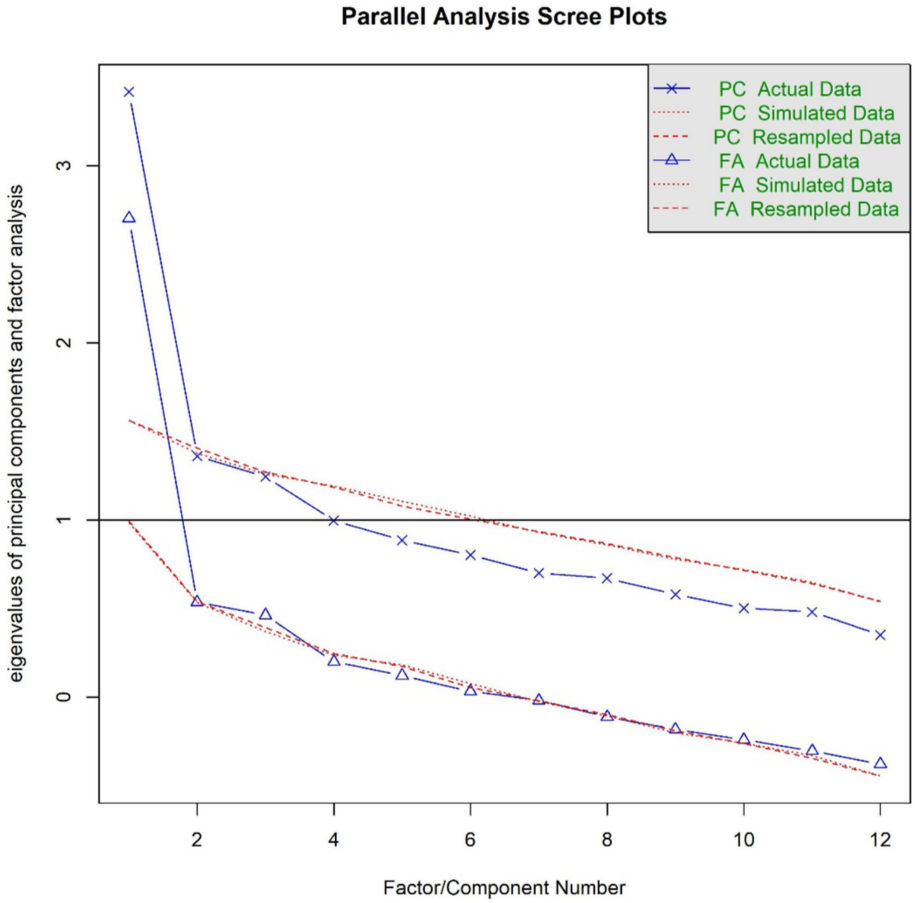

FIGURE 1
Parallel analysis scree plots (wave one).

one-factor model, thus confirming this model in an independent sample exhibiting acceptable psychometric properties. The descriptive statistics for the individual items as well as the entire scale showed good internal consistency.

The descriptive items based on the description of sensitive behavior by Brisch (2002) are supposed to reflect sensitive and predictable behavior by an EMDR therapist asking the client to indicate their agreement on a five-point scale. Items one to six describe the sensitive behavior of the therapist, whereas items seven to nine describe the development and quality of the therapeutic relationship. As the one-factor model was supported by the factor analysis, one can assume that sensitive therapist behavior is closely related to the development of the therapeutic relationship in EMDR therapy.

Even if a sample of psychotherapist seems to be a reasonably representative group regarding mental-health problems compared to the general population, limitations to this study are the relatively small number of participants and the sample that consisted only of therapists trained in EMDR Therapy. Especially one could question if the data and thus the drawn conclusions could be generalized to severly impaired multiply traumatized individuals. This study was conducted with EMDR therapists who perhaps have a higher level of capacity and readiness to engage in a therapeutic relationship. Severly impaired clients come in with a need for varying amounts of stabilization strategies and interventions relevant to their problems in order to maintain dual awareness during EMDR memory processing. Further, clients will differ in the amount of time (and sessions) needed to build up trust in the therapeutic relationship. Hence, this study needs to be viewed within a broader therapeutic framework with EMDR therapy integrating within an overall treatment plan based on assessment of the client and readiness for EMDR memory work. These issues should be addressed in future research. In questioning diverse groups of patients regarding their experience with EMDR Therapy, one could gain additional information more closely related to the client experience. In addition, the list of descriptive items could be used to create a questionnaire measuring the quality of therapist behavior, the development, and quality of the therapeutic relationship in an EMDR Therapy setting.

Implications for training, consultation, and research

Due to the very short training in EMDR Therapy, it seems understandable that therapists seem to start with EMDR Therapy in the midst of their career, as they first have to undergo extensive training to acquire basic psychotherapeutic knowledge beforehand. As the sample consisted to great extent of German therapists, it might also reflect the special situation in Germany,

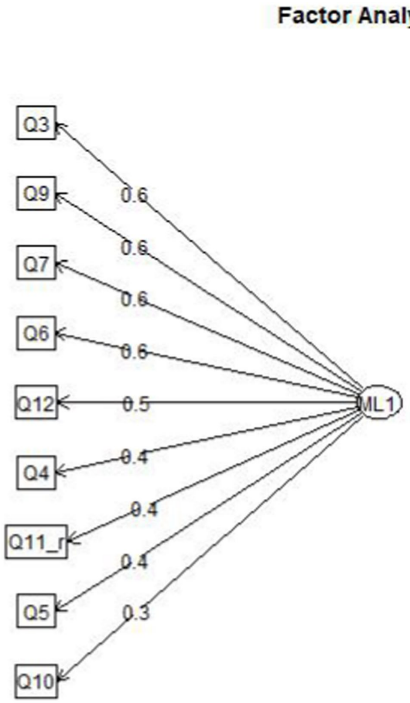

FIGURE 2
Factor loading plot (study 1).

TABLE 3 Number of answers on the five point scale in % related to question/item.

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	0.00	2.68	20.81	56.38	20.81
2	0.67	2.68	20.13	52.35	24.16
3	0.00	0.00	12.75	48.32	38.93
4	0.00	3.36	14.77	52.35	29.53
5	0.00	4.03	9.40	46.31	40.94
6	0.00	0.67	14.09	40.27	45.64
7	0.67	5.37	12.75	36.91	44.30
8	52.35	33.65	8.72	3.36	2.01
9	1.34	0.67	6.71	40.94	50.34

where EMDR Therapy can only be applied when embedded in one of the major psychotherapeutic approaches; that is, behavioral, systemic, psychodynamic therapy, or in modified psychoanalysis. Regarding the dissemination of EMDR therapy, it is desirable to reach out to therapists early in their career, but this would possibly call for an extension of the EMDR training or integration in university education.

The fact that more than two thirds of the therapists had obviously more experience in the role of client than required in the basic training is remarkable, as this is not mandatory in the current EMDR Training requirements. This could encourage the regulatory bodies like EMDR Europe Association to require additional self-experience as part of the EMDR therapy basic training. As the data seem to support the attachment theory-based concept of the therapeutic relationship with a sensitive behavior of the therapist as a pivotal element, one could discuss the necessity to enhance education in EMDR therapy with a training in sensitive behavior. To our knowledge, this has been successfully implemented in trainings in attachment-based therapy.

TABLE 4 Scale descriptives.

Item	*M*	*SD*	*Min.*	*Max.*
1	3.94	0.72	2	5
2	3.97	0.78	1	5
3	4.26	0.67	3	5
4	4.08	0.76	2	5
5	4.24	0.78	2	5
6	4.31	0.73	2	5
7	4.19	0.90	1	5
8	4.31	0.91	1	5
9	4.38	0.76	1	5
Scale	4.19	0.52	0	5

Summary

A description of the therapeutic relationship in EMDR therapy is important in the development of EMDR Therapy as a psychotherapeutic approach. Therefore, Hase and Brisch (2022) described the therapeutic relationship in EMDR Therapy, pointing out parallels between the therapeutic relationship and the development and core features of an attachment-based relationship. We tested descriptions of the elements of sensitive and predictable therapist behavior in therapists who had completed at least a part of the basic training in EMDR therapy. The factor analysis of the collected survey data supported a one-factor model, thus supporting the assumption that sensitive and predictable therapist behavior is related to the development of the therapeutic relationship in EMDR therapy. Limitations to this study are the relatively small number of participants and the sample consisting of therapists trained in EMDR therapy. These issues should be addressed in future research.

Additional data on demographic factors and the amount of self-experience reported by the therapists indicate that most of the therapists begin to train in EMDR Therapy rather late in their professional career and engage in more self-experience than is required by the standards of training. One should consider promoting training in EMDR Therapy within a university context to better reach therapists in the beginning of their professional careers. In addition, the standards of EMDR training could be adapted to the real-life situation by asking for mandatory self-experience in addition to the self-experience in the training courses. Regarding the finding, that a considerable number of therapist engages in self-experience on their own accords we assume, that a mandatory amount of self-experience would be accepted.

In future research, questioning patients on their experience in the EMDR therapy could bring up additional information more closely related to the client experience. In addition, the list of descriptive items could be used to create a questionnaire measuring the quality of

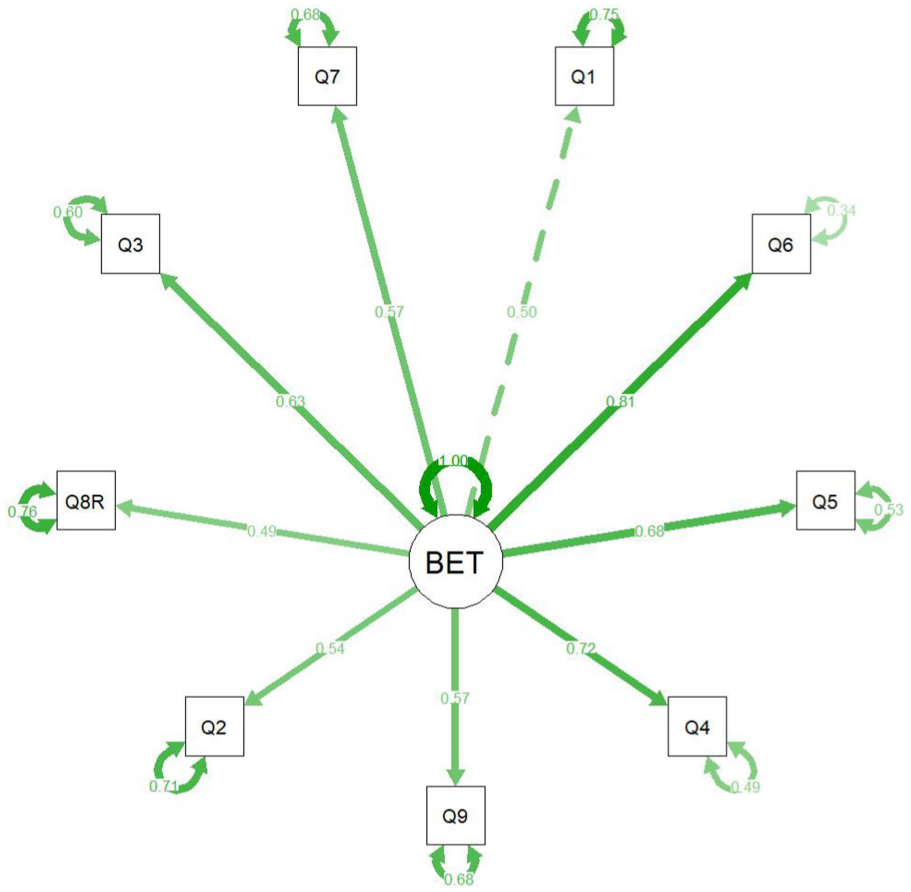

FIGURE 3
Confirmatory factor analysis plot (study 2).

therapist behavior, the development, and quality of the therapeutic relationship in an EMDR therapy setting. This could be helpful for the therapist to adjust his or her behavior.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the study involving humans in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants or participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements.

Author contributions

MH: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. KB: Writing – review & editing. RS: Writing – review & editing. AH: Data curation, Formal analysis, Software, Writing – review & editing.

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Conflict of interest

MH and RS offer training in EMDR therapy.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

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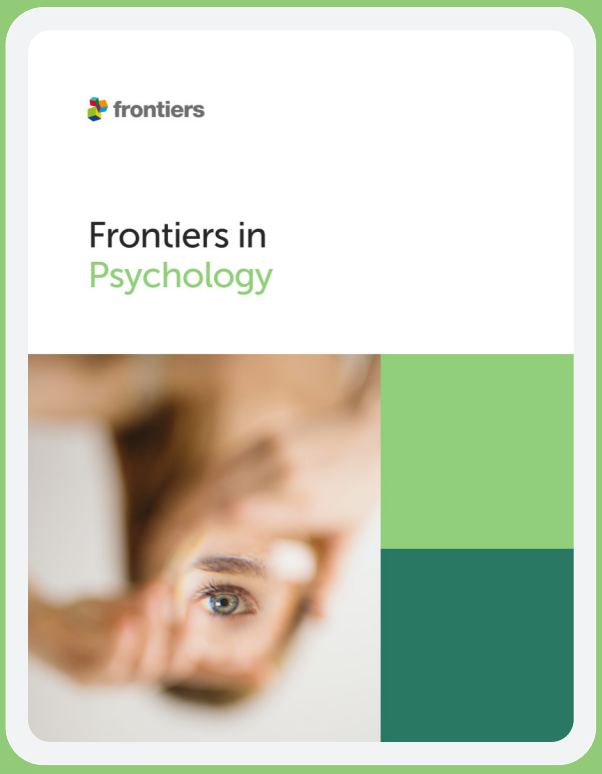

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