



# Self-esteem treatment in anxiety: A randomized controlled crossover trial of Eye Movement Desensitization and Reprocessing (EMDR) versus Competitive Memory Training (COMET) in patients with anxiety disorders



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## ABSTRACT

**Background and purpose:** Little is known about treating low self-esteem in anxiety disorders. This study evaluated two treatments targeting different mechanisms: (1) Eye Movement Desensitization and Reprocessing (EMDR), which aims to desensitize negative memory representations that are proposed to maintain low self-esteem; and (2) Competitive Memory Training (COMET), which aims to activate positive representations for enhancing self-esteem.

**Methods:** A Randomized Controlled Trial (RCT) was used with a crossover design. Group 1 received six sessions EMDR first and then six sessions COMET; group 2 vice versa. Assessments were made at baseline (T0), end of first treatment (T1), and end of second treatment (T2). Main outcome was self-esteem. We included 47 patients and performed Linear Mixed Models.

**Results:** COMET showed more improvements in self-esteem than EMDR: effect-sizes 1.25 versus 0.46 post-treatment. Unexpectedly, when EMDR was given first, subsequent effects of COMET were significantly reduced in comparison to COMET as the first intervention. For EMDR, sequence made no difference. Reductions in anxiety and depression were mediated by better self-esteem.

**Conclusions:** COMET was associated with significantly greater improvements in self-esteem than EMDR in patients with anxiety disorders. EMDR treatment reduced the effectiveness of subsequent COMET. Improved self-esteem mediated reductions in anxiety and depression symptoms.

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## 1. Introduction

Recent definitions of self-esteem emphasize the fact that self-esteem should be distinguished from other components of the

self-concept (such as self-knowledge and self-efficacy), insofar as self-esteem represents the affective, or evaluative, component of the self-concept; it signifies how people feel about themselves (Leary & Baumeister, 2000). Low self-esteem is associated with anxiety. A meta-analysis on 18 longitudinal studies with various samples found that low self-esteem is both causal to and consequential of anxiety (Sowislo & Orth, 2013). Although the associations were small, low self-esteem and anxiety seem to exacerbate one another. A recent study on 5.607 adolescents found that family dysfunction – domestic violence, substance use and broken

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marriage – predicted social anxiety symptoms, and that this was mediated by low self-esteem: the association of self-esteem with anxiety was  $r = -0.43$  (Yen, Yang, Wu, & Cheng, 2013). One longitudinal study with 1.641 adolescents found that low self-esteem predicted social anxiety symptoms two years later, and not the other way around (van Tuijl, de Jong, Sportel, de Hullu, & Nauta, 2014). Presumably, people with low self-esteem feel insecure and less able to handle stress, whereas people with a stable and positive self-image are more resilient in stressful situations (Zeigler-Hill, 2011). Possibly, patients with low self-esteem pay more attention to negative and frightening information, and less to safety cues. In line with this, recent research has found that people with an inferior self-image were more inclined to interpret situations and other people as threatening (Kesting & Lincoln, 2013).

To date, no studies have specifically addressed treatment of low self-esteem in anxiety disorders. It is known, however, that not all anxiety patients benefit from cognitive behaviour therapy (CBT). In about 40% of them, remission of the disorder is accomplished. Yet a substantial 30% of the patients will go on to have non-remitted and severe anxiety symptoms (Durham, Higgins, Chambers, Swan, & Dow, 2012). Self-esteem treatment may enhance these suboptimal effects.

### 1.1. Treatment of low self-esteem

Learning theory provides a background for treating low self-esteem. Negative evaluations of stimuli can be described as Conditioned Stimulus – Unconditioned Stimulus (CS-US) associations. A person with an anxiety disorder has learned that the CS implies a threatening US. During CBT, it appears that the CS-US association is not “unlearned”, but rather gets inhibited by a newly formed association: CS-noUS (Craske, Liao, & Vervliet, 2012). These old and new associations with regard to the same CS can be regarded as negative and positive representations that compete with each other in determining someone’s response (‘retrieval competition account of CBT’; Brewin, 2006). Consequently, treatment of low self-esteem may generate effects by focusing on two mechanisms: (1) de-activating negative representations, which may give room for existing positive representations, or (2) activating positive representations, which may then inhibit negative representations.

The first mechanism is explicitly the focus of Eye Movement Desensitization and Reprocessing (EMDR). EMDR is an effective treatment for reducing memory vividness and emotionality in patients with Post Traumatic Stress Disorder (PTSD) (van den Hout, Rijkeboer et al., 2012). de Jongh, ten Broeke, and Meijer (2010) postulate that EMDR can also reduce negative core beliefs (e.g. low self-esteem), by desensitizing relevant representations that the patient considers to be ‘evidence’ for this belief. The idea is this will improve self-esteem. Some evidence for this was found in a randomized controlled trial in 26 children that compared 4 sessions of EMDR to 4 sessions of cognitive behaviour therapy. Both treatments were associated with significant self-esteem improvements, also at six months follow-up (Wanders, Serra, & de Jongh, 2008).

The second mechanism is the explicit focus of Competitive Memory Training (COMET). This treatment aims to activate positive representations and associate them to relevant CSs, inhibiting some of the negative self-beliefs and feelings. A more detailed description is included in the method section. COMET as a group intervention has been tested in various randomized controlled trials. It was found to be effective when it was added to treatment as usual – when it was compared to just treatment as usual – in treating low self-esteem in 61 patients with depression; a between groups post-treatment effect-size of 1.3, and at 6-month follow-up the effects were maintained (Korrelboom, Maarsingh, & Huijbrechts,

2012). Also, it was effective in reducing low self-esteem in addition to treatment as usual – when compared to just treatment as usual – in 91 patients with a personality disorder; the effect-size was 0.9 post-treatment and 0.6 at 3-month follow-up (Korrelboom, Marissen, & van Assendelft, 2011). In a trial with 52 patients with eating disorders, COMET added to usual treatment, compared with just usual treatment, had an effect-size of 0.8 (Korrelboom, de Jong, Huijbrechts, & Daansen, 2009). Finally, COMET was effective, in comparison to treatment as usual, in reducing symptoms of depression and dysfunctional cognitive reactions in 77 patients with auditory verbal hallucinations (van der Gaag, van Oosterhout, Daalman, Sommer, & Korrelboom, 2012). However, COMET has not yet been tested on its effect on self-esteem in anxiety disordered patients, and has not been compared to an active treatment, such as EMDR, that aims to reduce negative representations.

### 1.2. Research questions

- Which of the two aforementioned treatments is associated with better outcome in improving self-esteem in patients with anxiety disorders?
- How do the treatments exert their effect on positive and negative self-esteem as separate constructs? We expected that EMDR would mostly reduce negative self-beliefs and that COMET would mostly improve positive self-beliefs, and that the total effect on self-esteem would be about equal.
- Do patients improve more after both treatments, in comparison to receiving just one?
- Does the treatment order affect the outcome? We assumed that after EMDR has desensitized negative representations, these representations would go down in the retrieval hierarchy (Brewin, 2006), allowing for COMET to strengthen the activation levels of positive representations more easily. So we expected that the sequence EMDR – COMET would result in better outcome than COMET – EMDR.
- Are there any effects of COMET and EMDR on anxiety and depression symptoms, and if so: are these effects mediated by improved self-esteem?

## 2. Methods

### 2.1. Design

A Randomized Controlled Trial (RCT) was used with a crossover design and two allocations. The two study allocations received the following sequence of treatments (see also Fig. 1):

1. First EMDR (6 sessions) and then COMET (6 sessions)
2. First COMET (6 sessions) and then EMDR (6 sessions)

### 2.2. Procedure

Patients were recruited at six outpatient clinics of two psychiatric institutes in the Netherlands: Altrecht Academic Anxiety Center (Utrecht area) and the Departments of PTSD and of Anxiety Disorders of PsyQ, Parnassia (The Hague area). Both institutes encompass secondary and tertiary referral centers, specialized in the treatment of patients with complex anxiety disorders. Eligible patients were informed about the study by their mental health professional. If a patient was interested, the Rosenberg Self-Esteem Scale was administered in order to assess low self-esteem. The clinician informed the patient about the study, verbally and in writing. The patients were given two weeks to consider whether

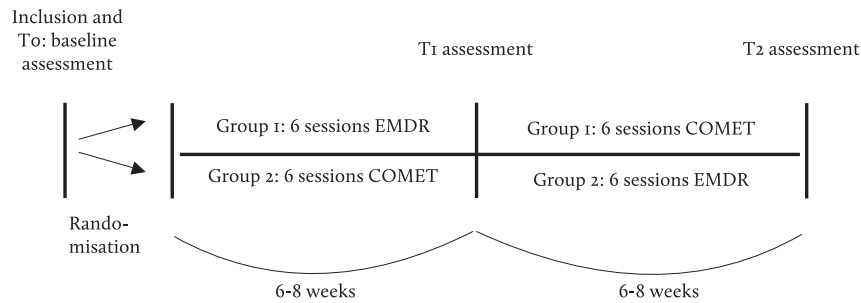


Fig. 1. Research design.

they wanted to participate, and after this period, one of the researchers contacted the patient and formally invited the person to participate. If so, an ‘informed consent form’ was signed, the baseline assessment took place, and the patient was randomized to allocation 1 or 2.

The trial design was registered on February 19th, 2014 ([www.trialregister.nl](http://www.trialregister.nl)) with identifier NTR4441. The Medical Ethics Committee of Utrecht University Medical Center approved the study (NL 47772.041.14). Patient recruitment and data gathering were performed in the period between June 2014 and May 2015.

### 2.3. Participants

Participants were eligible if they had a primary anxiety disorder according to the DSM-IV TR criteria (American Psychiatric Association, 2000) and low self-esteem (see below). Co-morbidity of other mental disorders was not an exclusion criterion per se. Patients also varied with respect to the duration of the anxiety disorder and the extent in which they had received treatment in the past (see Table 1). During the study period, patients did not receive other treatments, except the continuation of their pharmacological treatment if they already received medication at the start of the study.

Inclusion criteria were:

- Anxiety disorder, based on SCID-I or MINI
- Clinical anxiety symptoms (scoring > 38 on the STAI-state)
- Low self-esteem (scoring < 26 on the Rosenberg Self-esteem scale)
- Stable medication use (type and dosage) in the past month and willingness of both patient and treating physician to keep it stable during the study period
- Sufficient mastery of Dutch to complete the questionnaires
- Ability to mention at least one positive aspect of their self-image, which did not need to be ‘felt’ as convincing for the patient

Exclusion criteria were:

- Current alcohol or drug abuse or dependence
- Current severe major depression disorder
- Psychotic disorder

### 2.4. Randomization

After baseline assessment, patients were randomized by an independent bureau. A two by two block design was used in which random group allocations were generated by a computer system, stratified for the two psychiatric institutions. None of the researchers knew beforehand which allocation participants would

receive.

### 2.5. Assessments

Assessments were conducted at baseline (T0), end of first treatment (T1) and end of second treatment (T2) (Fig. 1). Assessments were performed by independent and allocation-blind assessors, who were students following a master in psychology at the level of higher vocational learning. We went to great lengths to assure their blindness to the treatment order. The assessors were not allowed to communicate with the therapists and were kept away from study meetings where the therapists were present. Upon seeing a participant for an assessment, assessors were instructed to immediately state that participants are not allowed to discuss aspects of the treatment. In the case of unblinding, another assessor was assigned to that participant to do an entirely new assessment.

For all patients, the anxiety disorder was diagnosed in accordance with the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV, 2000), using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; Lobbstaal, Leurgans, & Arntz, 2011) or the Mini International Neuropsychiatric Interview (MINI; van Vliet & de Beurs, 2007). At T0, demographics, medication use, and duration of the anxiety disorder were assessed. Repeatedly at T0, T1, and T2, primary and secondary outcomes were measured.

#### 2.5.1. Rosenberg self-esteem scale

The primary study outcome variable entailed self-esteem scores as measured with the Rosenberg Self-Esteem Scale (range 10–40). This scale has good reliability (Wongpakaran, Tinakon, Wongpakaran, & Nahathai, 2012) and it is used in self-esteem treatment studies around the world (Schmitt & Allik, 2005). In the Netherlands, an average score of 31.6 has been found (SD = 4.5) in a healthy population (Schmitt & Allik, 2005). We used 26 as the cut-off for inclusion, so participants at baseline all scored at least one standard deviation below the mean.

#### 2.5.2. Self-esteem rating scale – short form

The Self-Esteem Rating Scale – Short Form (SERS-SF) was used because it possesses distinctly validated subscales for measuring both positive and negative domains of self-esteem (Lecomte, Corbière, & Laisné, 2006). Scores on both dimensions range from 10 to 70.

#### 2.5.3. State-trait anxiety inventory

Current anxiety symptoms were measured with the state part (S-Anxiety) of the State-Trait Anxiety Inventory (STAI). This scale consists of 20 items that ask how participants feel ‘right now’, measuring subjective feelings of apprehension, tension, nervousness, worry, and arousal of the autonomic nervous system. The STAI has been validated, and for example meets the DSM-IV anxiety

**Table 1**  
Baseline characteristics of the sample, divided by group allocation.

		Group 1: EMDR-COMET	Group 2: COMET-EMDR
		N = 24	N = 23
Mean age		35.5 years (range 20–56)	38.4 years (range 21–60)
Sex	Male	3	4
	Female	21	19
Living status	Alone, independently	12	7
	With spouse/family	10	13
	With parents	2	3
Ethnicity	Dutch	14	17
	First generation immigrant	5	6
	Second generation immigrant	5	–
Anxiety disorder	PTSD	11	9
	Social Phobia	6	7
	Panic Disorder	3	3
	Generalized Anxiety Disorder	1	3
	Obsessive–Compulsive Disorder	2	1
	Anxiety Disorder NOS	1	–
Co-morbidity	Another Anxiety Disorder	10	8
	Depressive Disorder	12	8
	Other Axis I Disorder	5	4
	Axis II Disorder or traits thereof	12	10
	Substance Use (no disorder)	5	7
Mean duration of the primary anxiety disorder		9.7 years (range 0–28)	12.6 years (range 0–44)
Medication use	None	8	9
	SSRI	10	8
	Benzodiazepine	4	5
	Other	4	3

The two groups do not differ significantly on any of the baseline characteristics (independent samples *t*-tests and Chi-square tests).

disorder criteria (Okun, Stein, Bauman, & Silver, 1996). A score of 39 or higher indicates clinical levels (Julian, 2011).

#### 2.5.4. Beck depression inventory II

Symptoms of depression were measured with the Beck Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996). This self-administered scale consists of 21 items that are rated 0 through 3. The total score ranges from 0 until 63, in which higher scores indicate more depressive symptoms.

#### 2.6. Treatments and treatment integrity

Eye Movement Desensitization and Reprocessing (EMDR) is an effective treatment for Posttraumatic Stress Disorder (Nijdam, Gersons, Reitsma, de Jongh, & Olff, 2012; van den Hout, Rijkeboer et al., 2012). By using EMDR, mental representations get reduced in their vividness and emotionality (Shapiro, 2007), and the memory content becomes less accessible (van den Hout, Bartelski, & Engelhard, 2012). Next to EMDR's merit for treating PTSD, it has been proposed that it may also be effective in treating low self-esteem by desensitizing negative memory content in a more general sense; this approach has been termed 'EMDR second method' (de Jongh et al., 2010). An underlying principle is that negative events leave memory tracks causing and maintaining dysfunctional core beliefs (e.g. 'I am worthless') (de Jongh et al., 2010). EMDR may desensitize patients' relevant mental representations that form 'evidence' for these beliefs, for example the memory of being criticized by parents. The idea is that by doing so, positive representations are no longer inhibited and self-esteem improves. EMDR for low self-esteem is similar to EMDR for PTSD, but instead of flashbacks, memory representations that support low self-esteem are selected. A certified Dutch manual published by the Dutch EMDR Association was used in this study, as well as an 'EMDR-Europe' and Dutch EMDR Association certified trainer: Erik ten Broeke. For more details on EMDR procedures, we refer to handbooks (Shapiro, 2001).

Competitive Memory Training (COMET) aims to enhance the accessibility of positive self-representations in long term memory by repeatedly activating these representations, making them emotionally more salient, and finally associate them to relevant CSs. Positive self-representations within a person's autobiographical memory are selected on the basis of their disconfirmation or compensation of negative self-beliefs. The person then repeatedly relives them as vividly as possible in imagination. This way, positive representations may become more dominant, inhibit negative memory representations, and improve self-esteem. Relevant CSs are regular triggers for low self-esteem and may include, for example, making an error at work, not getting a response from someone, or having a conversation in which someone brings up the fact that the patient is unemployed. By imagery practices, these CSs may become associated with the positive representations.

As mentioned, COMET was tested in various randomized controlled trials. The Dutch manual was adapted for this study by the original author of COMET to fit six individual sessions. Reasons were that we had limited time available for the study duration and also that we wanted to execute COMET individually, for better comparison to EMDR, which incidentally allowed us to compress the eight group sessions into six individual sessions. With the individual format, each patient had more time to practice exercises during treatment sessions than in a group format. All of the regular steps and exercises were still included.

Both treatments were fully manualized. For each session, therapists had to check various boxes that corresponded with treatment procedures. Treatment sessions were recorded (90% video and 10% audio). After completion, 65 sessions (13% of the total) were randomly selected for integrity checks, performed by independent assistants with standardized rating forms. The ratings consisted of four-point scales for each component, as well as a four-point scale for the total evaluation of the session. Many components were rated, of which some examples for EMDR include: identifying the 'evidence', assessing the negative cognition, and appropriate eye movements during desensitization; and for

COMET: identifying the 'counter-evidence', giving various homework tasks, and practicing with the imaging techniques, all targeting the enhancement of emotional saliency and therefore retrievability of this 'counter-evidence'. Also, the assessors observed whether other topics were discussed that were not part of the intended treatment and if so, they gave a percentage of the time that was lost on this, added by comments on what it was about. Good treatment integrity was defined as scoring at least 80% of the maximum for that session.

### 2.7. Therapist training and supervision

The therapists were psychologists who were all trained in the basics of EMDR by completing at least a four-day basic course at the Dutch EMDR Association, except for one psychologist who had received a slightly different, but compatible EMDR training outside the Dutch EMDR Association. Of the 12 therapists involved, five were fully trained clinical psychologists; eight were cognitive behaviour therapists at the Dutch CBT Association, and nine were fully trained EMDR therapists or practitioners at the Dutch EMDR Association. In addition, for this study, all therapists received a one-day training in EMDR specifically to tackle self-esteem (by an EMDR-Europe and Dutch EMDR Association certified trainer: Erik ten Broeke) as well as a one-day training in COMET. One therapist was already familiar with the COMET procedure in advance of this training. During the study all therapists participated in eight supervision sessions in small groups (1–4 persons) for both treatment methods. Therapists received feedback on the recorded therapy sessions during supervision.

### 2.8. Statistical analysis

All analyses were conducted with SPSS version 20.0. Descriptive statistics were used to describe the sample. Independent samples *t*-tests and Chi-square tests were performed to analyse whether the randomization procedure was successful.

To analyse outcome results, we plotted graphs and used Linear Mixed Models with intention-to-treat analyses. Attrition for measurements was low (4 out of 47 patients) and missing data was automatically accounted for in the Linear Mixed Models analyses. Self-esteem was the dependent variable, subject's ID-numbers were entered with the possibility of different individual intercepts, and Time (T0, T1 and T2) indicated the repeated measures. We allowed for an unstructured covariance matrix for the repeated measurements. In the first model, we entered as fixed factors: (1) whether or not an individual had received EMDR and (2) whether or not an individual had received COMET. These two variables combined the information of measurement time and group allocation. At baseline, both these variables were '0' for all patients because no one had received treatment yet. At T1, half of the patients had received EMDR and the other half COMET. At T2, all patients scored '1' on both variables because they had received both treatments by then. In the second model, we entered the interactions of EMDR and COMET with the sequence in which they were given (Group Allocation), in order to assess whether the sequence made a difference.

Within group effect-sizes were calculated for self-esteem, anxiety, and depression symptoms. We used Cohen's *D* (Cohen, 1992): the mean difference – computed by the linear mixed models analyses – divided by the pooled standard deviation of the pre- and post-measurements.

We analysed whether changes in anxiety and depression were mediated by changes in self-esteem, using the method described by Hayes (2015). A variable is a mediating variable if it accounts for the association between treatment and symptom reduction. Perfect or

complete mediation refers to an absence of change when the mediator has been controlled for. When the treatment effect is reduced by a non-trivial amount, but not to zero, partial mediation has occurred (Baron & Kenny, 1986). To demonstrate mediation, the causal steps strategy was applied (Fig. 2). Several results must be ascertained: (1) an effect of treatment on symptoms (C path); (2) an effect of treatment on the mediator (A path); (3) an effect of the mediator on symptoms without the indirect effect of the mediator must be non-trivially reduced or absent (C' path). In order to analyse whether self-esteem mediated the changes in anxiety and depression, we used the bootstrap method that can handle non-parametric data and relatively small sample sizes (Preacher & Hayes, 2008). The algorithm and syntax for SPSS 18 are available on the Internet (Hayes & Preacher, 2014; Hayes, 2015).

Finally, as a post-hoc analysis, we examined the anxiety diagnoses. Because PTSD was highly prevalent, we were able to enter this variable as a predictor in order to test for differential effects.

## 3. Results

### 3.1. Participants and randomization

A total of 61 patients were referred for the study and 47 were included and randomized (Fig. 3 and Table 1). Despite low self-esteem, all referred patients met the inclusion criterion of being able to mention at least one positive aspect of their self-image. The randomization procedure was successful: there were no significant differences between the two groups on any demographic characteristic or outcome variable at baseline. Largest non-significant differences were found on the BDI-II, with group 1 revealing higher depressed scores ( $t = 1.37$ ,  $df = 45$ ,  $p = 0.178$ ) and on the positive SERS-SF subscale, with group 1 having more positive self-beliefs ( $t = 1.31$ ,  $df = 45$ ,  $p = 0.196$ ); see Table 2.

### 3.2. Treatment and assessment participation

Patients participated actively and equally in both treatments. Of the 47 patients, 41 (87%) completed at least 4 EMDR sessions and were considered EMDR-completers. For COMET, 44 (94%) patients completed at least 4 sessions and were completers. The average number of sessions completed did not differ significantly between EMDR (5.26) and COMET (5.57):  $t = 1.32$ ,  $p = 0.19$ . Also, it did not differ significantly within both treatments when comparing their sequence place (for EMDR:  $t = 0.96$ ,  $p = 0.34$  and for COMET:  $t = 1.25$ ,  $p = 0.22$ ). Within EMDR, an average of 3.05 memory representations were targeted for desensitization. That means that on average at least two representations were completely desensitized to  $SUD = 0$  (Shapiro, 2001). Together, only four patients (9%) missed the last assessment (T2), two in each of the arms of the study (see Fig. 3).

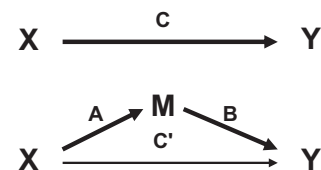


Fig. 2. Path models of the total effect of treatment on symptoms (upper figure) and mediated effects of treatment on symptoms (lower figure). C is the total effect of treatment X on symptoms Y. C' is the direct effect of treatment X on symptoms Y with the effects of mediator M partialled out. A is the effect of treatment X on mediator M and B is the effect of mediator M on symptoms Y.

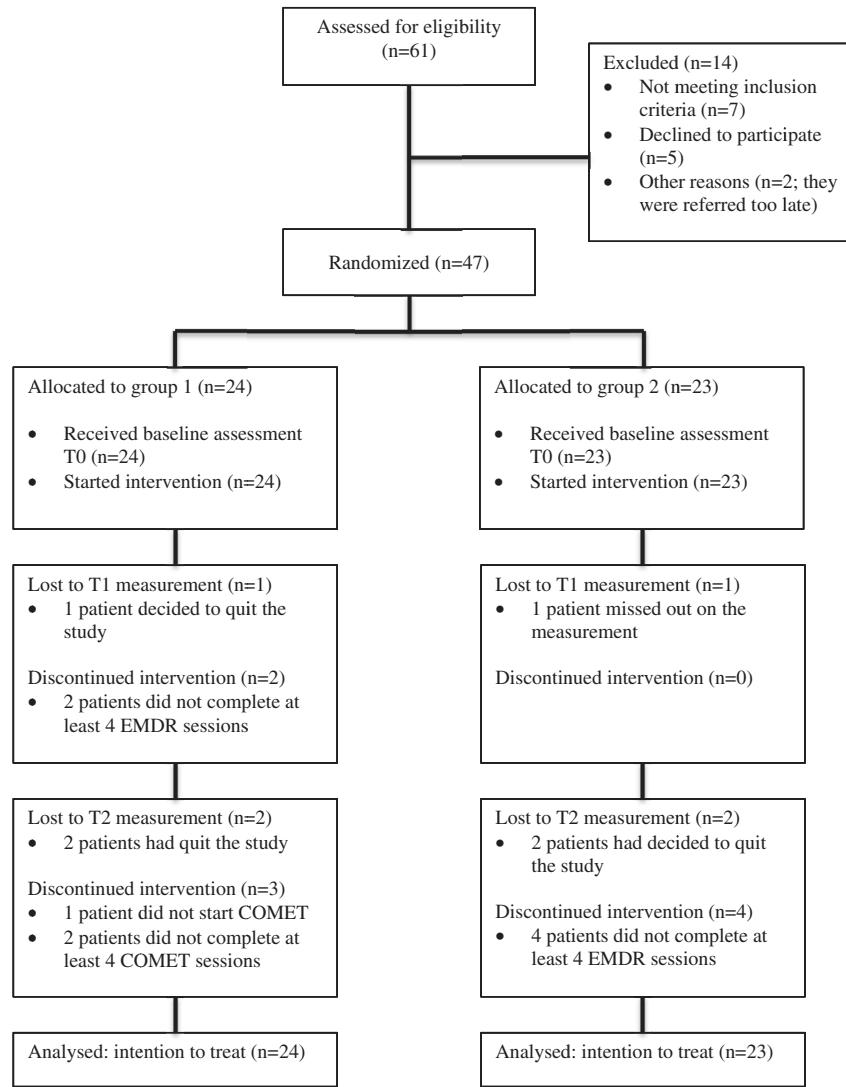


Fig. 3. Participant flow chart.

Table 2  
Means (SD) of the outcome measures.

	Group 1: first EMDR then COMET			Group 2: first COMET then EMDR		
	T0 (N = 24)	T1 (N = 23)	T2 (N = 22)	T0 (N = 23)	T1 (N = 22)	T2 (N = 21)
Rosenberg self-esteem	18.96 (3.01)	21.87** (4.42)	23.64** (4.35)	19.39 (4.48)	25.64** (4.14)	27.38** (4.40)
SERS-SF positive self-esteem	43.67 (11.98)	43.70 (10.03)	43.36 (12.53)	39.35 (10.49)	45.64 (9.60)	49.90 (9.69)
SERS-SF negative self-esteem	51.88 (8.99)	48.00* (9.40)	41.95* (10.04)	50.61 (9.53)	40.64* (10.49)	33.48* (13.10)
S-Anxiety (STAI)	58.29 (9.85)	51.22 (12.79)	46.91 (12.87)	56.96 (9.46)	46.64 (11.90)	41.24 (12.24)
BDI-II	31.58 (10.07)	26.30* (12.18)	21.73* (13.53)	27.22 (11.79)	17.27* (10.09)	13.14* (9.70)

\*p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001 in comparison to the other group at the same measurement time point (independent samples t-test). EMDR: Eye Movement and Desensitization Reprocessing. COMET: Competitive Memory Training. SERS-SF: Self-Esteem Rating Scale – Short Form. STAI: State-Trait Anxiety Inventory. BDI-II: Beck Depression Inventory II.

3.3. Treatment integrity

We randomly selected 65 (13%) out of the total 509 executed therapy sessions to be rated. Of these 65 selected, a randomly chosen 17 sessions got an extra independent rating by a second research assistant. There was a 77% agreement, indicating adequate inter-rater reliability of the integrity checks. Treatment integrity was high for both treatments; more than 90% of the sessions had

good quality. There was no carryover: therapists did not wrongfully include aspects of the other treatment in their sessions. So no participants or therapies were deleted from the analyses.

3.4. Treatment effects

Figs. 4–6 and Table 2 depict the outcome results.

### 3.4.1. Rosenberg self-esteem scale

In the first mixed models analysis, having received EMDR and having received COMET were highly significant predictors of the Rosenberg self-esteem scale total score. Adding the interaction terms with the sequence in which the modules were given, the interaction with COMET was statistically significant ( $F = 13.62$  |  $p < 0.001$ ), yet the interaction with EMDR was not ( $F = 0.502$  |  $p = 0.481$ ). We dropped the EMDR  $\times$  Allocation interaction. This resulted in the final model, in which EMDR and COMET were used as predictors as well as the interaction-effect of COMET  $\times$  Allocation. The estimated effects indicate that receiving EMDR would on average result in a 2.31 point increase ( $SE = 0.54$  |  $p < 0.001$ ) on the Rosenberg self-esteem scale, corresponding with a within-group effect size of 0.46. For COMET, the model estimated that receiving this treatment would result in an increase of 5.75 points ( $SE = 0.86$  |  $p < 0.001$ ) on the Rosenberg self-esteem scale, corresponding with an effect size of 1.25. However, if EMDR was provided first, the average effect of COMET was estimated to be reduced again by as much as 4.05 points ( $SE = 1.14$  |  $p = 0.001$ ). This suggests that COMET was most effective as stand-alone treatment. Preceding it by EMDR significantly reduced the effects of COMET. Such a pattern was not the case for EMDR (no interaction effect).

### 3.4.2. Self-esteem rating scale – short form

The effects on the positive self-esteem subscale of the SERS-SF were difficult to relate to the separate treatments, as Fig. 5 shows. The two variables EMDR and COMET were not significant, which means that, when comparing both groups together, neither EMDR nor COMET had significant overall effects on positive self-esteem. Because the graph hints towards a Time  $\times$  Allocation interaction, we entered this as fixed factor, which indeed produced significant effects:  $p = 0.017$ . The model estimations indicated that no changes occurred in positive self-esteem for Group 1 (first EMDR, then COMET). However, in Group 2 (first COMET, then EMDR), COMET corresponded with an increase of 5.66 points from T0 to T1 (effect size = 0.55), and EMDR with an increase of 4.71 points from T1 to T2 (effect size = 0.49). The total change was 10.37 points ( $SE = 2.69$ ), corresponding with an effect size of 1.03. Thus, positive self-esteem only changed in the group that got COMET first and EMDR second.

Both EMDR and COMET were significantly associated with reductions on the negative self-esteem subscale of the SERS-SF. According to the model, EMDR was associated with a 4.35 point decrease ( $SE = 1.50$  |  $p = 0.005$ ), corresponding with an effect size of 0.35, and COMET was associated with a decrease of 9.07 points ( $SE = 1.50$  |  $p < 0.001$ ), corresponding with an effect size of 0.93.

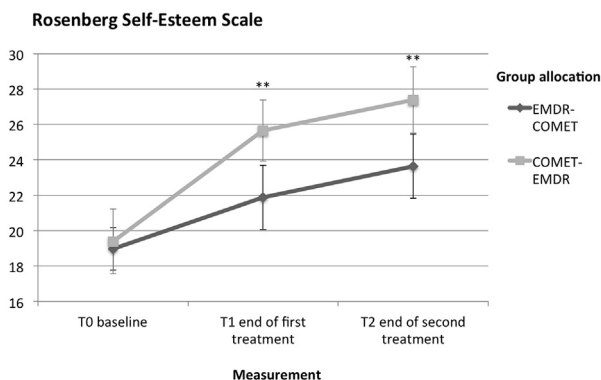


Fig. 4. Rosenberg Self-Esteem Scale mean scores across the three measurements for both group allocations, with 95% confidence interval error bars. \*\* $p < 0.01$  for difference between the two groups (independent samples  $t$ -test).

### Self-Esteem Rating Scale – Short Form – positive subscale

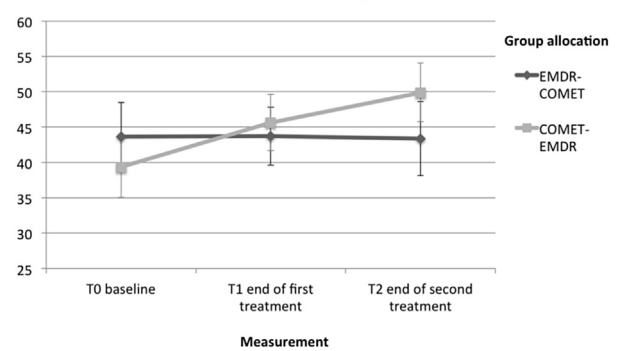


Fig. 5. Self-Esteem Rating Scale – Short Form (SERS-SF) positive subscale mean scores across the three measurements for both group allocations, with 95% confidence interval error bars. No significant difference at any time point.

### Self-Esteem Rating Scale – Short Form – negative subscale

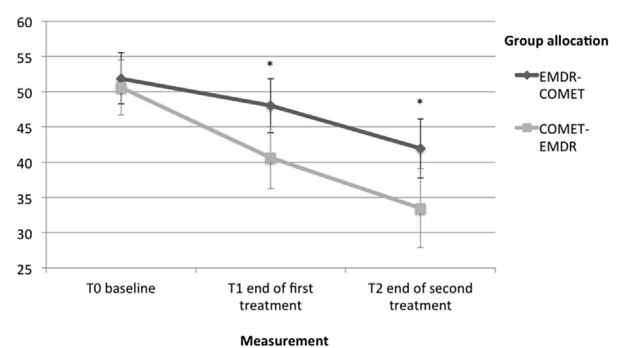


Fig. 6. Self-Esteem Rating Scale – Short Form (SERS-SF) negative subscale mean scores across the three measurements for both group allocations, with 95% confidence interval error bars. \* $p < 0.05$  for difference between the two groups (independent samples  $t$ -test).

### 3.4.3. State-trait anxiety inventory

State anxiety symptoms decreased in both groups, and there were no significant interaction effects of EMDR or COMET with the sequence. According to the estimation, EMDR was associated with a decrease of 5.53 points ( $SE = 1.72$  |  $p = 0.002$ ), corresponding with an effect size of 0.43, and COMET was associated with a decrease of 7.08 points ( $SE = 1.71$  |  $p < 0.001$ ), corresponding with an effect size of 0.60. At T2, using the cut-off of 39 as a dichotomous outcome, 42% of the patients were no longer in the clinical range of anxiety symptoms.

### 3.4.4. Beck depression inventory II

Depression symptoms (BDI-II) decreased in both groups, and there was a significant interaction effect of Sequence  $\times$  COMET. EMDR was estimated to be associated with a decrease of 3.94 points ( $SE = 1.34$  |  $p = 0.004$ ), corresponding with an effect size of 0.31. COMET was estimated to be associated with a decrease of 9.90 points ( $SE = 2.11$  |  $p < 0.001$ ), corresponding with an effect size of 0.83. However, if EMDR was provided first, COMET's effect was reduced by 5.41 points. So again, this suggests that COMET was more effective as a stand-alone treatment. At T2, using the cut-off of 14 (lowest BDI-II category), 44% of the patients scored below the clinical range, whereas at baseline this was 6%.

### 3.5. Mediation analyses

Table 3 presents the mediation results. The total mediator model

for anxiety symptoms was significant  $F(2, 83) = 44.485, p < 0.0001$ . The total explained variance ( $R^2$ ) was 52%. Self-esteem fulfilled the criteria for complete mediation: therapy significantly affected the mediator (path A), the mediator self-esteem significantly affected anxiety symptoms (B), the direct effect of therapy on anxiety symptoms disappeared when corrected for self-esteem (path C' is not significant), and the bootstrap indirect effects were significant. In short: the reduction in anxiety symptoms was completely mediated by improved self-esteem. For depression, results were similar. The total mediator model for depression symptoms was significant  $F(2, 83) = 36.789, p < 0.0001$ . The explained variance was 47%. The reduction in depression symptoms was completely mediated by improved self-esteem.

3.6. PTSD as moderator

Twenty patients had a diagnosis of PTSD as the primary anxiety disorder, and another four patients had it as the second diagnosis – together 51% of the sample. To test differential effects, we added this variable to the prediction models. There was a general effect: presence of PTSD corresponded with, on average, a 1.88 points lower score on the Rosenberg self-esteem scale ( $SE = 0.91 | p = 0.045$ ), a 6.68 points higher score on the BDI-II ( $SE = 2.59 | p = 0.013$ ), and a 5.59 points higher score on the S-Anxiety ( $SE = 2.46 | p = 0.027$ ). However, PTSD did not predict less or more improvement on any of the scales (not even trends, p-values were higher than 0.40), also not specifically for the EMDR treatment. So patients with PTSD had lower self-esteem and higher levels of depression and anxiety than patients without PTSD, but we could not detect significant differences in treatment effects.

The clinical impression of the therapists was that for most PTSD patients, the memories for low self-esteem targeted by EMDR did not correspond with the traumatic events connected to PTSD reliving symptoms. This does not mean, however, that the memories targeted were not severe. Some of the examples imply that the patients' low self-esteem was related to traumatic or sub-traumatic events, such as repeatedly being beaten by a parent, being bullied and excluded by peers, or being humiliated by a parent in front of others. Yet others talked about more self-initiated behaviors, such as being drunk and having severely embarrassed oneself in front of colleagues.

4. Discussion

To our knowledge, this is the first time that self-esteem treatment was tested in patients with anxiety disorders. We compared two different treatment strategies: de-activating negative representations versus activating positive representations.

The results indicate that six COMET sessions are more effective in improving self-esteem in anxiety patients than six EMDR

sessions; effect-sizes in this study were 1.25 vs. 0.46. On specific self-esteem subdomains of positive and negative self-esteem, we had expected that EMDR would reduce negative self-esteem more than COMET, because it desensitises negative representations. However, COMET was associated with larger reductions of negative self-esteem than EMDR. It seems that COMET's focus on positive representations is not only effective in boosting self-esteem in general, but also in reducing negative self-beliefs. Furthermore, COMET in this study was more effective than EMDR in reducing depressive symptoms (effect-sizes 0.83 vs. 0.31). However, there was no significant difference between treatments in reducing anxiety symptoms. Together, the results constitute strong evidence that COMET is effective in treating low self-esteem in anxiety patients, more so than six sessions of EMDR. The COMET effectiveness in this study is comparable with its effect in other studies (Korrelboom et al., 2009, 2011, 2012), irrespective of mental disorder (other trials included other disorders) and treatment modality: we used six individual sessions whereas other studies executed COMET in a seven or eight-session group format.

Seemingly, according to its own underlying theoretical background, COMET increases access to and boosts positive representations that effectively compete with existing negative representations. EMDR aims to desensitize negative representations, but this does not by itself greatly enhance self-esteem. One explanation is that too few negative self-representations have been targeted by EMDR in order to be effective. On average, EMDR in this study targeted three representations and at least the two most important representations were desensitized completely, yet this did not result in large changes in self-beliefs. Alternatively, perhaps negative self-beliefs are rooted in cognitive belief systems that are less characterized by emotionally charged and fearful memory representations, and are as a consequence less sensitive to EMDR. But differences in effects could also be explained by other aspects: COMET incorporates active homework between the sessions, such as daily training to activate positive representations as well registering this in a logbook, and – at a later stage – the conditioning of these positive representations to CSs that used to trigger negative representations. This may be important for enhancing self-esteem. The EMDR manual does not actively engage the patient in doing new things between sessions. Based on our results, EMDR can not be considered as the intervention of first choice for treating low self-esteem in anxiety disordered patients.

Surprisingly, COMET was associated with greater improvements as a stand-alone treatment. When EMDR was provided first, the effects of COMET on self-esteem and depression were significantly reduced to such an extent, that the combined effect of EMDR + COMET was smaller than that of COMET alone. Thus it appears that offering EMDR to patients with low self-esteem as a first treatment hampers the potential benefits of subsequent COMET. Possibly, EMDR does not effectively reduce the activation

Table 3 Results of mediation analyses with bootstrapping.

		Direct and total effects p-values			Bootstrap indirect effects 95% confidence interval (A*B path)	
		A	B	C'	Lower limit	Upper limit
Effects on anxiety symptoms (STAI)	Total treatment effect (without mediation)			0.000 (C)		
	Self-esteem as mediator	0.000	0.000	0.139 (C')	-14.216	-6.395
Effects on depression symptoms (BDI-II)	Total treatment effect (without mediation)			0.000 (C)		
	Self-esteem as mediator	0.000	0.000	0.378 (C')	-14.350	-6.124

C: total effect of treatment (time) on anxiety symptoms; A: effect of treatment on the mediator self-esteem; B: effect of self-esteem on anxiety symptoms; C': effect of treatment on anxiety symptoms without the indirect effect of the mediator self-esteem; A\*B path: bootstrap results for the indirect effect; lower and upper limits of confidence interval for test of mediation with 5.000 bootstrap re-samples and bias correction. STAI: State-Trait Anxiety Inventory. BDI-II: Beck Depression Inventory II.



levels of negative memory representations related to low self-esteem. Despite EMDR's proven merit in desensitizing the vividness and emotionality of negative mental representations that constitute the flashbacks in Posttraumatic Stress Disorder, the psychological problem of low self-esteem may not be characterized by such vivid and highly emotional representations in a majority of the cases. Consequently, there may be no need for desensitization. Applying EMDR to reduce negative self-esteem might even paradoxically activate negative representations by extensively attending to them. This seems contradictory with the observed reductions of low self-esteem associated with EMDR, but placebo effects may have played a role. As a result, when negative representations have been activated by providing EMDR as the first treatment, COMET might be less able to effectively compete with these activated negative representations by boosting positive self-representations. Also then, the effects on positive self-beliefs of EMDR when it has been preceded by COMET may be due to a carry-over effect of the positive representation boost by COMET.

The current study indicates that treating self-esteem in anxiety patients may also impact positively on anxiety symptoms, even though the interventions did not target these symptoms directly. The EMDR treatment probably did not target the flashback memories in the PTSD patients (51% of the sample). Both treatments focussed on self-esteem only. This constitutes some experimental evidence for the cause-effect relationship between low self-esteem and anxiety symptoms, in line with cross-sectional and longitudinal studies (Sowislo & Orth, 2013; van Tuijl et al., 2014; Yen et al., 2013). Improved self-esteem may work as a buffer for stress in patients with anxiety disorders, making them more resilient and experience less anxiety. We also found this for depression symptoms: reductions were significant and mediated by improved self-esteem, in line with other studies (Korrelboom et al., 2011, 2012; van der Gaag et al., 2012). It is increasingly apparent that low self-esteem constitutes a relevant treatment target in various mental health conditions, including anxiety disorders.

#### 4.1. Limitations

A first limitation is the sample size. Even though we tested both treatments in all 47 patients – generating more statistical power in comparison to patients receiving only one of the treatments – the current sample size leaves some room for chance findings and type 1 error. Secondly, we performed no follow-up assessments, and therefore it is unclear whether these short-term effects hold across time. Also, potential follow-up data in this within-groups study cannot be linked to one of the treatments, as everyone had received both in the end. A third limitation is that we cannot rule out that treatment effects observed in the second part of the study were in fact carryover effects of the first treatment. For example, the fact that EMDR only enhanced positive self-esteem when COMET was provided first, may mean that COMET still exerted carryover effects even after cessation and that EMDR actually did not affect positive self-esteem at all. Fourthly, there was no non-intervention control group. We were therefore unable to control for time and placebo. Fifth, for comparison reasons as well as study duration, we restricted the treatments to six sessions. While this may have worked well for COMET, it may have been too short for EMDR. There were some cases in which therapists stated that EMDR was not yet finished within those six sessions. More sessions of EMDR may be more effective for low self-esteem. Finally, we did not measure the patients' real world positive and negative memory representations, nor did we measure their relative retrieval activation levels. We only used proxies, i.e. the separate negative and positive self-esteem subscales. Future studies may use something

like the implicit association test (IAT), an automated reaction time task that can measure the relative strength of two attribute concepts (e.g., positive/negative) related to the self. During several phases, a participant uses two response keys to categorize words from these concepts. The IAT is based on the notion that when a target and attribute sharing a response key are strongly associated (e.g., self/positive), the categorizing is easier than when the two response-sharing concepts are weakly associated (e.g., self/negative). The IAT effect is the response time difference between these two conditions. See for example Engelhard, Huijding, Van den Hout, and De Jong (2007).

#### 4.2. Strengths

The study had several strengths. First, assessments were performed independently and blinded for treatment condition. Second, an independent bureau performed the randomisations. Third, there was low attrition and patients participated well in the treatments. Fourth, all therapists executed both treatments – therefore the possibility of unequal therapist characteristics between the two groups was not a confounding factor when comparing the two treatments. Fifth, we checked treatment integrity, which was high. Finally, due to the study design and mixed model statistical analyses, patients acted as their own 'control group' as all of them received both treatments.

Future studies may compare COMET for self-esteem in patients with anxiety disorders with CBT for anxiety or no treatment, to further examine the potential of reducing anxiety symptoms by improving self-esteem. They may also examine the best moment for doing so: at the beginning of regular treatment for anxiety, perhaps helping later CBT for anxiety to produce more effect; or rather later on, when regular anxiety treatment has proven to be insufficient. Such findings may then be translated to optimize treatment outcome in patients with anxiety disorders.

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