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Research Paper

A Replicated Single Case Evaluation of a Depression Focused EMDR Protocol (EMDR DeprEnd) for Reducing Depression, Anxiety, and Emotion Dysregulation

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Abstract

Introduction and Objective: Major depressive disorders are highly prevalent and frequently co-occur with anxiety and emotion dysregulation, highlighting the need for brief interventions that target shared mechanisms. Eye movement desensitization and reprocessing (EMDR) has an expanding evidence base beyond posttraumatic stress disorder, including emerging support for depressive symptoms. This replicated single-case study examined a depression-focused EMDR protocol (EMDR-DeprEnd) in three university students in Tehran, Iran.

Research Methodology: Participants completed repeated self-report assessments during baseline (three occasions), treatment (five occasions), and follow-up (one occasion). Outcomes were depression (Beck Depression Inventory–II; BDI-II), anxiety (Beck Anxiety Inventory; BAI), and emotion dysregulation (Difficulties in Emotion Regulation Scale; DERS). Analyses included structured visual inspection and single-case metrics (percentage of nonoverlapping/overlapping data [PND/POD], mean baseline level reduction [MBLR], and reliable change indices [RCI]).

Findings: Across cases, baselines were stable, followed by downward trends during treatment and further reductions at follow-up. From baseline to follow-up, depression decreased by 33.8%–38.6%, anxiety decreased by 45.1%–58.5%, and emotion dysregulation decreased by 23.0%–28.9%. PND values were lower for depression (20% across cases) than for anxiety and DERS, which may suggest early transient symptom elevations in some participants. RCIs exceeded conventional thresholds for reliable improvement for all outcomes (using pooled baseline variability).

Conclusion: These preliminary findings suggest EMDR-DeprEnd may be feasible and potentially beneficial for reducing depressive symptoms alongside anxiety and emotion dysregulation. Replication using rigorous multiple-baseline and controlled designs with longer follow-up is warranted.

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Introduction

Depressive disorders are among the most common and disabling mental health conditions worldwide. They are associated with substantial personal suffering, impaired functioning, and increased risk for recurrent episodes. The World Health Organization estimates that hundreds of millions of people live with depression globally, underscoring the public health importance of improving access to effective psychological treatments (World Health Organization, 2023). Although evidence-based psychotherapies and pharmacotherapies exist, a meaningful proportion of patients experience incomplete response, residual symptoms, relapse, or barriers to care (e.g., limited availability of specialized services, stigma, and treatment burden; (Cuijpers et al., 2023). Accordingly, there is continued interest in brief, scalable interventions that can address depression and its common co-occurring difficulties.

University populations are a particularly relevant context for early intervention research. Academic demands, financial pressures, and developmental transitions can amplify vulnerability to depressive and anxious symptoms, while service capacity at university counseling centers is often limited. Brief, mechanism-focused interventions may therefore be especially valuable for student populations, provided that efficacy and feasibility are established in the local context (Cuijpers et al., 2019).

Depression rarely presents in isolation. Anxiety symptoms frequently co-occur with depression, and this comorbidity is linked to greater symptom severity, functional impairment, and poorer treatment outcomes (McRae & Gross, 2020). Meta-analytic evidence suggests that transdiagnostic psychological treatments can be effective for depression and anxiety, supporting the clinical value of targeting shared mechanisms rather than disorder-specific symptom clusters in some contexts (Cuijpers et al., 2023). Contemporary frameworks increasingly emphasize transdiagnostic processes that cut across traditional diagnostic boundaries, such as maladaptive emotion regulation, negative affectivity, and biased memory and attention systems (Dalgleish et al., 2020).

Emotion regulation refers to processes through which individuals influence the intensity, duration, and expression of emotions, including how emotions are experienced and managed in response to stressors (McRae & Gross, 2020). emotion dysregulation are conceptualized as a transdiagnostic feature of emotional disorders and have been linked to both depressive and anxious symptomatology (Cludius et al., 2020). Consistent with this view, a meta-analysis of psychological interventions for youth with depression and anxiety found that treatments can improve emotion regulation outcomes, suggesting that emotion regulation is both clinically relevant and modifiable (Daros et al., 2021). In depressive disorders, persistent negative affect, maladaptive rumination, and avoidance may be maintained by unprocessed distressing memories and rigid negative self-beliefs, which can also contribute to anxiety and broader emotion dysregulation (Cludius et al., 2020).

Eye movement desensitization and reprocessing (EMDR) therapy is a structured, phase-based psychotherapy originally developed for posttraumatic stress disorder (PTSD). EMDR is grounded in the Adaptive Information Processing (AIP) model, which proposes that symptoms are maintained when distressing experiences are stored in a maladaptive form and remain insufficiently integrated with adaptive memory networks. During EMDR reprocessing, the individual attends simultaneously to aspects of the distressing memory and an external dual-attention stimulus (typically bilateral stimulation), with the goal of facilitating adaptive reprocessing and symptom reduction. Contemporary syntheses describe EMDR as having a strong evidence base for PTSD and a growing body of research across other conditions, including mood and anxiety problems (de Jongh et al., 2024). In addition to international evidence, preliminary clinical studies conducted in Iran have explored the application of EMDR for non-trauma-related conditions, such as primary insomnia, reporting outcomes comparable to cognitive behavioral therapy and suggesting broader therapeutic applicability within the local context (Ranjbaripour et al., 2014). Extending this perspective to mood disorders, contemporary cognitive-affective models of depression emphasize the role of maladaptive autobiographical memory networks and negatively biased self-referent representations in the maintenance of symptoms. (Cheng et al., 2025)

From a cognitive-affective standpoint, depression is characterized not only by elevated negative affect but also by biased processing of autobiographical memory and self-referent meaning. Depressed individuals often report recurrent negative memories, persistent feelings of shame or guilt, and difficulty accessing adaptive, emotionally corrective experiences. These features are compatible with memory-network accounts in which distressing experiences remain strongly linked to negative beliefs (e.g., "I am helpless" or "I am unlovable"), which can be reactivated by current stressors. A treatment approach that directly targets the affective and memory representations of such experiences—rather than working primarily at the level of present-focused cognitive content—may be particularly relevant for some presentations of depression (Cheng et al., 2025; Duyser et al., 2025). Consistent with this perspective, a recent narrative review of clinical studies on imagery rescripting for depression reported that modifying the emotional and representational features of intrusive autobiographical memories is associated with reductions in cognitive, emotional, and behavioral symptoms of depression, while highlighting the need for further research on mechanisms of change and protocol comparisons (Poursaeid Esfahani et al., 2024).

The application of EMDR to depression is motivated by several converging observations. First, depressive episodes are often associated with adverse life events and distressing autobiographical memories that can shape negative self-referent beliefs (e.g., worthlessness, helplessness) and contribute to persistent dysphoria. Second, depression commonly involves cognitive-emotional patterns (e.g., rumination, hopelessness) that may be linked to unprocessed memory networks and affective states. Third, EMDR protocols can be adapted to target depressive memories, triggers, and anticipated future stressors in a manner that is conceptually compatible with transdiagnostic approaches emphasizing negative affect and emotion dysregulation (Hofmann et al., 2022).

Consistent with these theoretical foundations, Empirical support for EMDR in depression has expanded substantially in recent years. A systematic review and meta-analysis concluded that EMDR can reduce depressive symptoms, with effects observed both when EMDR is delivered as a stand-alone intervention and when used as an adjunct to usual care (Carletto et al., 2021). Similarly, a meta-analysis focusing on adults with major depressive disorder reported that EMDR was associated with symptom improvement across randomized controlled trials (Yan et al., 2021). More recently, a meta-analysis and meta-regression of randomized trials found that EMDR produced beneficial effects on depressive symptoms, although the authors emphasized the need for higher-quality studies and careful attention to methodological heterogeneity (Seok & Kim, 2024). In addition to meta-analytic evidence, the European Depression EMDR Network (EDEN) randomized controlled trial compared EMDR and cognitive behavioral therapy (CBT) as adjunctive treatments for recurrent depression and reported improvements over time in both conditions (Ostacoli et al., 2018). Follow-up evidence from inpatient settings has also suggested that EMDR-based depression treatments may yield maintained benefits over extended periods in some contexts (Altmeyer et al., 2022).

At the same time, the depression literature on EMDR is heterogeneous with respect to treatment dosage, target selection (e.g., single adverse events vs. depressive episodes), and whether EMDR is delivered alone or integrated into broader care. Such variability likely contributes to between-study heterogeneity in meta-analytic estimates (Carletto et al., 2021; Seok & Kim, 2024). Protocol-specific studies can help clarify which components are most relevant to depressive symptoms and what patterns of change can be expected over time.

Despite these encouraging findings, the evidence base for EMDR in depressive disorders remains less mature than for PTSD. Important gaps include limited replication in diverse cultural contexts, variability in EMDR protocols used for depression, and uncertainty about which patient characteristics predict response. Furthermore, many studies primarily focus on depressive symptoms without systematically examining changes in comorbid anxiety or emotion dysregulation—domains that are central to transdiagnostic conceptualizations of emotional disorders (Dalgleish et al., 2020; McRae & Gross, 2020). Evaluating depression-focused EMDR protocols with repeated measurement of multiple symptom domains can therefore contribute to both clinical and mechanistic understanding.

One protocol explicitly designed for depressive disorders is EMDR-DeprEnd (DeprEnd), a structured EMDR protocol that targets depressive episodes and their maintaining memory networks, as well as current triggers and future relapse risk. DeprEnd has been described as an adaptation of standard EMDR procedures with specific attention to depressive affective states, negative self-beliefs, and relapse prevention (Hofmann et al., 2016; Hofmann et al., 2022). The protocol includes a systematic case conceptualization (e.g., identifying depressive episode memories and affective states), reprocessing of relevant targets, and future-template work to strengthen adaptive coping and reduce vulnerability to relapse.

Single-case experimental designs (SCEDs) are well-suited for early-stage evaluation of novel or contextually adapted interventions, particularly when resources for large trials are limited or when treatment development is ongoing. By collecting repeated observations across clearly defined phases (e.g., baseline and treatment), SCEDs allow clinicians and researchers to examine temporal relations between treatment onset and symptom change through visual analysis and complementary quantitative indices. Replication across cases strengthens inference by demonstrating whether similar patterns of change occur across individuals under comparable conditions. Given the emerging nature of EMDR protocols for depression and the need for evidence in understudied settings, a replicated SCED approach can provide useful feasibility and signal-of-benefit data to inform subsequent controlled trials.

Despite the theoretical promise of the EMDR-DeprEnd protocol, a clear empirical gap remains regarding its application and continuous evaluation in non-Western, developmentally vulnerable populations. Most existing research on EMDR for depression relies on aggregate, group-level data from Western clinical samples, which obscures individual trajectories of change and limits cross-cultural generalizability. Furthermore, while the DeprEnd protocol explicitly targets depression-maintaining memory networks, it is currently unclear how this targeted reprocessing impacts the broader transdiagnostic cluster of comorbid anxiety and emotion dysregulation session-by-session. Addressing these specific gaps requires a granular, longitudinal evaluation of the DeprEnd protocol within a culturally distinct, high-risk group—such as Iranian university students—to establish its feasibility, map its temporal effects on multiple symptom domains, and determine its broader clinical utility.

The present study examined the preliminary effectiveness of EMDR-DeprEnd for reducing depressive symptoms in a small case series of three university students in Tehran, Iran. Consistent with the protocol's

transdiagnostic rationale, secondary outcomes included anxiety symptoms and difficulties in emotion regulation through the mechanism of adressing the pathogenic memories (Hase et al., 2023). It was hypothesized that (a) depression (BDI-II), anxiety (BAI), and emotion dysregulation (DERS) scores would decrease from baseline to posttreatment and follow-up within each case, and (b) improvements would be observable via both structured visual analysis and single-case quantitative metrics (PND/POD, MBLR, and RCI).

Methodology

Design

The study employed a replicated single-case design with repeated measurement across three phases: baseline (A; three measurement occasions), treatment (B; five measurement occasions), and follow-up (FU; one measurement occasion). The baseline phase was intended to establish the pre-intervention level and stability of outcomes prior to treatment initiation. The treatment phase corresponded to ongoing delivery of the EMDR-DeprEnd protocol, and the follow-up phase provided a preliminary check on maintenance of gains. All outcomes were assessed at each measurement occasion, yielding nine repeated measurements per participant. Replication across three independent cases was used to evaluate consistency of change patterns across individuals.

Setting and recruitment

Participants were recruited from universities in Tehran, Iran. Recruitment procedures included university announcements and direct referrals to the study team for eligibility screening. Eligibility screening was conducted by a clinical psychologist via interview and questionnaire assessment.

Participants

Three university students (Case P1–P3) who scored moderate in depressive symptoms (20-28 in BDI-II scale) without being diagnosed by MDD (using SCID-5-CV in a clinical interview) were enrolled. At baseline, all three cases reported BDI-II scores in the moderate range (baseline means: 25.67–27.67) and BAI scores reflecting elevated anxiety (baseline means: 21.67–23.67), with high DERS total scores (baseline means: 88.33–102.67), indicating substantial emotion-regulation difficulties (Table 1). The Persian versions of these self-report measures have demonstrated satisfactory reliability and validity in prior research. Specifically, the Persian BDI-II has shown high internal consistency, with Cronbach's alpha coefficients reported around 0.87–0.90, along with acceptable test–retest reliability and strong construct validity. Similarly, the Persian version of the BAI has been reported to possess good reliability and validity in Iranian samples . The Persian DERS has also demonstrated strong internal consistency and supported factor structure in validation studies (e.g., α coefficients typically above 0.85 reported in Iranian populations). Collectively, these findings support the appropriateness of using these Persian-adapted instruments in both clinical and research contexts (Ghassemzadeh et al., 2005; Kaviani & Mousavi, 2008; Khanzadeh et al., 2012). Cases are presented using de-identified labels (P1–P3) to protect confidentiality.

Inclusion criteria were: (a) age 20–35 years, (b) student status, (c) moderate depressive symptoms at screening (20-28 in BDI-II scale), and (d) willingness to participate and provide informed consent. Exclusion criteria were: (a) current psychotic symptoms, (b) active substance use disorder, (c) high acute risk of suicide requiring urgent intervention, (d) being diagnosed by MDD (using SCID-5-CV in a clinical interview), or (f) severe comorbid psychiatric conditions that would preclude outpatient psychotherapy.

Table 1. *Participant characteristics and baseline symptom severity*

Case	Age (years)	Gender	University degree	Baseline BDI-II (A mean)	Baseline BAI (A mean)	Baseline DERS (A mean)	Concurrent treatment
P1	34	Male	Master	27.67	23.67	102.67	NO
P2	32	Male	Bacheler	25.67	21.67	88.33	NO
P3	28	Male	Bacheler	27.33	23.67	98.67	NO

Measures

Depression. The Beck Depression Inventory–II (BDI-II) is a 21-item self-report measure assessing depressive symptom severity over the past two weeks. Items are rated on a 0–3 scale, yielding total scores from 0 to 63, with higher scores indicating more severe depressive symptoms. The BDI-II demonstrates strong psychometric properties, including high internal consistency and good short-term test–retest reliability (Beck et al., 1996). The measure is widely used in clinical and research settings and has demonstrated sensitivity to change in treatment studies.

Anxiety. The Beck Anxiety Inventory (BAI) is a 21-item self-report scale assessing common somatic and cognitive symptoms of anxiety. Items are rated from 0 (not at all) to 3 (severely), yielding total scores from 0 to 63, with higher scores indicating greater anxiety severity. The BAI has demonstrated excellent internal consistency and acceptable test–retest reliability in psychiatric samples (Beck et al., 1988). The BAI was selected

because of the frequent co-occurrence of anxiety symptoms in depressive presentations and its suitability for repeated administration.

Emotion dysregulation. The Difficulties in Emotion Regulation Scale (DERS) is a 36-item self-report instrument assessing multiple dimensions of emotion dysregulation, including nonacceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness and clarity, and limited access to emotion regulation strategies. Items are rated on a Likert-type scale; higher total scores indicate greater difficulties in emotion regulation. The DERS has demonstrated good reliability and validity in initial validation work (Gratz & Roemer, 2004). The DERS total score was used as an index of overall emotion dysregulation in the present analyses.

Intervention (EMDR-DeprEnd)

EMDR-DeprEnd is a depression-focused EMDR protocol designed to address depressive episodes and their maintaining memory networks, as well as current triggers and relapse risk (Hofmann et al., 2016; Hofmann et al., 2022). DeprEnd retains the core, phase-based structure of standard EMDR therapy (history taking, preparation, assessment, desensitization, installation, body scan, closure, and re-evaluation), but organizes target selection and sequencing around depressive phenomena.

Based on the protocol description in Hofmann et al. (2016) and Hofmann et al. (2022), DeprEnd includes the following treatment components: (1) establishing safety and stabilization strategies (including a safety plan when indicated), (2) developing a memory map of depressive episodes and associated affective states, (3) reprocessing memories of depressive episodes and related negative self-beliefs, (4) reprocessing current triggers that activate depressive affective states, (5) addressing suicidal or self-harm-related affective states when present within a structured safety framework, and (6) relapse-prevention work using future templates to strengthen adaptive coping responses to anticipated stressors.

The intervention was planned as weekly 90-minute sessions, 6 sessions of individual psychotherapy. It includes five treatment-phase measurement occasions; analyses were conducted on the observed nine-point time series for each participant (three baseline, five treatment, one follow-up measurement occasions). The Intervention was performed by a certified EMDR therapist with 6 years of experience in EMDR therapy. Treatment fidelity was supervised using a one-way mirror and evaluated quantitatively using the EMDR Fidelity Rating Scale (Korn et al,. 2023).

Procedure

After screening and informed consent, participants completed baseline assessments across three measurement occasions prior to initiating EMDR-DeprEnd. Participants then received EMDR-DeprEnd treatment. Outcome measures (BDI-II, BAI, DERS) were administered at each measurement occasion during the treatment phase and once at follow-up after a month. Baseline assessments were conducted on separate occasions prior to the first reprocessing session to characterize symptom stability.

During treatment, participants completed measures on each assessment occasion (B1–B5). Follow-up assessment (FU) was conducted a month after treatment completion.

Data analysis

Analyses followed a mixed approach combining structured visual analysis and complementary single-case quantitative indices. All three outcomes were scored such that lower values indicate improvement.

Visual analysis. For each case and outcome, time-series plots were inspected for (a) level (mean within each phase), (b) trend (direction and rate of change within phases), (c) variability (spread of scores within phases), (d) immediacy of effect (change from end of baseline to start of treatment), and (e) consistency of effects across cases. Visual analysis was used as the primary basis for interpreting temporal relations between treatment onset and symptom change.

Percentage of nonoverlapping/overlapping data (PND/POD). PND was calculated as the percentage of treatment-phase data points that improved beyond the most favorable baseline point (i.e., below the lowest baseline score, because lower scores indicate improvement). POD was computed as the complementary percentage of treatment points that overlapped with baseline. PND is a commonly used nonoverlap index in single-case research (Scruggs et al., 1987). Following common interpretive guidelines, higher PND values indicate stronger nonoverlap (Scruggs et al., 1987), although PND can be sensitive to baseline outliers and delayed treatment effects.

Mean baseline level reduction (MBLR). MBLR was computed as the percent reduction from the baseline mean to (a) the end-of-treatment value and (b) the follow-up value: MBLR = ((Mean_A − Score_phase) / Mean_A) × 100, with positive values indicating symptom reduction. MBLR is one of several summary indices used to quantify level change in single-case studies (Campbell, 2004). Because MBLR is computed relative to the baseline mean, it provides an interpretable percentage change but does not model trend or serial dependence.

Reliable change index (RCI). Reliable change was evaluated using the Jacobson and Truax (1991) RCI: RCI = (X_post − X_pre) / S_diff, where S_diff = SD_pre × √(2(1 − r)). X_pre was defined as the baseline mean and X_post as the follow-up score. SD_pre was estimated using the pooled standard deviation of baseline observations across cases to provide a more stable estimate of baseline variability. Reliability coefficients were drawn from psychometric literature (BDI-II test–retest r ≈ .93; Beck et al., 1996; BAI test–retest r ≈ .75; Beck et al., 1988; DERS test–retest r ≈ .88; Gratz & Roemer, 2004). Absolute RCI values ≥ 1.96 were interpreted as indicating statistically reliable change (Jacobson & Truax, 1991). Because baseline variability was minimal, RCI values may be large in magnitude; interpretation focused on whether the absolute value exceeded the conventional threshold for reliable change.

All analyses were conducted in Python. No missing data were observed in the available time series.

Results

Outcome scores across baseline (A1–A3), treatment (B1–B5), and follow-up (FU) are reported in Table 2 and depicted in Figures 1–3. No missing data were observed. Baseline phases showed minimal within-phase variability across all cases and outcomes, providing a stable foundation for interpreting subsequent changes.

Visual analysis. A broadly consistent pattern emerged across cases. Depression (BDI-II) showed an initial increase at the first treatment measurement before declining across the remainder of treatment and into follow-up (Figure 1). Anxiety (BAI) followed a similar trajectory in two of the three cases, with an early rise giving way to a sustained decrease; the third case showed an immediate and consistent decline from treatment onset (Figure 2). Emotion dysregulation (DERS) showed transient increases at treatment onset in two cases before declining steadily, while one case decreased monotonically from the start of treatment (Figure 3). Across all outcomes and cases, scores at follow-up were lower than baseline means.

Case P1. Depression was stable during baseline before rising sharply at the first treatment occasion and then declining steadily throughout the treatment phase. By follow-up, scores had fallen well below baseline levels, with reliable improvement confirmed by RCI (Table 3). Anxiety followed a similar pattern of initial increase and subsequent decline, with meaningful reductions by end of treatment and further improvement at follow-up (Table 3). Emotion dysregulation showed a brief uptick at treatment onset followed by a sharp and consistent decrease, with the lowest scores observed at follow-up (Table 3).

Case P2. Depression increased during early treatment before declining across later sessions, reaching its lowest point at follow-up, with reliable improvement indicated by RCI (Table 3). Anxiety showed the most immediate response across all cases, decreasing from the very first treatment occasion and continuing to decline steadily through follow-up; PND for anxiety was 100%, reflecting a complete non-overlap with baseline (Table 3). Emotion dysregulation showed a transient increase at treatment onset before declining across treatment and follow-up, with the most pronounced reduction observed at the follow-up assessment (Table 3).

Case P3. Depression followed the typical pattern seen across cases, with an initial increase at treatment onset followed by a consistent downward trajectory, culminating in reliable improvement at follow-up (Table 3). Anxiety also showed an early rise before declining substantially across treatment; despite a modest PND, the reduction from baseline to follow-up was among the largest observed across cases (Table 3). Emotion dysregulation decreased steadily across the entire treatment phase without an initial increase, a pattern that distinguished this case from the others, and continued to improve at follow-up (Table 3).

Cross-case synthesis. Taken together, the three cases showed a consistent pattern of symptom reduction across depression, anxiety, and emotion dysregulation. Reliable improvement, as indicated by RCI values exceeding conventional thresholds, was observed for all outcomes in all cases (Table 3). MBLR values at follow-up were substantial across outcomes, with the largest proportional reductions observed for anxiety (Table 3). It is worth noting, however, that the follow-up phase consists of a single observation collected one month after treatment completion. While the follow-up data are encouraging and consistent with continued or consolidated improvement, conclusions about the durability or post-treatment trajectory of change should be drawn cautiously given this limitation.

Table 2. *Outcome scores across baseline (A), treatment (B), and follow-up (FU) by case*

Case	Measure	A1	A2	A3	B1	B2	B3	B4	B5	FU
P1	BDI-II	28	28	27	38	35	31	28	21	17
P1	BAI	23	24	24	34	32	28	21	15	13
P1	DERS	102	103	103	111	107	102	90	80	73
P2	BDI-II	25	26	26	34	33	28	25	21	17
P2	BAI	21	22	22	19	17	14	12	12	9
P2	DERS	89	88	88	97	91	85	74	82	68
P3	BDI-II	28	27	27	33	32	30	27	23	18
P3	BAI	23	24	24	33	32	27	23	17	12
P3	DERS	98	99	99	102	100	94	85	80	72

Table 3. *Single-case quantitative indices by outcome and case*

Case	Outcome	PND% (Tx)	POD% (Tx)	MBLR% (End Tx)	MBLR% (Follow-up)	RCI (Baseline→FU)	Hedges'g	Reliable Change?
P1	BDI-II	20.0	80.0	24.1	38.6	-27.04	-0.545	Yes
P1	BAI	40.0	60.0	36.6	45.1	-13.49	-0.361	Yes
P1	DERS	40.0	60.0	22.1	28.9	-9.43	-0.447	Yes
P2	BDI-II	20.0	80.0	18.2	33.8	-21.97	-0.568	Yes
P2	BAI	100.0	0.0	44.6	58.5	-16.02	-2.677	Yes
P2	DERS	60.0	40.0	7.2	23.0	-6.46	-0.354	Yes
P3	BDI-II	20.0	80.0	15.9	34.1	-23.66	-0.500	Yes
P3	BAI	20.0	80.0	28.2	49.3	-14.76	-0.505	Yes
P3	DERS	60.0	40.0	18.9	27.0	-8.47	-0.833	Yes

Figures

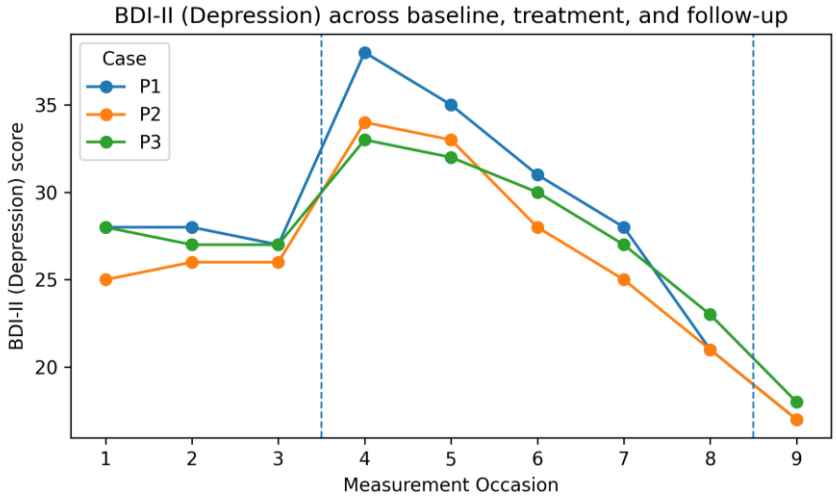

Figure 1. BDI-II scores across measurement occasions for Cases P1–P3. A1–A3 = baseline; B1–B5 = treatment; FU = follow-up. Dashed lines indicate phase changes.

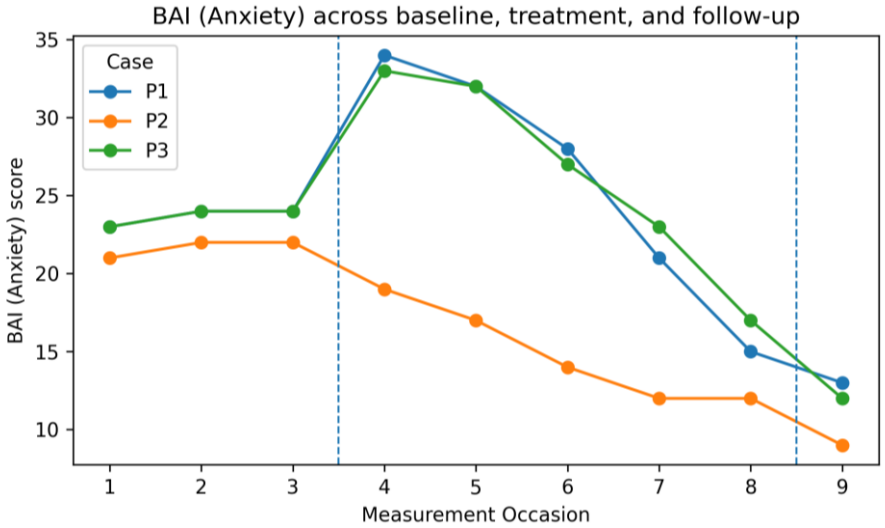

Figure 2. BAI scores across measurement occasions for Cases P1–P3. A1–A3 = baseline; B1–B5 = treatment; FU = follow-up. Dashed lines indicate phase changes.

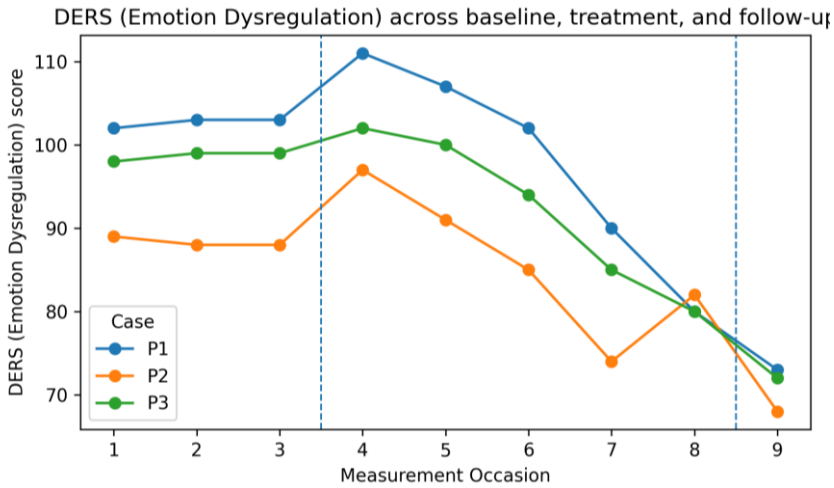

Figure 3. DERS total scores across measurement occasions for Cases P1–P3. A1–A3 = baseline; B1–B5 = treatment; FU = follow-up. Dashed lines indicate phase changes.

Discussion and Conclusion

This replicated single-case study evaluated the EMDR-DeprEnd protocol in three university students with moderate depressive symptoms and examined concurrent changes in anxiety and emotion dysregulation. Across cases, visual analysis may suggesed an stable baseline phases followed by downward trends during treatment and further reductions at follow-up for depression (BDI-II), anxiety (BAI), and emotion dysregulation (DERS). Quantitative single-case indices converged with the visual patterns: MBLR values indicated meaningful reductions by end of treatment that were maintained or enhanced at follow-up, and RCIs suggested that baseline-to-follow-up changes were reliable across all outcomes. Although PND values were comparatively low for depression (20% across cases which typically interpreted as weak or ineffective effects in the SCED literature), this appeared to reflect early transient symptom elevations after treatment onset rather than an absence of later improvement.

The observed pattern—initial symptom activation followed by sustained improvement—may be clinically plausible in memory-processing therapies. Early sessions may bring distressing memories and affective states into awareness, temporarily increasing symptom reporting before subsequent reprocessing leads to symptom reduction. This dynamic is consistent with the DeprEnd protocol's emphasis on identifying and processing depressive episode memories, affective states, and associated negative self-beliefs (Hofmann et al., 2016; Hofmann et al., 2022). Methodologically, it also highlights a limitation of single-case nonoverlap indices such as PND: when improvement is delayed or preceded by short-term increases, PND can underestimate treatment effects because it is anchored to the best baseline point and treats early elevations and later improvements similarly in the overlap calculation (Scruggs et al., 1987). In the present data, depression scores decreased steadily across later treatment occasions and were lowest at follow-up in all cases (Figure 1). However, given that the follow-up phase includes only a single observation one month after treatment, conclusions about maintenance or further improvement of treatment effects should be interpreted with caution.

Interpreting the quantitative indices alongside the graphs is important. Across outcomes, MBLR provided an intuitively interpretable estimate of percentage reduction relative to baseline means and suggested meaningful improvement by follow-up. In contrast, PND depended on whether treatment observations fell below the single best baseline point, which can be a stringent criterion when baselines are low in variability and when early-session symptom activation occurs. For example, depression PND values were uniformly low despite clear downward treatment trends and sizeable baseline-to-follow-up reductions. This discrepancy illustrates that different single-case indices capture different aspects of change (level, overlap, timing) and may diverge when symptom trajectories are nonmonotonic. Consistent with recommendations in the single-case literature, the present results were therefore interpreted primarily through visual analysis, with quantitative indices used to complement—rather than replace—graphical inspection (Campbell, 2004; Scruggs et al., 1987).

The student context and cultural setting may also be relevant to interpretation. University students may experience episodic stressors (e.g., examinations, interpersonal conflicts, financial strain) that can transiently exacerbate symptoms even while treatment is effective, potentially contributing to the early spikes observed in several trajectories. At the same time, the observed follow-up improvements suggest that participants may have generalized adaptive learning from reprocessing sessions to daily challenges over time. If replicated, these findings could support integrating a structured EMDR depression protocol into stepped-care models within university counseling services, where brief interventions are often prioritized. Systematic evaluation of feasibility

outcomes (e.g., session attendance, dropout, adverse events, patient acceptability) would strengthen conclusions about implementation potential in this context.

The results align with and extend emerging evidence for EMDR-based approaches in depressive disorders. Recent meta-analyses indicate that EMDR can reduce depressive symptoms in adults and may be effective as a stand-alone intervention or as an adjunct to usual care (Carletto et al., 2021; Yan et al., 2021; Seok & Kim, 2024). The present findings are also broadly consistent with the EDEN randomized controlled trial, which found that EMDR and CBT—delivered as adjunctive treatments for recurrent depression—were associated with symptom improvements over time (Ostacoli et al., 2018). Moreover, follow-up data from inpatient contexts suggest that EMDR-based depression treatments may yield sustained benefits over longer intervals in some samples (Altmeyer et al., 2022). While the current study cannot establish comparative efficacy, the consistency of within-case improvements across three independent participants provides a preliminary signal that DeprEnd may be feasible and potentially beneficial in an Iranian university-student context.

Importantly, improvements were not limited to depressive symptoms. Anxiety symptoms decreased substantially from baseline to follow-up in all cases, and emotion dysregulation showed parallel reductions. These patterns are clinically meaningful because depression–anxiety comorbidity is common and often associated with greater impairment and treatment complexity. From a transdiagnostic perspective, reductions in DERS scores may index improved capacity to tolerate, understand, and modulate negative emotional states, which could plausibly support downstream reductions in both depressive and anxious symptoms (Cludius et al., 2020; McRae & Gross, 2020). The DeprEnd protocol targets depressive episode memories and affective states, and may therefore influence symptom clusters through changes in underlying negative affective networks and emotion regulation capacities. This is consistent with broader transdiagnostic approaches emphasizing shared mechanisms across emotional disorders (Dalgleish et al., 2020; Cuijpers et al., 2023).

Several mechanisms could account for the observed improvements, though the present study did not directly test mechanisms. Within the AIP model, depressive symptoms may be maintained by maladaptively stored memories that continue to trigger negative affect and negative self-beliefs in the present. Reprocessing such targets could reduce the emotional intensity and intrusiveness of distressing memories, facilitate updating of self-relevant meanings, and increase access to adaptive emotion regulation strategies (de Jongh et al., 2024; Hofmann et al., 2022). Additionally, EMDR's dual-attention procedures may decrease vividness and emotionality of distressing imagery and promote cognitive reappraisal or reconsolidation-compatible updating, thereby attenuating affective triggers that sustain depression and anxiety. Future studies incorporating process measures (e.g., changes in negative self-beliefs, rumination, autobiographical memory specificity, and physiological indices of arousal) could clarify whether reductions in depression and anxiety are mediated by improvements in emotion regulation and memory-related processes.

Clinical implications should be considered cautiously but are noteworthy. First, the magnitude of baseline-to-follow-up reductions suggests that DeprEnd may produce clinically meaningful improvement within a relatively brief time frame. Second, concurrent reductions in depression, anxiety, and DERS scores are consistent with a transdiagnostic benefit profile, which may be valuable in settings where comorbidity is the norm and where delivering multiple disorder-specific protocols is impractical. Third, conducting this case series in Iran contributes to the cross-cultural evidence base for EMDR-based interventions, which is important given global disparities in access to mental health services (World Health Organization, 2023; de Jongh et al., 2024).

Limitations. Several limitations of the present study should be interpreted in light of the study's intentional design choices, which prioritized feasibility and exploratory signal detection over maximal experimental control. First, the use of a brief, non-staggered baseline phase (three observations per case) reflects a pragmatic decision to reduce participant burden and accelerate treatment initiation in a student population. While this approach allowed for preliminary assessment of baseline stability, it limits the ability to rule out time-related confounds (e.g., spontaneous symptom fluctuation or regression to the mean). A multiple-baseline design with staggered phase lengths would provide stronger experimental control and should be considered in future studies.

Second, the reliance on a small number of cases (n = 3) is consistent with early-stage, hypothesis-generating single-case research but inherently constrains generalizability. The study was designed as a preliminary replication across individuals rather than a definitive test of efficacy. Future research adopting larger samples and controlled group designs will be necessary to establish the robustness and external validity of the findings.

Third, outcomes were assessed exclusively באמצעות self-report measures. This reflects a deliberate choice to enable repeated, session-by-session measurement with minimal intrusion; however, such measures are susceptible to reporting biases, expectancy effects, and shared method variance. Incorporating clinician-rated outcomes, behavioral indicators, or physiological measures in future work would strengthen the validity of conclusions.

Fourth, the follow-up period was limited to a single post-treatment assessment. This design choice provided an initial indication of maintenance while minimizing attrition risk, but it does not allow for evaluation of longer-term durability or relapse patterns. Extended and multiple follow-up assessments are needed to determine whether observed gains persist over time.

Finally, the sample consisted exclusively of male participants. This reflects recruitment outcomes rather than an intentional restriction, but it introduces a potential gender-related sampling bias. Given known gender differences in the prevalence, expression, and treatment response of depressive and anxiety symptoms, the findings may not generalize to female or more diverse populations. Future studies should aim to include gender-diverse samples to evaluate whether the observed effects replicate across groups.

In summary, the present study was intentionally designed as a preliminary, resource-efficient investigation to explore feasibility and within-case change patterns. While these design choices enabled detailed longitudinal observation, they also limit causal inference and generalizability, underscoring the need for more rigorous and inclusive designs in subsequent research.

Future research. The present findings support several priorities for subsequent studies. First, larger SCED studies should use staggered multiple baselines across participants to strengthen internal validity and to better isolate treatment effects from time-related confounds. Second, controlled trials comparing DeprEnd to established treatments (e.g., CBT) or to active control conditions are needed to evaluate comparative effectiveness and to examine moderators of response. Third, future work should include structured diagnostic interviews, systematic assessment of comorbidities, and documentation of concurrent treatments. Fourth, longer and multiple follow-up assessments would clarify the durability of gains and potential relapse-prevention effects of the protocol's future-template components. Finally, mechanistic studies integrating repeated measures of candidate processes (e.g., rumination, negative self-beliefs, emotion regulation strategies, and autobiographical memory characteristics) could test whether changes in these processes mediate symptom improvement and help refine the protocol.

In summary, this case series provides preliminary suggestion that EMDR-DeprEnd may reduce depressive symptoms and confer broader benefits for anxiety and emotion dysregulation. The converging pattern of symptom improvement across three cases and multiple outcome domains suggests that DeprEnd is feasible and merits further evaluation using rigorous experimental designs.

In three university students with moderate depressive symptoms, EMDR-DeprEnd was associated with reductions in depression, anxiety, and emotion dysregulation from baseline to follow-up. Although causal conclusions are limited by the lack of staggered baselines and other controls, these findings provide an initial signal of benefit and feasibility for implementing a depression-focused EMDR protocol in an Iranian context. Larger studies employing multiple-baseline and randomized controlled designs are needed to confirm efficacy, clarify mechanisms, and determine durability of gains.

Declarations

Ethics approval and consent to participate

The study has been assigned the Iranian Randomized Controlled Trial Registry Number IRCT20251123068095N1. The design of the study was approved by Research Ethics Committees of Faculty of Medicine-Shahed University (ethics code IR.SHAHED.MED.REC.1404.086). All participants received trial information and provided written informed consent. Also, the confidentiality of all information was managed carefully by researchers.

Competing interests

The authors declare that they have no competing interests.

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Data availability

De-identified data and analysis code are available from the corresponding author upon reasonable request.

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