Psychiatry Research 354 (2025) 116775

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Advancing depression treatment: a multi-center randomized controlled trial of dynamic interpersonal therapy versus CBT and pharmacotherapy on symptoms, sleep, and cognition

Hamid Yari-Renani [a,*], Tahereh Zare [b]

[a] Department of Psychology, Goldsmiths, University of London, UK
[b] Department of Psychology, Islamic Azad University, Ayatollah Amoli Branch, Iran

ARTICLE INFO

Keywords:
Major depressive disorder
Dynamic interpersonal therapy, Cognitive behavioral therapy
Pharmacotherapy
Cognitive performance, Sleep quality
Randomized controlled trial

ABSTRACT

Background: While Cogni Behavioral Therapy (CBT) and pharmacotherapy are widely recognized treatments for Major Depressive Disorder (MDD), Dynamic Interpersonal Therapy (DIT) remains underexplored, particularly regarding its long-term effects on symptom reduction, sleep quality, and cognitive functioning. Existing studies rarely compare these approaches across such multidimensional outcomes.
Methods: In this multi-center randomized controlled trial (MC-RCT), 225 individuals diagnosed with Major Depressive Disorder (MDD) were randomly allocated to one of three structured 16-week treatment conditions comprising Dynamic Interpersonal Therapy (DIT), Cognitive Behavioral Therapy (CBT), or standard pharmacotherapy. The study was conducted across five primary care centers in Iran (Tehran, Tabriz, Shiraz, Isfahan, Mashhad), with follow-ups at 6 and 12 months. Outcomes were measured using the Hamilton Depression Rating Scale (HAM-d-17), Pittsburgh Sleep Quality Index (PSQI), and the Stroop Test. Data were analyzed via Mixed-Design ANOVA.
Results: All three groups showed significant short-term improvements. However, only DIT maintained stable long-term reductions in depressive symptoms (38 %) and sleep disturbances (45 %). DIT also produced superior and lasting gains in cognitive inhibition, selective attention, cognitive flexibility, and processing speed. CBT showed moderate long-term stability, while pharmacotherapy was linked to symptom relapse and diminished cognitive outcomes.
Conclusions: DIT demonstrates durable, multidimensional benefits in treating MDD, outperforming CBT and pharmacotherapy in sustaining improvements in mood, sleep, and cognition. These findings highlight DIT's potential as a holistic and effective alternative, challenging symptom-focused models and informing future directions in depression care.

1. Introduction

Depression, particularly Major Depressive Disorder (MDD) is a prevalent psychiatric condition marked by persistent low mood, anhedonia, and disruptions in sleep and cognition, which significantly impair daily functioning and, due to its chronic and recurrent nature, require sustained, multidimensional treatment strategies (Fitzpatrick, 2024; Minaeva et al., 2024; X. Wang et al., 2025, 2025; Y. Wang et al., 2023).

Among the common approaches to treating depression, pharmacotherapy, particularly with selective serotonin reuptake inhibitors (SSRIs), remains widely utilized due to its accessibility and relatively rapid onset of action. Nevertheless, concerns regarding side effects, dependency risks, and limited patient acceptance have increasingly shifted attention toward psychological treatments. (Cohen et al., 2024; Olaya et al., 2025; L. Wang et al., 2020; Zainal, 2024). Among psychotherapeutic interventions, cognitive-behavioral therapy (CBT) has gained substantial recognition as an evidence-based treatment (Hvenegaard et al., 2020). Its extensive research support and effectiveness in addressing maladaptive thought patterns and behaviors make it a cornerstone in depression treatment (Cuijpers et al., 2013; Nobile et al., 2024; L. Wang et al., 2020). Following the NICE guidelines, CBT is the primary treatment offered to most patients with depression through the Improving Access to Psychological Therapies (IAPT) program in the United Kingdom (Fonagy et al., 2020; Harwood et al., 2023).

* Corresponding author.
E-mail address: hyari001@gold.ac.uk (H. Yari-Renani).

https://doi.org/10.1016/j.psychres.2025.116775
Received 8 April 2025; Received in revised form 18 September 2025; Accepted 12 October 2025
Available online 17 October 2025

In recent years, Dynamic Interpersonal Therapy (DIT) has emerged as a promising short-term psychodynamic intervention for depression, structured around a 16-session format that targets emotional regulation and interpersonal functioning (Fonagy, 2015; Fonagy et al., 2020). Rooted in psychodynamic theories, attachment principles, and mentalization, DIT conceptualizes depression as a response to perceived threats to attachment relationships and interpersonal difficulties (Lemma et al., 2011). By focusing on the Interpersonal-Affective Focus (IPAF), DIT identifies and addresses recurrent problematic relational patterns linked to negative self and other schemas, which perpetuate depressive symptoms (Lemma et al., 2011).

Early research laid the groundwork for DIT's development and application. In a pilot study, Lemma et al. (2011) introduced DIT as a brief psychodynamic intervention tailored for depression, testing its feasibility and acceptability in a small sample. Their findings highlighted DIT's potential to alleviate depressive symptoms by fostering insight into interpersonal dynamics, offering preliminary evidence of its therapeutic promise. Building on this foundation, Fonagy et al. (2020) conducted a randomized controlled trial (RCT) comparing DIT, CBT, and low-intensity treatment (LIT) in a primary care setting. Their results demonstrated that DIT outperformed LIT in reducing depressive symptoms, with a significant proportion of patients achieving clinically meaningful improvements. Notably, DIT demonstrated efficacy comparable to CBT in reducing depressive symptoms at the post-treatment assessment. The mean HRSD-17 score in the DIT group decreased from 18.11 to 9.96, reflecting a 45 % reduction. In contrast, CBT resulted in a 30.93 % reduction, with the mean score dropping from 19.14 to 13.22.

Further supporting DIT's efficacy, Wang et al. (2023) conducted a study in China examining DIT in combination with antidepressant medication (ADM) compared to ADM alone and general supportive therapy (GST) plus ADM. Their findings revealed that the DIT-ADM combination led to the greatest reduction in depressive symptoms, with a 67.72 % decrease in HAMD-17 scores (from 21.50 to 6.94), outperforming both GST+ADM and ADM alone, and with benefits persisting over a 12-month follow-up period.

Beyond symptom reduction, DIT's broader therapeutic impact has also been explored. Luyten and Blatt (2012) reviewed the psychodynamic treatment of depression, emphasizing interventions like DIT that address underlying interpersonal and emotional processes. They argued that such approaches not only alleviate depressive symptoms but also improve relational functioning and emotional resilience, offering advantages over treatments focused solely on symptom management.

Despite the promising findings supporting DIT's efficacy, its evidence base remains less robust than CBT's, particularly regarding broader impacts beyond symptom reduction. While CBT and pharmacotherapy have been widely studied, direct comparisons with DIT remain scarce. This gap is due to DIT's recent emergence, challenges in standardizing its psychodynamic components, and a historical focus on symptom reduction rather than broader measures like sleep and cognition. Consequently, uncertainties persist regarding DIT's effectiveness in treating depression and its advantages or limitations compared to CBT and pharmacotherapy. The primary aim of this study is to address these gaps by evaluating the effects of DIT on depressive symptoms relative to pharmacotherapy and CBT. Additionally, this research examines DIT's impact on sleep quality and cognitive functioning, domains often impaired in depression but underexplored in DIT studies. By broadening the scope beyond symptom relief, this study aims to enhance understanding of DIT's multifaceted effects and assist clinicians in tailoring interventions to patient needs.

2. Material and method

2.1. Research design

The present study employs a multi-center randomized controlled trial (MC-RCT) with a three-arm parallel-group design, conducted across five primary care centers in Iran, located in the cities of Tehran, Tabriz, Shiraz, Isfahan, and Mashhad. Participants were randomly assigned to one of three 16-week intervention groups: Dynamic Interpersonal Therapy (DIT), Cognitive Behavioral Therapy (CBT), or pharmacotherapy. This design was chosen due to its ability to minimize confounding variables and enhance internal validity, as randomization allows for an unbiased comparison of the effectiveness of these interventions (Shateri et al., 2024). The philosophical foundation of this research lies in post-positivism, which embraces empirical inquiry and causal analysis while acknowledging contextual influences, interpretive limits, and potential measurement errors (Yari-Renani et al., 2025). This paradigm supports the use of quantitative methods and advanced statistical tools, making it especially suitable for examining complex psychological variables like depression and sleep quality (Yari-Renani and Oldfield, 2025).

2.2. Sampling method and participants

This study was initiated following ethical approval IR.Yu.Yasouj.REC.1398.11 at the Research Deputy Department of Yasouj University, Iran with additional local approvals obtained from each of the five participating primary care centers to ensure regional compliance. Participants were recruited through stratified random sampling from five geographically diverse primary care centers located in Tehran, Tabriz, Shiraz, Esfahan, and Mashhad. These centers were selected to capture a broad demographic and regional representation, enhancing the external validity and generalizability of the findings.

All participants were diagnosed with Major Depressive Disorder (MDD) based on DSM-5 criteria by licensed clinical psychologists or psychiatrists. Eligibility was confirmed through a structured screening process that included the Mini-International Neuropsychiatric Interview (MINI Plus 6.0), the Hamilton Depression Rating Scale (HAM-d-17) with scores >14, and the Patient Health Questionnaire-9 (PHQ-9) with scores >10. The HAM-d-17 served as the primary outcome measure throughout the study.

A computer-generated, centralized randomization sequence was used to allocate participants into three parallel intervention arms (DIT, CBT, or pharmacotherapy), with stratification by age, sex, and depression severity to ensure balanced distribution across groups. The randomization process was managed independently by a central administrator to ensure allocation concealment and methodological consistency across all sites.

Based on a priori power analysis (effect size $= 0.5$, $\alpha = 0.05$, power $=$ 0.80), a minimum of 192 participants was required (64 per group). To account for potential attrition ($\sim$20 %), a total of 240 participants (approximately 48 per site) were recruited, providing robust statistical power for intergroup comparisons.

Inclusion Criteria:

- Adults aged 20–60 years
- Diagnosis of major depressive disorder (MDD) confirmed by the Mini-International Neuropsychiatric Interview (MINI Plus 6.0) based on DSM-5 criteria
- Baseline score of $\geq$14 on the (HAM-d-17) and $>$10 on the (PHQ-9) to establish depression severity
- Ability to provide written informed consent

Exclusion Criteria:

- Severe concurrent medical or neurological conditions
- Diagnosis of bipolar disorder, psychosis, or substance use disorder in the last 24 months
- High suicide risk (MINI module score $\geq$10)
- History of psychotherapeutic treatment in the last 6 months
- Visual or auditory impairments affecting participation

2.3. Ethical consideration

Participants received comprehensive information regarding the study's objectives, procedures, potential benefits, and risks, as well as their rights, including the option to withdraw at any stage without any consequences. Informed consent was obtained to ensure voluntary participation, emphasizing that their decision to take part in the study would not impact their access to healthcare services. Confidentiality and anonymity were strictly preserved by assigning unique identification codes instead of personal identifiers, with all collected data securely stored and accessible exclusively to the research team. The study adhered to core ethical principles, including respect for participants, beneficence, and justice, ensuring the protection of their rights, dignity, and well-being throughout the research process. To address the needs of individuals excluded due to high suicide risk (MINI score $\geq$10), a referral protocol was implemented, ensuring they were promptly directed to appropriate clinical services, such as psychiatric crisis intervention or counseling, to safeguard their well-being.

2.4. Instruments

This study utilized standardized and validated assessment tools to measure depressive symptoms, sleep quality, and cognitive performance at baseline (week 0), mid-treatment (week 8), post-treatment (week 16), and at 6- and 12-month follow-ups. The selected instruments have been widely used in clinical research and were recognized for their reliability and validity in assessing the targeted psychological constructs.

2.4.1. Depressive symptoms

The Hamilton Depression Rating Scale (HAM-d-17) was used to assess the severity of depressive symptoms. This 17-item clinician-administered scale evaluated various aspects of depression, including mood, guilt, suicidal thoughts, sleep disturbances, and psychomotor retardation(Santen et al., 2008). Scores ranged from 0 to 52, with higher scores indicating greater depression severity.

2.4.2. Sleep quality

The Pittsburgh Sleep Quality Index (PSQI) was employed to assess subjective sleep quality and sleep disturbances over the past month. This self-reported questionnaire consisted of 19 items covering seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. A global PSQI score greater than 5 indicated poor sleep quality (Zitser et al., 2022).

2.4.3. Cognitive performance

Cognitive performance was evaluated with the Stroop Test, a key neuropsychological tool measuring cognitive control and executive function across four domains: cognitive inhibition (suppressing automatic responses), selective attention (focusing on relevant stimuli), cognitive flexibility (adapting to shifting tasks), and speed process.

During the Stroop Test, participants were asked to identify the color of words while inhibiting the instinct to read the words themselves. Performance was assessed based on reaction time and accuracy, with longer response times and increased errors indicating greater cognitive impairment (Periáñez et al., 2021).

2.5. Interventions

2.5.1. Dynamic interpersonal therapy (DIT)

DIT was delivered as a structured 16-session psychodynamic intervention grounded in attachment theory, aiming to enhance mentalization and interpersonal functioning in individuals with depression (A. Bateman and Fonagy, 2010; A. W. Bateman and Fonagy, 2019). The therapy conceptualized depression as a response to unresolved interpersonal conflicts and attachment-related stress, progressing through three phases: assessment and case formulation (sessions 1–4), an active intervention targeting maladaptive relational patterns (sessions 5–12), and termination with consolidation of relational gains (sessions 13–16). It was delivered by five licensed therapists with at least nine years of psychodynamic experience, all trained in the study's DIT protocol to ensure fidelity and consistency.

2.5.2. Cognitive behavioral therapy (CBT)

CBT was delivered over 16 structured sessions targeting negative thoughts and maladaptive behaviors contributing to depression (López-López et al., 2019). The intervention included psychoeducation and cognitive restructuring (sessions 1–5), behavioral activation and coping strategies (sessions 6–12), and relapse prevention and skills consolidation (sessions 13–16), with homework and real-life applications reinforcing skills. Five experienced therapists, trained in the study's standardized CBT protocol, ensured consistent and collaborative implementation.

2.5.3. Pharmacotherapy

In this study, the pharmacotherapy group received standard antidepressant treatment, primarily consisting of selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine (20–40 mg/day), sertraline (50–150 mg/day), and citalopram (20–40 mg/day). Medication doses were titrated based on clinical guidelines and patient tolerance, with treatment lasting the full 16-week study period. Five experienced psychiatrists prescribed and adjusted medications according to standard practice guidelines and individual patient needs. Biweekly follow-ups were conducted to monitor progress, tolerability, and side effects. This group served as an active control for comparison with psychotherapy outcomes.

The interactive graph displaying the adjusted mean scores of depressive symptoms, sleep quality, and cognitive components in the three groups across different measurement stages is shown in the chart (Figs. 1–7).

3. Result

According to the CONSORT flow diagram, this MC-RCT initially assessed 300 individuals for eligibility across five geographically diverse primary care centers in Iran (Tehran, Isfahan, Tabriz, Shiraz, and Mashhad). A total of 60 individuals were excluded due to not meeting inclusion criteria, including subthreshold depression, elevated suicide risk, substance use disorders, or severe comorbidities such as eating disorders or psychosis.

Subsequently, 240 participants were randomized equally into three intervention groups: Cognitive Behavioral Therapy (CBT), Dynamic Interpersonal Therapy (DIT), and Pharmacotherapy, with 80 participants per group. Randomization was stratified by age, sex, and depression severity to ensure balanced allocation across the groups. At Week 8 (Mid-Test), 100 % of participants completed the scheduled assessments. However, two participants in the CBT group, one in the DIT group, and one in the Pharmacotherapy group withdrew their consent and discontinued participation. By Week 16 (Post-Test), further attrition occurred due to failure to complete the assigned intervention: two participants each from the CBT and DIT groups, and three participants from the Pharmacotherapy group were excluded for non-adherence. During the 6-month follow-up, additional attrition due to unavailability led to the exclusion of one participant in the CBT group, two in the DIT group, and one in the Pharmacotherapy group. At the 12-month follow-up, 75 participants remained in each group, yielding a total of 225 participants retained through all study phases. This reflects an overall retention rate of 93.75 %, demonstrating high participant adherence and robust methodological integrity.

In this study, the effectiveness of DIT was examined in comparison to CBT and pharmacotherapy on depressive symptoms, sleep quality, and cognitive performance in individuals with depression. The hypotheses

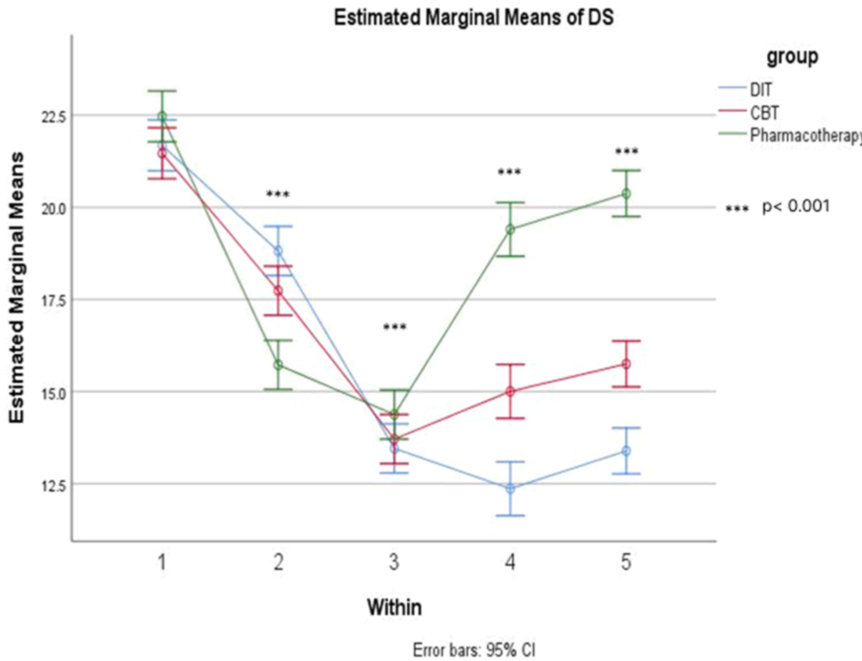

Fig. 1. Adjusted mean scores of depressive symptoms in the three groups across measurement stages.

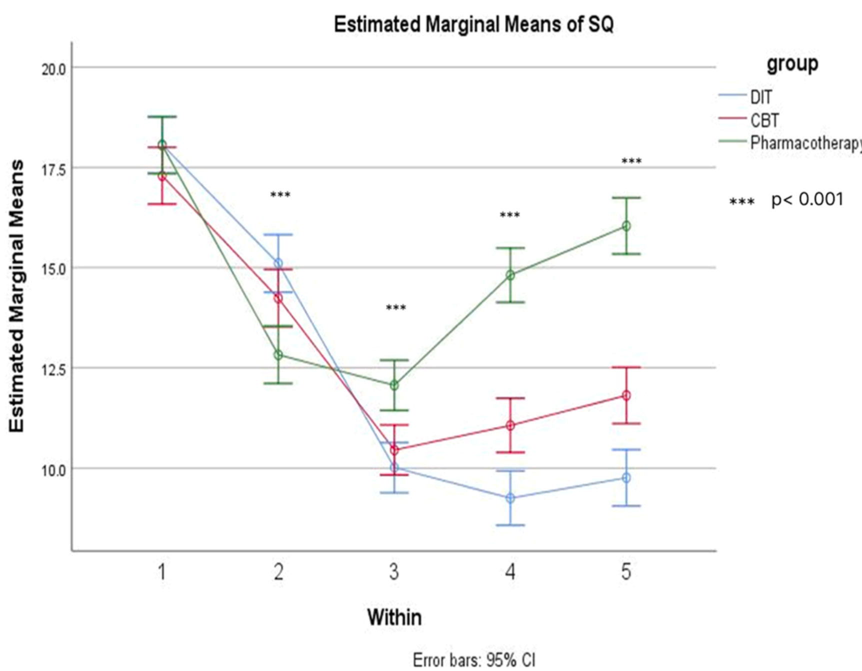

Fig. 2. Adjusted mean scores of sleep quality in the three groups across measurement stages.

were formulated concerning the research topic, and a mixed ANOVA statistical test was used to evaluate them.

The table below presents the gender, marital status, age, and education level of participants in the three groups (Tables 1 and 2).

As the results in the table indicate, the three groups are relatively homogeneous in terms of gender, marital status, age, and education level. Before testing the hypotheses, descriptive statistical indices for the research variables were reported separately for each group.

As observed in this study, all three groups (DIT, CBT, and Pharmacotherapy) showed a decrease in depressive symptoms, sleep quality, and cognitive components up to week 16. In the DIT group, the mean depressive symptoms score reduced from 21.68 at pre-test to 13.45 at week 16 and remained relatively stable in the 6- and 12-month follow-ups. Similarly, sleep quality decreased from 18.07 to approximately 10.01 and stabilized over time. Cognitive functions, including inhibition, selective attention, cognitive flexibility, and processing speed, improved significantly with minimal changes after week 16.

In the CBT group, depressive symptoms (from 21.47 to 13.71) and sleep quality (from 17.29 to 10.45) reduced until week 16, but a slight increase was observed in later follow-ups. Cognitive improvements followed a similar pattern, initially improving and then slightly increasing.

In contrast, the Pharmacotherapy group initially showed a reduction in depressive symptoms (from 22.47 to 14.37) and sleep quality (from

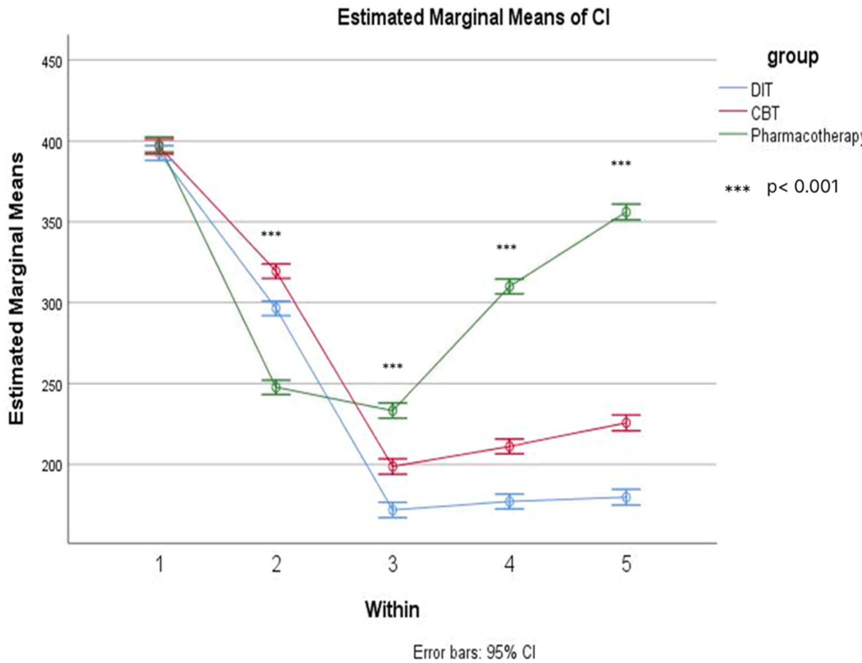

Fig. 3. Adjusted mean scores of cognitive inhibition in the three groups across measurement stages.

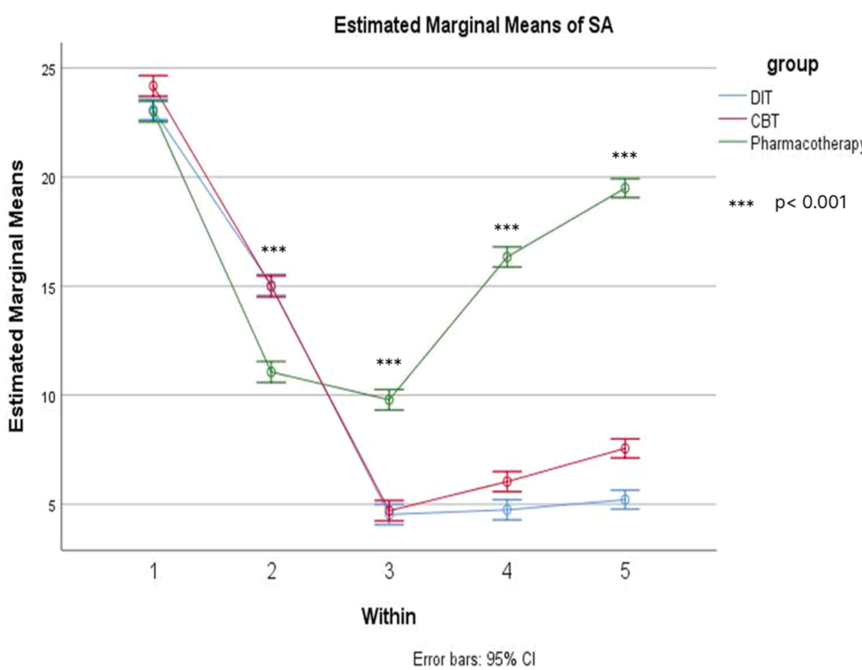

Fig. 4. Adjusted mean scores of selective attention in the three groups across measurement stages.

18.05 to 12.07) by week 16. However, these improvements were less stable, and symptoms returned to higher levels in the 6- and 12-month follow-ups. Cognitive improvements, including inhibition, selective attention, cognitive flexibility, and processing speed, were less sustained compared to psychotherapy groups.

Overall, data suggest that psychotherapy treatments, particularly DIT, have more stable and long-term effects in reducing depressive symptoms, improving sleep quality, and enhancing cognitive functions compared to Pharmacotherapy.

4. Discussion

The most prominent findings of this study reveal that all three interventions, DIT, CBT, and pharmacotherapy, effectively reduced depressive symptoms by the end of the 16-week treatment period, yet their trajectories diverged significantly over time. DIT demonstrated the greatest and most stable reduction in depressive symptoms, with a mean HAM-d-17 score decrease of approximately 38 % (from 21.68 to 13.45) by week 16, maintaining this improvement at the 12-month follow-up (13.39). In contrast, CBT achieved a notable initial reduction of about 36 % (from 21.47 to 13.71) by week 16, but its efficacy waned slightly, with symptoms rising to 15.75 by 12 months. Pharmacotherapy showed

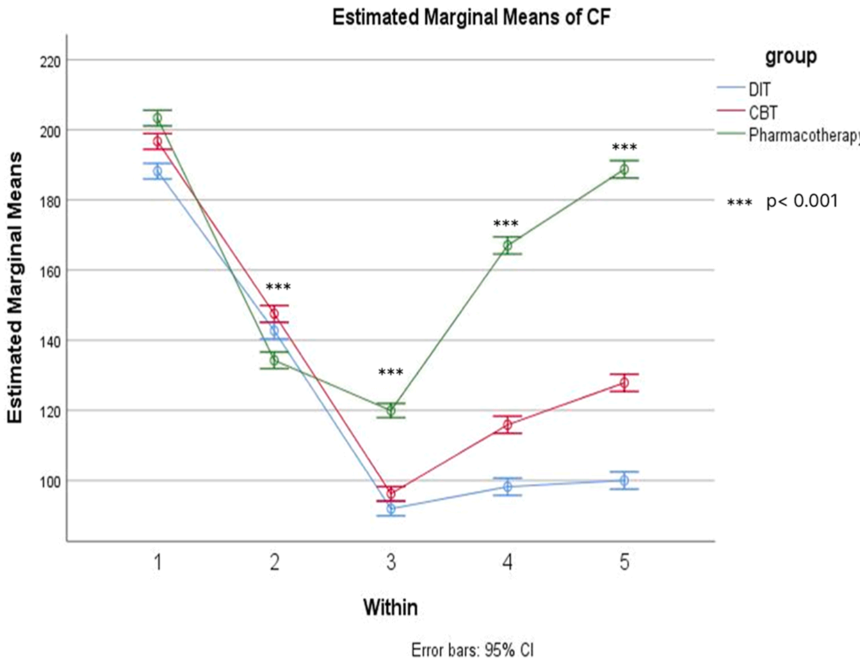

Fig. 5. Adjusted mean scores of cognitive flexibility in the three groups across measurement stages.

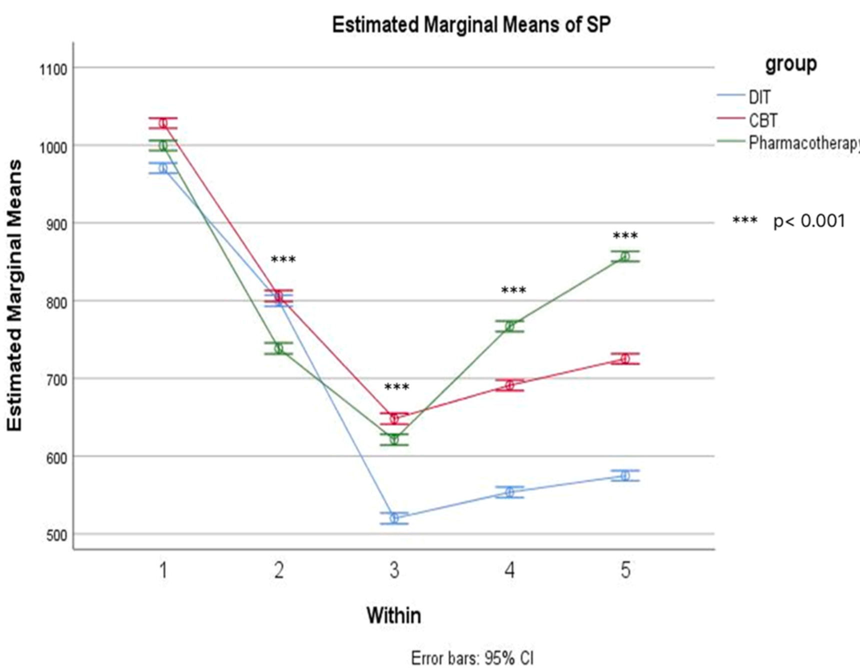

Fig. 6. Adjusted mean scores of processing speed in the three groups across measurement stages.

a more modest short-term reduction of roughly 36 % (from 22.47 to 14.37) by week 16, followed by a substantial relapse, with symptoms climbing back to 20.37 at the 12-month follow-up. Beyond depressive symptoms, DIT exhibited sustained enhancements in sleep quality and cognitive functioning, mirroring the trend observed in depression reduction. Statistical analyses and graphical representations indicate that sleep disturbances (PSQI mean score dropping from 18.07 to 9.76 by 12 months) and cognitive domains such as inhibition (from 392.52 to 179.72), selective attention (from 23.09 to 5.21), cognitive flexibility (from 188.21 to 100.00), and processing speed (from 970.41 to 574.79) followed a similar trajectory of improvement with DIT, outperforming CBT and pharmacotherapy, which showed less durability in these areas over the follow-up period. These findings position DIT as a pioneering intervention with robust, long-term effects across multiple dimensions of MDD.

These findings suggest that DIT's structured, psychodynamic approach—focusing on interpersonal patterns and emotional regulation—may offer a unique mechanism for fostering enduring therapeutic change. The stability of DIT's effects could be attributed to its emphasis on addressing underlying relational and attachment-related conflicts, which are often central to the persistence of depressive symptoms. In contrast, CBT's focus on cognitive restructuring and behavioral activation appears highly effective during active treatment but may require ongoing reinforcement to sustain benefits, possibly due

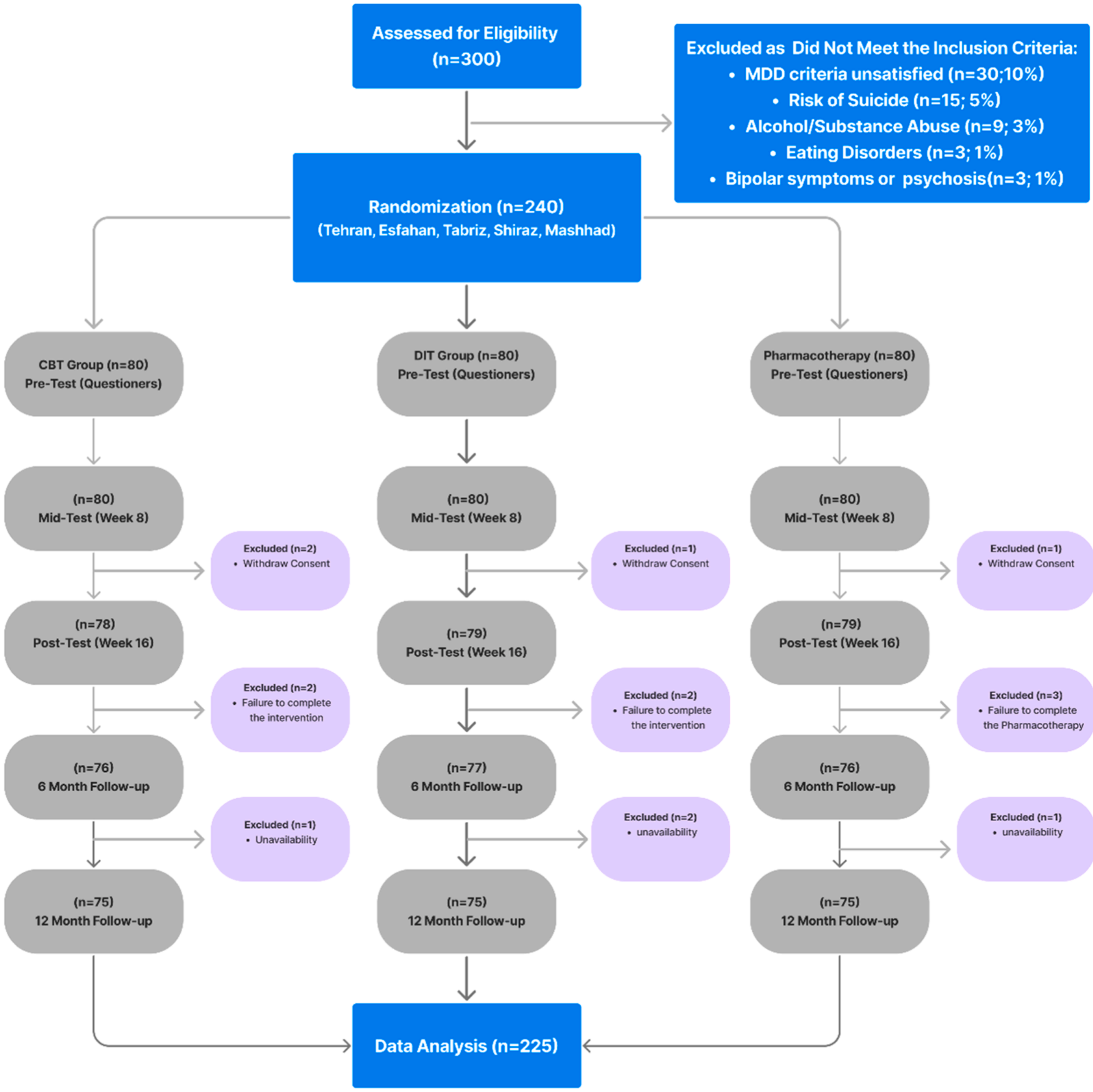

Fig. 7. Consort flow diagram.

Table 1
Frequency and percentage distribution of gender, marital status, age, and education level among the three groups.

Variables		Frequency in DIT Group	Percentage	Frequency in the CBT group	Percentage	Frequency in pharmacotherapy group	Percentage
Gender	Female	34	45.33	38	50.67	35	46.67
	Male	41	54.67	37	49.33	40	53.33
Marital Status	Single	35	46.67	33	44	36	48
	Married	40	53.33	42	56	39	52
Age	20–30 years	23	30.67	20	26.67	20	26.67
	31–40 years	15	20	15	20	15	20
	41–50 years	19	25.33	25	33.33	21	28
	51–60 years	18	24	15	20	19	25.33
Education Level	Below Diploma	20	26.67	15	20	18	24
	Diploma	18	24	23	30.67	19	25.33
	Associate	20	26.67	18	24	17	22.67
	Bachelor's Degree	17	22.67	19	25.33	21	28
	Master's Degree Above						

to its reliance on conscious skill application rather than deeper emotional processing. Pharmacotherapy's initial efficacy, followed by a significant relapse, aligns with its symptomatic focus, which alleviates neurochemical imbalances without necessarily equipping individuals with adaptive strategies for long-term coping. The sustained improvements in sleep quality and cognitive functioning with DIT further imply

Table 2
Mean and standard deviation of depressive symptoms, sleep quality, and cognitive components by assessment stage in groups.

Group	Variable	Index	Pre-Test	Week 8	Week 16	6-Month Follow-Up	12-Month Follow-Up
DIT	Depression Symptoms	Mean	21.68	18.81	13.45	12.36	13.39
CBT	Depression Symptoms	Standard Deviation	2.90	2.83	3.08	3.16	2.28
Pharmacotherapy	Depression Symptoms	Mean	21.47	17.73	13.71	15.0	15.75
		Standard Deviation	3.33	3.03	2.88	3.41	2.79
		Mean	22.47	15.72	14.37	19.40	20.37
		Standard Deviation	2.84	2.92	2.81	3.05	3.09
DIT	Sleep Quality	Mean	18.07	15.11	10.01	9.25	9.76
CBT	Sleep Quality	Standard Deviation	3.24	3.03	2.86	3.10	3.16
Pharmacotherapy	Sleep Quality	Mean	17.29	14.24	10.45	11.07	11.81
		Standard Deviation	3.03	3.25	2.63	3.00	2.87
		Mean	18.05	12.83	12.07	14.81	16.04
		Standard Deviation	3.04	3.15	2.74	2.80	3.19
DIT	Cognitive Inhibition	Mean	392.52	296.45	171.81	177.07	179.72
CBT	Cognitive Inhibition	Standard Deviation	20.11	18.00	17.75	21.45	20.56
Pharmacotherapy	Cognitive Inhibition	Mean	396.48	319.44	198.68	211.08	225.65
		Standard Deviation	20.50	18.88	21.41	21.63	21.51
		Mean	397.80	247.63	233.19	309.96	356.07
		Standard Deviation	20.11	22.00	22.61	17.30	22.00
DIT	Selective Attention	Mean	23.09	15.05	4.53	4.75	5.21
CBT	Selective Attention	Standard Deviation	2.20	1.93	2.13	2.13	1.76
Pharmacotherapy	Selective Attention	Mean	24.17	14.99	4.71	6.04	7.56
		Standard Deviation	2.08	1.87	2.32	2.06	1.82
		Mean	23.00	11.07	9.79	16.33	19.49
		Standard Deviation	1.95	2.47	1.66	1.88	2.13
DIT	Cognitive Flexibility	Mean	188.21	142.71	91.96	98.21	100.00
CBT	Cognitive Flexibility	Standard Deviation	8.96	10.27	9.24	11.58	9.97
Pharmacotherapy	Cognitive Flexibility	Mean	196.69	147.55	96.23	115.88	127.85
		Standard Deviation	10.89	11.30	8.78	11.22	11.85
		Mean	203.35	134.28	119.93	167.01	188.76
		Standard Deviation	9.54	9.51	8.68	9.31	10.73
DIT	Processing Speed	Mean	970.41	799.80	519.91	553.41	574.79
CBT	Processing Speed	Standard Deviation	30.35	31.71	28.39	33.86	31.05
Pharmacotherapy	Processing Speed	Mean	1028.19	805.97	647.99	690.97	725.17
		Standard Deviation	24.09	30.57	32.83	28.01	27.61
		Mean	999.43	738.55	621.07	766.92	856.76
		Standard Deviation	30.52	31.16	30.85	27.41	26.68

that resolving interpersonal distress may have cascading benefits on physiological regulation and executive control, domains critical to overall well-being in depression.

The significance of these results lies in their demonstration of DIT as a viable and potentially superior alternative to established treatments like CBT and pharmacotherapy, particularly for achieving lasting outcomes. By showing that DIT not only reduces depressive symptoms but also enhances sleep and cognition, areas often neglected in depression research, the study underscores the value of integrative therapeutic approaches that target both emotional and functional domains. These findings highlight the potential of brief psychodynamic interventions to meet the needs of patients seeking durable recovery, offering clinicians evidence to diversify treatment options beyond the conventional reliance on CBT and pharmacotherapy. Moreover, the results emphasize the importance of evaluating treatment efficacy over extended follow-up periods, as short-term gains may not fully reflect an intervention's true impact.

4.1. Comparison with previous research

The present study offers a valuable addition to the growing body of research on psychodynamic interventions for mental health, particularly through its focus on Dynamic Interpersonal Therapy (DIT). By evaluating its efficacy in a targeted clinical context, this section situates the current findings within the broader landscape of previous research on DIT and related therapeutic approaches.

An early contribution by Lemma et al. (2011) introduced DIT as a brief psychodynamic intervention tailored for depression, testing its feasibility and acceptability in a pilot study with a small sample. While their findings demonstrated DIT's potential to foster insight into interpersonal dynamics, the study's exploratory design lacked a control group, randomization, and long-term follow-up, limiting its ability to establish efficacy or durability. The present study overcomes these methodological constraints with a robust three-arm RCT involving 225 participants, randomly assigned to DIT, CBT, or pharmacotherapy, and tracked over 12 months. This controlled, longitudinal approach confirms DIT's therapeutic promise and establishes its sustained effectiveness, significantly enhancing the evidence beyond Lemma et al.'s preliminary exploration.

Building on this foundation, Fonagy et al. (2020) conducted an RCT comparing DIT, CBT, and low-intensity treatment (LIT) in a primary care setting, focusing solely on depressive symptom reduction. Their study demonstrated DIT's efficacy compared to LIT and suggested it performed comparably to CBT post-treatment. However, it omitted pharmacotherapy, a cornerstone of depression treatment, and lacked extended follow-up or assessment of broader outcomes like sleep and cognition. The current study expands this framework by incorporating pharmacotherapy as a comparator, revealing its initial effectiveness but significant relapse over time, while DIT and CBT show more sustained benefits. Additionally, by evaluating sleep quality and cognitive functioning alongside depressive symptoms, this study addresses critical gaps in Fonagy et al.'s symptom-centric design, offering a more holistic understanding of treatment impacts over 12 months.

In a different line of research, Wang et al. (2023) explored DIT's efficacy in combination with antidepressant medication (ADM), reporting a substantial symptom reduction compared to ADM alone or with general supportive therapy (GST), with benefits persisting at 12 months. While their findings underscore DIT's potential in a combined-treatment context, they did not isolate DIT's standalone effects or compare it directly with other independent treatments like CBT, nor did they extend beyond symptom-focused outcomes. In contrast, the present study examines DIT, CBT, and pharmacotherapy as standalone interventions, enabling a direct comparison of their independent effects. It demonstrates DIT's stable symptom reduction (from 21.68 to 13.39), outperforming CBT's partial relapse (to 15.75) and pharmacotherapy's significant relapse (to 20.37), while also assessing broader impacts, such as sleep quality (PSQI from 18.07 to 9.76) and cognitive domains (e.g., processing speed from 970.41 to 574.79). This independent and multidimensional approach marks a significant advancement over Wang et al.'s combined-treatment focus.

Theoretical contributions Luyten and Blatt (2012) argued that psychodynamic interventions such as DIT enhance relational functioning and emotional resilience, offering advantages over narrowly symptom-focused treatments. While insightful, their review lacked empirical specificity regarding DIT's outcomes. The present study provides empirical support for these theoretical claims, demonstrating that DIT not only facilitates sustained symptom improvement but also promotes emotional regulation and functional recovery across sleep and cognitive domains, contrasting sharply with the relapse trajectory observed in pharmacotherapy.

Taken together, the study's methodological strengths, including large sample size, rigorous randomization, extended follow-up, and multidimensional outcome measures, not only address the limitations of prior research but also establish DIT as a clinically viable and comprehensive intervention for depression with enduring benefits.

4.2. 4.2 scientific, practical, and policy implication

The findings of this study carry significant implications across scientific, clinical, and policy domains, with the potential to transform approaches to depression treatment.

Scientific Implications: This research, with its three-arm design and long-term follow-up, enriches the evidence base for psychodynamic interventions like DIT, surpassing the scope of earlier, limited studies. Exploring sleep quality and cognitive performance challenges the traditional symptom-focused perspective and urges researchers to investigate interpersonal mechanisms—such as mentalization or neural responses tied to attachment. This multidimensional approach redefines success criteria and underscores the need for broader assessments. The findings question CBT's dominance and encourage wider exploration of DIT across diverse contexts to enhance its global relevance, paving the way for scientific innovation.

Practical Implications: DIT, with its focus on interpersonal dynamics, offers a sustainable and effective option for patients facing emotional and relational challenges. Its short-term format aligns with clinical demands, while improvements in sleep and cognition enhance patients' ability to navigate daily life, extending benefits beyond symptom relief. However, the scarcity of psycho-dynamically trained therapists and training costs pose challenges, necessitating targeted educational initiatives. Integrating DIT training alongside CBT can diversify therapeutic options, while CBT and pharmacotherapy may require periodic booster sessions to sustain outcomes. This flexibility strengthens clinicians' capacity to address varied patient needs effectively.

Policy Implications: Incorporating DIT into clinical guidelines, such as the IAPT program, could reduce reliance on medication-centric approaches, with its sustained effects alleviating long-term healthcare burdens. Expanding access through funded training and leveraging supervised practitioners in resource-scarce regions, like Iran, is a practical step forward. Yet, institutional resistance and the need for robust cost-effectiveness analyses remain hurdles to overcome. Emphasizing comprehensive outcomes like sleep and cognition steers policymakers toward prioritizing overall well-being over temporary relief. Such shifts could make mental health services more efficient, equitable, and aligned with societal needs.

This study guides research, practice, and policy toward sustainable, patient-centered approaches, though its success hinges on addressing practical and systemic challenges.

5. Limitations

Despite its strengths, this study has several limitations that warrant consideration. Although the sample was drawn from five geographically and demographically diverse primary care centers across Iran, the findings may still not be fully generalizable to other healthcare systems or cultural contexts beyond the Iranian setting. Cultural factors may influence both symptom presentation and responsiveness to psychotherapeutic interventions, particularly for approaches like Dynamic Interpersonal Therapy (DIT), which emphasize interpersonal dynamics and emotional processing.

Moreover, while rigorous randomization and stratification procedures were employed, the absence of qualitative data on patient experiences limits the depth of insight into the therapeutic process and mechanisms of change. Future studies could benefit from incorporating qualitative or mixed-method designs to explore patients' subjective experiences, especially concerning interpersonal transformation.

Furthermore, therapist fidelity and adherence to the treatment manuals, while monitored through supervision and training, were not formally assessed using standardized fidelity instruments. This may limit the ability to attribute observed outcomes directly to the quality or consistency of intervention delivery.

In addition, we acknowledge that using clinician-administered HAM-d-17 as the primary outcome could introduce assessment bias. Although trained clinicians rated participants' symptoms, future research should employ independent raters who are blinded to treatment assignments or supplement clinician ratings with validated self-report scales to minimize potential bias.

Moreover, while the inclusion criteria minimized severe comorbid DSM disorders, individuals with mild comorbid conditions (e.g., anxiety disorders) could still influence treatment outcomes. Detailed data on comorbidities were not retained because such individuals were excluded during screening, as illustrated in the CONSORT diagram. This approach enhances sample homogeneity but limits our ability to assess comorbidity effects. Future studies should collect and report detailed comorbidity information.

Lastly, we note that the HAM-d-17 focuses on typical depressive symptoms and does not capture atypical features (e.g., hypersomnia, increased appetite) associated with attachment-based mechanisms. Future research should consider using instruments that include atypical symptoms to better assess the therapeutic effects of Dynamic Interpersonal Therapy.

6. Conclusion

This randomized controlled trial investigated the efficacy of DIT compared to CBT and pharmacotherapy in treating major depressive disorder (MDD), introducing a novel emphasis on DIT's potential as a psychodynamic intervention with sustained, multifaceted benefits. By extending beyond traditional symptom-focused evaluations, this study innovatively explored DIT's impact on depressive symptoms, sleep quality, and cognitive functioning, offering a comprehensive perspective on its therapeutic value. The study employed validated instruments including the Hamilton Depression Rating Scale (HAM-d-17), Pittsburgh Sleep Quality Index (PSQI), and the Stroop Test to comprehensively assess treatment effects.

Key findings include:

- All three interventions led to significant short-term reductions in depressive symptoms, but only DIT maintained stable improvements across the 12-month follow-up.
- DIT demonstrated greater long-term efficacy than CBT and pharmacotherapy in improving sleep quality, with PSQI scores dropping by nearly 50 %.

- Cognitive functioning, across inhibition, attention, flexibility, and processing speed, improved most significantly in the DIT group, with effects persisting over time.
- Pharmacotherapy, while effective short-term, was associated with relapse in both mood and cognitive domains by the 12-month mark.
- CBT showed moderate stability in outcomes but was outperformed by DIT in most follow-up comparisons.

These findings contribute to the advancement of mental health care by highlighting DIT as a promising and sustainable psychotherapeutic option for depression, particularly in addressing the often-overlooked domains of sleep and cognitive performance. The integration of interpersonal and affective mechanisms within a brief, manualized format positions DIT as a viable alternative or complement to CBT and pharmacotherapy in clinical practice. This research encourages clinicians and policymakers to consider more holistic and enduring interventions, supporting a shift toward broader, function-focused models of depression treatment.

Funding/financial disclosure

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author statement

All individuals listed as authors have made significant contributions to the research and the preparation of the manuscript titled Advancing Depression Treatment: A Multi-Center Randomized Controlled Trial of Dynamic Interpersonal Therapy Versus CBT and Pharmacotherapy on Symptoms, Sleep, and Cognition and are also aware of the submission of the manuscript in the Psychiatry Research Journal. We declare that the manuscript is an original work, has not been published previously, and is not under consideration for publication elsewhere.

CRediT authorship contribution statement

Hamid Yari-Renani: Visualization, Validation, Supervision, Resources, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Tahereh Zare:** Writing – review & editing, Writing – original draft, Software, Investigation.

Declaration of competing interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. All authors have contributed significantly to the work, have read and approved the final manuscript, and agree with its submission to the Psychiatry Research.

Acknowledgment

The authors appreciate participants who contributed to the research through their valuable engagement.

Appendix A

Data analysis

The collected data were analyzed using descriptive and inferential statistics, specifically Mixed-Design ANOVA (repeated-measures ANOVA). Statistical analyses were performed using SPSS (Version 24). The Mixed-Design ANOVA was employed to examine both within-subject effects (changes over time) and between-subject effects (differences between intervention groups), allowing for a comprehensive evaluation of the impact of DIT, CBT, and pharmacotherapy across multiple time points.

Descriptive statistics

Descriptive statistics were computed to summarize the basic characteristics of the data, including means and standard deviations for all dependent variables (depressive symptoms, sleep quality, and cognitive performance components) across the five measurement points (baseline, week 8, week 16, 6-month follow-up, and 12-month follow-up).

Assumption testing

Before conducting inferential analyses, assumption tests were performed to ensure the appropriateness of using parametric tests:

- Normality: The Shapiro-Wilk test was conducted to assess whether the data followed a normal distribution. A non-significant result ($p > 0.05$) indicated that the assumption of normality was met.
- Independence of Observations: Each participant's responses were independent of others, fulfilling this assumption.
- Homogeneity of Variances: Levene's test was used to evaluate whether variances were equal across groups. Non-significant p-values ($p > 0.05$) suggested homogeneity of variances.
- Sphericity: Mauchly's test of sphericity was used to examine whether variances of differences between repeated measures were equal. Since this assumption was met ($p > 0.05$), parametric analyses were performed without sphericity corrections.

Mixed-design ANOVA

A Mixed-Design ANOVA (repeated-measures ANOVA) was employed to assess whether there were significant differences in depressive symptoms, sleep disturbances, and cognitive performance across time and among the three intervention groups. The analysis involved:

- Within-Subject Effects (Time Effects): Examining how depressive symptoms, sleep quality, and cognitive performance changed across the five measurement points.
- Between-Subject Effects (Group Effects): Comparing overall differences between DIT, CBT, and pharmacotherapy groups.
- Interaction Effects (Group × Time): Investigating whether the changes over time differed significantly among the intervention groups.

The statistical equation for Mixed-Design ANOVA was as follows:

$$Y_{\{ijk\}} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{\{ij\}} + \epsilon_{\{ijk\}}$$

Where:

- $Y_{\{ijk\}}$ represents the observed dependent variable (e.g., depression score).
- μ is the overall mean.
- α_i represents the between-group factor (treatment groups: DIT, CBT, pharmacotherapy).
- β_j represents the within-subject factor (time: baseline, week 8, week 16, 6-month follow-up, 12-month follow-up).
- $(\alpha\beta)_{\{ij\}}$ represents the interaction effect between group and time.
- $\epsilon_{\{ijk\}}$ is the residual error.

Results showed that for all dependent variables (depressive symptoms, sleep disturbances, cognitive performance), the main effects of time, group, and the interaction between time and group were significant ($p < 0.05$).

Post-Hoc comparisons

Following significant results in the Mixed-Design ANOVA, Bonferroni-adjusted pairwise comparisons were conducted to determine specific differences between intervention groups at each time point.

Trend analysis

To further explore the longitudinal effects of the interventions, trend analyses were conducted to assess whether the trajectories of symptom reduction and cognitive improvements followed a linear or non-linear pattern.

Appendix B

In applying parametric statistical methods, the assumptions of the mixed ANOVA test were evaluated, including independence of observations, normality of the dependent variable distribution, homogeneity of variances, and sphericity test.

Independence means that each participant's score in the dependent variable is independent of other participants' scores. This condition was met as participants' responses were not influenced by others.

To assess normality in the three groups, the Shapiro-Wilk test was used.

Table 3
Shapiro-wilk test.

Group	Variable	Depressive Symptoms	Sleep Disorder	Cognitive Inhibition	Selective Attention	Cognitive Flexibility	Processing Speed
DIT	SW	0.98	0.98	0.98	0.97	0.98	0.98
	P	0.24	0.21	0.28	0.10	0.20	0.49
CBT	SW	0.97	0.96	0.97	0.99	0.99	0.99
	P	0.05	0.02	0.10	0.68	0.70	0.84
Pharmacotherapy	SW	0.99	0.98	0.99	0.98	0.99	0.98
	P	0.81	0.14	0.64	0.20	0.77	0.48

Based on the results of Table 3 and the obtained significance levels, for each research variable where the p-value is greater than 0.05, the null hypothesis is confirmed, indicating that the data distribution in all three groups is normal. Therefore, parametric tests can be used for further analysis. To examine the effect of CBT and DIT interventions on depressive symptoms, sleep quality, and cognitive components across the five measurement stages, a mixed ANOVA method was used (one within-subject factor and one between-subject factor). The five measurement stages were considered as the within-subject factor, while the grouping of participants into three groups was treated as the between-subject factor. To determine significant differences between the mean scores of depressive symptoms, sleep quality, and cognitive components across the three groups in the three treatment stages, the assumption of sphericity was first examined. The variance of differences between all group combinations must be equal. To assess this assumption, Mauchly's test of sphericity was used, and its results are presented in Table 4.

Table 4
Levene's F-test for examining homogeneity of variances across groups.

Variable	Test Statistic	Df1	Df2	Significance Level
Depressive Symptoms	1.63	2	222	0.20
Sleep Quality	0.69	2	222	0.51
Cognitive Inhibition	0.04	2	222	0.96
Selective Attention	0.25	2	222	0.78
Cognitive Flexibility	0.66	2	222	0.52
Processing Speed	2.40	2	222	0.09

As observed, the assumption of equal variances is met ($p > 0.05$). The variance of differences between all group combinations (sphericity) must be equal. To examine this assumption, Mauchly's test of sphericity was used, and its results are presented in Table 5.

Table 5
Mauchly's test of sphericity for examining covariance homogeneity.

Variable	Mauchly's Test Statistic	Degrees of Freedom	Significance Level
Depressive Symptoms	0.76	9	0.97
Sleep Quality	0.54	9	0.97
Cognitive Inhibition	0.87	9	0.98
Selective Attention	0.19	9	0.95
Cognitive Flexibility	0.13	9	0.94
Processing Speed	0.47	9	0.96

As observed, the assumption of sphericity is met ($p > 0.05$).
Table 6 summarizes the mixed ANOVA results for within-group and between-group factors.

Table 6
Mixed ANOVA test for depressive symptoms, sleep quality, and cognitive components.

Variable	Statistical Factor	Sum of Squares	Degree of Freedom	Mean Square	Test Statistic	Significance Level	Eta Squared
Depressive Symptoms	Within-Group	8122.17	4	2030.54	227.92	0.001	0.51
	Interaction	2983.24	8	372.91	41.86	0.001	0.27
	Between-Group	1253.97	2	626.98	74.28	0.001	0.40
Sleep Quality	Within-Group	6740.56	4	1685.14	183.78	0.001	0.45
	Interaction	2039.97	8	255.00	27.81	0.001	0.20
	Between-Group	1107.38	2	553.69	63.96	0.001	0.37
Cognitive Inhibition	Within-Group	5037,028.22	4	1259,257.05	2989.97	0.001	0.93
	Interaction	1503,954.86	8	187,994.36	446.37	0.001	0.80
	Between-Group	811,159.05	2	405,579.52	997.10	0.001	0.90
Selective Attention	Within-Group	39,050.32	4	9762.58	2400.09	0.001	0.92
	Interaction	10,784.45	8	1348.06	331.41	0.001	0.75
	Between-Group	6239.45	2	3119.73	697.56	0.001	0.86
Cognitive Flexibility	Within-Group	1057,541.00	4	264,385.25	2484.54	0.001	0.92
	Interaction	261,986.78	8	32,748.35	307.75	0.001	0.74
	Between-Group	288,070.43	2	144,035.22	1565.43	0.001	0.93
Processing Speed	Within-Group	21,154,673.71	4	5288,668.43	6315.01	0.001	0.97
	Interaction	2980,290.17	8	372,536.27	444.83	0.001	0.80
	Between-Group	2780,248.11	2	1390,124.06	1282.90	0.001	0.92

The results of Table 6 indicate that, for the within-group factor, the calculated F-value for the effect of measurement stages (pre-test, post-test, and follow-up) is statistically significant at the 0.05 level for depressive symptoms, sleep quality, and cognitive components ($p < 0.05$). As a result, there is a significant difference in the mean scores of depressive symptoms, sleep quality, and cognitive components across the five measurement stages. According to the results of Table 6, regarding the interaction between measurement stages and group factors, the calculated F-value for the effect of measurement stages across the three groups (DIT, CBT, and pharmacotherapy) is statistically significant at the 0.05 level for depressive symptoms, sleep quality, and cognitive components ($p < 0.05$).

As a result, there is a significant difference in the mean scores of depressive symptoms, sleep quality, and cognitive components across the five measurement stages in the three groups.

According to the results of Table 5, for the between-group factor, the calculated F-value is statistically significant at the 0.05 level for depressive symptoms, sleep quality, and cognitive components ($p < 0.05$).

As a result, there is a significant difference in the overall mean scores of depressive symptoms, sleep quality, and cognitive components among the DIT, CBT, and pharmacotherapy groups.

The Bonferroni post hoc test was conducted to examine differences between the mean scores across the three groups. The results are presented in Table 7.

Table 7
Bonferroni post hoc test results for pairwise comparison of mean scores across the three groups.

Variable	Comparison Groups	Mean Difference	Standard Error	Significance Level
Depressive Symptoms	DIT – CBT	0.21	0.50	1.00
Stage 1	Pharmacotherapy – DIT	−0.79	0.50	0.34
	Pharmacotherapy – CBT	−1.00	0.50	0.13
Sleep Quality	DIT – CBT	0.77	0.51	0.39
Stage 1	Pharmacotherapy – DIT	0.01	0.51	1.00
	Pharmacotherapy – CBT	−0.76	0.51	0.41
Cognitive Inhibition Stage 1	DIT – CBT	−3.96	3.31	0.70
	Pharmacotherapy – DIT	−5.28	3.31	0.34
	Pharmacotherapy – CBT	−1.32	3.31	1.00
Selective Attention Stage 1	DIT – CBT	−1.08	0.34	0.27
	Pharmacotherapy – DIT	0.09	0.34	1.00
	Pharmacotherapy – CBT	1.17	0.34	0.17
Cognitive Flexibility Stage 1	DIT – CBT	−8.48	1.61	0.11
	Pharmacotherapy – DIT	−15.13	1.61	0.06
	Pharmacotherapy – CBT	−6.65	1.61	0.15

(continued on next page)

Table 7 (*continued*)

Variable	Comparison Groups	Mean Difference	Standard Error	Significance Level
Processing Speed Stage 1	DIT – CBT	−57.77	4.65	0.13
	Pharmacotherapy – DIT	−29.01	4.65	0.24
	Pharmacotherapy – CBT	28.76	4.65	0.32
Depressive Symptoms Stage 2	DIT – CBT	1.08	0.48	0.07
	Pharmacotherapy – DIT	3.09	0.48	0.001
	Pharmacotherapy – CBT	2.01	0.48	0.001
Sleep Quality Stage 2	DIT – CBT	0.87	0.51	0.28
	Pharmacotherapy – DIT	2.28	0.51	0.001
	Pharmacotherapy – CBT	1.41	0.51	0.02
Cognitive Inhibition Stage 2	DIT – CBT	−22.99	3.22	0.001
	Pharmacotherapy – DIT	48.83	3.22	0.001
	Pharmacotherapy – CBT	71.81	3.22	0.001
Selective Attention Stage 2	DIT – CBT	0.07	0.34	1.00
	Pharmacotherapy – DIT	3.99	0.34	0.001
	Pharmacotherapy – CBT	3.92	0.34	0.001
Cognitive Flexibility Stage 2	DIT – CBT	−4.84	1.70	0.01
	Pharmacotherapy – DIT	8.43	1.70	0.001
	Pharmacotherapy – CBT	13.27	1.70	0.001
Processing Speed Stage 2	DIT – CBT	−6.17	5.09	0.68
	Pharmacotherapy – DIT	61.25	5.09	0.001
	Pharmacotherapy – CBT	67.43	5.09	0.001
Depressive Symptoms Stage 3	DIT – CBT	−0.25	0.48	1.00
	Pharmacotherapy – DIT	−0.92	0.48	0.17
	Pharmacotherapy – CBT	−0.67	0.48	0.49
Sleep Quality Stage 3	DIT – CBT	−0.44	0.45	0.98
	Pharmacotherapy – DIT	−2.05	0.45	0.001
	Pharmacotherapy – CBT	−1.61	0.45	0.001
Cognitive Inhibition Stage 3	DIT – CBT	−26.87	3.38	0.001
	Pharmacotherapy – DIT	−61.37	3.38	0.001
	Pharmacotherapy – CBT	−34.51	3.38	0.001
Selective Attention Stage 3	DIT – CBT	−0.17	0.34	1.00
	Pharmacotherapy – DIT	−5.25	0.34	0.001
	Pharmacotherapy – CBT	−5.08	0.34	0.001
Cognitive Flexibility Stage 3	DIT – CBT	−4.27	1.45	0.01
	Pharmacotherapy – DIT	−27.97	1.45	0.001
	Pharmacotherapy – CBT	−23.71	1.45	0.001
Processing Speed Stage 3	DIT – CBT	−128.08	5.02	0.001
	Pharmacotherapy – DIT	−101.16	5.02	0.001
	Pharmacotherapy – CBT	26.92	5.02	0.001
Depressive Symptoms Stage 4	DIT – CBT	−2.64	0.52	0.001
	Pharmacotherapy – DIT	−7.04	0.52	0.001
	Pharmacotherapy – CBT	−4.40	0.52	0.001
Sleep Quality Stage 4	DIT – CBT	−1.81	0.49	0.001
	Pharmacotherapy – DIT	−5.56	0.49	0.001
	Pharmacotherapy – CBT	−3.75	0.49	0.001
Cognitive Inhibition Stage 4	DIT – CBT	−34.01	3.30	0.001
	Pharmacotherapy – DIT	−132.89	3.30	0.001
	Pharmacotherapy – CBT	−98.88	3.30	0.001
Selective Attention Stage 4	DIT – CBT	−1.29	0.33	0.001
	Pharmacotherapy – DIT	−11.59	0.33	0.001
	Pharmacotherapy – CBT	−10.29	0.33	0.001
Cognitive Flexibility Stage 4	DIT – CBT	−17.67	1.76	0.001
	Pharmacotherapy – DIT	−68.80	1.76	0.001
	Pharmacotherapy – CBT	−51.13	1.76	0.001
Processing Speed Stage 4	DIT – CBT	−137.56	4.88	0.001
	Pharmacotherapy – DIT	−213.51	4.88	0.001
	Pharmacotherapy – CBT	−75.95	4.88	0.001
Depressive Symptoms Stage 5	DIT – CBT	−2.36	0.45	0.001
	Pharmacotherapy – DIT	−6.99	0.45	0.001
	Pharmacotherapy – CBT	−4.63	0.45	0.001
Sleep Quality Stage 5	DIT – CBT	−2.05	0.50	0.001
	Pharmacotherapy – DIT	−6.28	0.50	0.001
	Pharmacotherapy – CBT	−4.23	0.50	0.001
Cognitive Inhibition Stage 5	DIT – CBT	−45.93	3.49	0.001
	Pharmacotherapy – DIT	−176.35	3.49	0.001
	Pharmacotherapy – CBT	−130.41	3.49	0.001
Selective Attention Stage 5	DIT – CBT	−2.35	0.31	0.001
	Pharmacotherapy – DIT	−14.28	0.31	0.001
	Pharmacotherapy – CBT	−11.93	0.31	0.001
Cognitive Flexibility Stage 5	DIT – CBT	−27.85	1.78	0.001
	Pharmacotherapy – DIT	−88.76	1.78	0.001
	Pharmacotherapy – CBT	−60.91	1.78	0.001
Processing Speed Stage 5	DIT – CBT	−150.39	4.66	0.001
	Pharmacotherapy – DIT	−281.97	4.66	0.001
	Pharmacotherapy – CBT	−131.59	4.66	0.001

The results of the Bonferroni post hoc test indicate that in the initial stage (pre-test), no significant differences were observed between the DIT, CBT, and pharmacotherapy groups for the variables.

Additionally, the findings show that at various stages, significant differences emerged between the DIT, CBT, and pharmacotherapy groups across different factors such as depressive symptoms, sleep quality, cognitive inhibition, selective attention, cognitive flexibility, and processing speed.

In most states, psychotherapy treatments (DIT and CBT) performed better than pharmacotherapy, particularly in reducing depressive symptoms and improving cognitive functions.

Notably, significant differences were also observed between the two psychotherapy groups (DIT and CBT) at different stages, indicating variations in treatment effectiveness over time.

Overall, the results suggest that psychotherapy interventions gradually demonstrated more stable and effective long-term impacts compared to pharmacotherapy, leading to greater improvement and a reduction in various symptoms

All pairwise comparisons between the groups showed significant differences in the follow-up stages. In other words, as time progressed, the treatment paths diverged, making the effectiveness of psychotherapy methods in improving the examined indicators more evident than pharmacotherapy.

Data availability

The data used in this study are available from the corresponding author upon reasonable request.

References

Bateman, A., Fonagy, P., 2010. Mentalization based treatment for borderline personality disorder. World Psychiatry 9 (1), 11. https://doi.org/10.1002/j.2051-5545.2010.tb00255.x.

Bateman, A.W., Fonagy, P., 2019. Handbook of Mentalizing in Mental Health Practice. American Psychiatric Pub.

Cohen, Z.D., Breunese, J., Markowitz, J.C., Weitz, E.S., Hollon, S.D., Browne, D.T., Rucci, P., Corda, C., Menchetti, M., Weissman, M.M., Bagby, R.M., Quilty, L.C., Blom, M.B.J., Altamura, M., Zobel, I., Schramm, E., Gois, C., Twisk, J.W.R., Wienicke, F.J., Driessen, E., 2024. Comparative efficacy of interpersonal psychotherapy and antidepressant medication for adult depression: a systematic review and individual participant data meta-analysis. Psychol. Med. 54 (14), 3785–3794. https://doi.org/10.1017/S0033291724001788.

Cuijpers, P., Berking, M., Andersson, G., Quigley, L., Kleiboer, A., Dobson, K.S., 2013. A meta-analysis of cognitive-behavioural therapy for adult depression, alone and in comparison with other treatments. Can. J. Psychiatry 58 (7), 376–385. https://doi.org/10.1177/070674371305800702.

Fitzpatrick, C., 2024. Adolescent internet use and symptoms of depression: a rejoinder. Psychol. Med. 54 (11), 3199–3200. https://doi.org/10.1017/S0033291724000412.

Fonagy, P., 2015. The effectiveness of psychodynamic psychotherapies: an update. World Psychiatry: Off. J. World Psychiatr. Assoc. (WPA) 14 (2), 137–150. https://doi.org/10.1002/wps.20235.

Fonagy, P., Lemma, A., Target, M., O'Keeffe, S., Constantinou, M.P., Ventura Wurman, T., Luyten, P., Allison, E., Roth, A., Cape, J., Pilling, S., 2020. Dynamic interpersonal therapy for moderate to severe depression: a pilot randomized controlled and feasibility trial. Psychol. Med. 50 (6), 1010–1019. https://doi.org/10.1017/S0033291719000928.

Harwood, H., Rhead, R., Chui, Z., Bakolis, I., Connor, L., Gazard, B., Hall, J., MacCrimmon, S., Rimes, K.A., Woodhead, C., Hatch, S.L., 2023. Variations by ethnicity in referral and treatment pathways for IAPT service users in South London. Psychol. Med. 53 (3), 1084–1095. https://doi.org/10.1017/S0033291721002518.

Hvenegaard, M., Moeller, S.B., Poulsen, S., Gondan, M., Grafton, B., Austin, S.F., Kistrup, M., Rosenberg, N.G.K., Howard, H., Watkins, E.R., 2020. Group rumination-focused cognitive-behavioural therapy (CBT) v. group CBT for depression: phase II trial. Psychol. Med. 50 (1), 11–19. https://doi.org/10.1017/S0033291718003835.

Lemma, A., Target, M., Fonagy, P., 2011. The development of a brief psychodynamic intervention (dynamic interpersonal therapy) and its application to depression: a pilot study. Psychiatry 74 (1), 41–48. https://doi.org/10.1521/psyc.2011.74.1.41.

López-López, J.A., Davies, S.R., Caldwell, D.M., Churchill, R., Peters, T.J., Tallon, D., Dawson, S., Wu, Q., Li, J., Taylor, A., Lewis, G., Kessler, D.S., Wiles, N., Welton, N.J., 2019. The process and delivery of CBT for depression in adults: a systematic review and network meta-analysis. Psychol. Med. 49 (12), 1937–1947. https://doi.org/10.1017/S003329171900120X.

Luyten, P., Blatt, S.J., 2012. Psychodynamic treatment of depression. Psychiatr. Clin. North Am. 35 (1), 111–129. https://doi.org/10.1016/j.psc.2012.01.001.

Minaeva, O., Riese, H., Booij, S.H., Lamers, F., Giltay, E.J., Scheer, F.a.J.L., Hu, K., 2024. Fractal motor activity during wakefulness and sleep: a window into depression recency and symptom recurrence. Psychol. Med. 54 (15), 4429–4437. https://doi.org/10.1017/S0033291724002769.

Nobile, B., Gourguechon-Buot, E., Malestroit, M., Olié, E., Haffen, E., Gorwood, P., Courtet, P., 2024. Does depression with current suicidal ideation lead to treatment-resistant depression? Two large naturalistic cohorts of outpatients with depression and current suicidal ideation. Psychiatry Res. 342, 116249. https://doi.org/10.1016/j.psychres.2024.116249.

Olaya, B., de Miquel, C., Francia, L., Rodríguez-Prada, C., Dolz del Castellar, B., Ayuso-Mateos, J.L., Haro, J.M., Domènech-Abella, J., 2025. Understanding the incidence and recurrence of depression and associated risk factors in 9 years of follow-up: results from a population-based sample. Psychiatry Res. 345, 116375. https://doi.org/10.1016/j.psychres.2025.116375.

Periáñez, J.A., Lubrini, G., García-Gutiérrez, A., Ríos-Lago, M., 2021. Construct validity of the stroop color-word test: influence of speed of visual search, verbal fluency, working memory, cognitive flexibility, and conflict monitoring. Arch. Clin. Neuropsychol.: Off. J. Natl. Acad. Neuropsycholog. 36 (1), 99–111. https://doi.org/10.1093/arclin/acaa034.

Santen, G., Gomeni, R., Danhof, M., Della Pasqua, O., 2008. Sensitivity of the individual items of the Hamilton depression rating scale to response and its consequences for the assessment of efficacy. J. Psychiatr. Res. 42 (12), 1000–1009. https://doi.org/10.1016/j.jpsychires.2007.11.004.

Shateri, L., Yari Renani, H., Bakhshipour Rudsari, A., Hashemi Nosratabad, T., Saeidi, Z., 2024. Through the lens of schizophrenia: Recognizing negative facial expressions and family patterns. Schizophr. Res. Cogn. 39, 100336. https://doi.org/10.1016/j.scog.2024.100336.

Wang, J., Liu, S., Qu, X., He, X., Zhang, L., Guo, K., Zhu, X., 2023a. Nurses' Colleague solidarity and job performance: mediating effect of positive emotion and turnover intention. Saf. Health Work 14 (3), 309–316. https://doi.org/10.1016/j.shaw.2023.06.001.

Wang, L., Wang, Q., Jiang, W., Luo, J., Tong, J., Li, X., Fang, F., Wang, H., Zhao, W., Koszycki, D., Qiu, J., 2020. Efficacy of brief dynamic interpersonal therapy in patients with major depressive disorder: a prospective, multicenter randomized controlled trial protocol. Trials 21 (1), 673. https://doi.org/10.1186/s13063-020-04569-8.

Wang, X., Hu, X., Chen, F., Yu, Q., Wang, Y., Qiu, X., Yang, F., Wang, C., Wang, W., 2025. Association between childhood hunger and depression or anxiety in later life: insights from two case-control studies. Psychiatry Res., 116475 https://doi.org/10.1016/j.psychres.2025.116475.

Wang, Y., Yao, J., Koszycki, D., Jiang, W., Fang, F., Wang, M., Tao, J., Zhao, W., Liu, Y., Su, S., Peng, Y., Wang, H., Wang, L., Gao, R., Gu, J., Zhang, J., Bai, Y., Wu, Y., Su, Y., Qiu, J., 2023b. Efficacy of dynamic interpersonal therapy for major depressive disorder in China: results of a multicentered, three-arm, randomized, controlled trial. Psychol. Med. 53 (15), 7242–7254. https://doi.org/10.1017/S0033291723000788.

Yari-Renani, H., Oldfield, L., 2025. Transforming anxiety, depression, and quality of life in rural remote workers with GAD via music therapy: A quasi-experimental study. J. Affect. Disord. 385, 119440. https://doi.org/10.1016/j.jad.2025.119440.

Yari-Renani, H., Rahmanian, A., Saeidi, Z., Birashk, B., Saraei, I., Ghodusi, S., 2025. The effect of positive psychology interventions on job satisfaction, work engagement and withdrawal intentions among remote working cancer survivors. Sci. Rep. 15, 35330. https://doi.org/10.1038/s41598-025-19250-w.

Zainal, N.H., 2024. Is combined antidepressant medication (ADM) and psychotherapy better than either monotherapy at preventing suicide attempts and other psychiatric serious adverse events for depressed patients? A rare events meta-analysis. Psychol. Med. 54 (3), 457–472. https://doi.org/10.1017/S0033291723003306.

Zitser, J., Allen, I.E., Falgàs, N., Le, M.M., Neylan, T.C., Kramer, J.H., Walsh, C.M., 2022. Pittsburgh Sleep Quality Index (PSQI) responses are modulated by total sleep time and wake after sleep onset in healthy older adults. PLoS. One 17 (6), e0270095. https://doi.org/10.1371/journal.pone.0270095.