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The Effectiveness of Bigdeli Mind Simulation in Improving Psychological Symptoms and Mental Health among Patients with Depression

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ABSTRACT

Purpose: This study aimed to investigate the effectiveness of Bigdeli Mind Simulation in reducing psychological symptoms and improving mental health among patients diagnosed with depression.

Methods and Materials: This quasi-experimental study employed a pretest-posttest control-group design. The statistical population consisted of men and women aged over 18 years with moderate-to-severe depressive symptoms who attended the Mind and Psyche Specialized Psychology Clinic in Tehran in 2024. Using convenience sampling, 30 eligible participants were selected and randomly assigned to an experimental group and a control group, with 15 participants in each group. Data were collected using the Goldberg General Health Questionnaire and the 21-item Depression, Anxiety, and Stress Scale. The experimental group received the Bigdeli Mind Simulation intervention in five 60-minute sessions, whereas the control group received no intervention during the study period. The collected data were analyzed using repeated-measures analysis of variance in SPSS version 26.

Findings: The inferential analyses demonstrated a statistically significant difference between the experimental and control groups in overall psychological symptoms following the intervention ($p < .001$). Bigdeli Mind Simulation significantly reduced depressive symptoms ($p < .001$), anxiety and stress symptoms ($p = .001$), and somatic symptoms ($p < .001$). The intervention also produced significant improvements in sleep disturbance ($p < .001$) and social functioning ($p < .001$). Collectively, these findings supported the research hypotheses and indicated that participants receiving Bigdeli Mind Simulation experienced significantly greater improvements in psychological symptoms and general mental health than participants in the control group.

Conclusion: Bigdeli Mind Simulation appears to be an effective brief psychological intervention for reducing depression, anxiety, stress, somatic complaints, and sleep-related difficulties while improving social functioning and general mental health in patients with depression. This intervention may therefore be considered a potentially useful complementary treatment within psychological and mental health services. Further studies with larger samples, follow-up assessments, and comparisons with established therapeutic approaches are recommended.

Keywords: Bigdeli Mind Simulation; Psychological Symptoms; Mental Health; Depression; Anxiety; Stress

1. Introduction

Depression is one of the most consequential psychological disorders because it affects emotional experience, cognition, behavior, interpersonal relationships, occupational functioning, physical health, and overall quality of life. It is generally characterized by persistent sadness, diminished interest or pleasure, hopelessness, reduced motivation, impaired concentration, sleep disturbance, fatigue, negative self-evaluation, and, in severe cases, suicidal thoughts or behaviors. These symptoms do not occur in isolation; rather, they interact with anxiety, stress, somatic complaints, social withdrawal, and disturbances in daily functioning, thereby creating a multidimensional pattern of impairment. Depression may emerge at different stages of life and can vary considerably in its clinical presentation according to age, developmental conditions, social environment, and exposure to stressful experiences. Consequently, recognizing depressive symptoms across the lifespan is essential for timely intervention and prevention of chronic psychological and functional consequences (Bagherifar et al., 2017). The importance of depression is further intensified by its frequent coexistence with anxiety and stress, which may complicate diagnosis, increase symptom severity, and reduce individuals' capacity to use adaptive coping strategies. Evidence from Iran has similarly demonstrated that anxiety represents a substantial psychological concern across different population groups, supporting the need for interventions capable of simultaneously addressing interrelated emotional symptoms rather than focusing exclusively on a single diagnostic category (Modara et al., 2017).

Depression also has important interpersonal and family consequences. An individual's depressive symptoms may influence communication patterns, emotional availability, parenting behavior, and the psychological adjustment of other family members. For example, maternal depression has been associated with depressive and anxiety symptoms among children with specific learning disorders, with parenting stress functioning as an important explanatory mechanism (Abbasi & Gheyraati, 2022). Such findings indicate that depression should not be understood merely as an intrapersonal disturbance but as a condition embedded within relational systems. Reduced energy, irritability, withdrawal, pessimistic interpretations, and impaired problem-solving may weaken supportive relationships at precisely the time when social resources are most necessary.

Social support can moderate the psychological consequences of stressful experiences by influencing appraisal processes, emotional regulation, coping resources, and perceptions of belonging and security (Cohen & Wills, 2020). Conversely, inadequate support and impaired social functioning may increase vulnerability to persistent distress. Social health is therefore a meaningful component of psychological well-being because it reflects the individual's capacity to participate effectively in social life, maintain constructive relationships, and experience integration within the community (Omid et al., 2017). Accordingly, interventions for depression should ideally improve not only mood symptoms but also sleep, somatic well-being, social functioning, and the broader dimensions of general mental health.

The clinical importance of depression is also related to its potential progression toward severe disability, recurrent episodes, and self-harm. Suicide prevention has consequently been recognized as a global mental-health priority, particularly because depressive symptoms, hopelessness, psychological pain, social disconnection, and limited access to effective care may interact to elevate risk (Gunnell et al., 2020). Although not all individuals with depression experience suicidal ideation, the association between severe depressive states and suicide-related outcomes underscores the importance of early identification, accessible treatment, and sustained clinical monitoring. At the same time, a considerable proportion of people experiencing psychological difficulties do not receive adequate professional services. Research on mental-health service utilization has shown that treatment-seeking is shaped by perceived need, stigma, cost, accessibility, knowledge of available services, and beliefs about treatment effectiveness (Eisenberg et al., 2017). These barriers create a need for interventions that are understandable, time-efficient, adaptable to individual symptom severity, and capable of being implemented within routine psychological services. Brief interventions may be particularly valuable when they provide structured techniques that patients can learn, practice, and apply beyond treatment sessions.

A range of psychological, behavioral, and health-related interventions has been proposed for reducing depression and its associated symptoms. Psychotherapy remains a central component of depression treatment, and systematic evidence indicates that several established psychotherapeutic approaches can produce meaningful reductions in adult depressive symptoms (Cuijpers et al., 2020). Cognitive, behavioral, interpersonal, metacognitive, schema-focused,

and emotion-oriented approaches attempt to modify different mechanisms involved in the development and maintenance of depression. For instance, emotional schema therapy has been found to reduce rumination and depression severity among patients with major depression, suggesting that changes in maladaptive interpretations of emotional experience may weaken repetitive negative thinking and depressive affect (Rezai et al., 2015). Metacognitive therapy has also been examined in comparison with cognitive therapy for the reduction of anxiety-related difficulties, demonstrating the therapeutic relevance of modifying beliefs and regulatory processes concerning thought itself (Ghahvechi-Hosseini et al., 2015). Problem-solving training represents another relevant intervention because depression is often associated with perceived helplessness, ineffective coping, and diminished hope. Findings among infertile women have indicated that problem-solving instruction can reduce depressive symptoms and enhance hopefulness, thereby illustrating the importance of active cognitive and behavioral coping skills (Kiani Fasqandi & Zarei, 2018).

Behavioral health strategies may similarly contribute to the prevention or reduction of depression and anxiety. Physical activity has been associated with beneficial effects on depressive and anxiety symptoms in nonclinical populations, indicating that behavioral activation and bodily engagement can influence psychological functioning (Rebar et al., 2015). Research has also emphasized the preventive potential of regular physical activity for depression through biological, psychological, and social pathways, including improved mood regulation, self-efficacy, sleep, stress tolerance, and social participation (Teychenne et al., 2019). Nevertheless, no single intervention is universally effective, and treatment response may depend on symptom severity, comorbidity, motivation, cognitive style, social context, therapeutic alliance, and adherence. Moreover, traditional psychotherapies may require numerous sessions, specialized training, and sustained patient participation. Depression care therefore benefits from integrated and evidence-based models that can be implemented in accessible clinical settings and adapted to patients' individual needs (Katon et al., 2017). The continuing burden of depressive disorders and the variability of treatment response justify the investigation of innovative interventions that may complement existing therapeutic methods.

Bigdeli Mind Simulation is an emerging psychological intervention developed on the premise that mental processes can be identified, represented, reorganized, and practiced

through a systematic form of simulation. The conceptual foundations of the method were introduced in works describing the "language of the mind," mental programming processes, and the use of structured simulation for changing learned patterns of cognition and behavior (Bigdeli Shamloo, 2017a). Related formulations conceptualize mind simulation as a method through which internal representations, anticipatory processes, and behavioral responses may be reconstructed by intentionally activating and rehearsing alternative mental patterns (Bigdeli Shamloo, 2017c). A further presentation of the approach emphasizes the possibility of treating mental functioning as an organized system in which ineffective programs or response sequences can be recognized and replaced through targeted simulation exercises (Bigdeli Shamloo, 2017b). Although the terminology of mental programming should not be interpreted as reducing complex psychological functioning to a purely mechanical process, it offers a practical metaphor for understanding how repetitive thoughts, expectations, emotional reactions, and habitual behaviors may become stabilized and subsequently modified.

From a psychological perspective, mental simulation refers broadly to the internal representation of events, actions, sensations, outcomes, or alternative responses in the absence of their immediate external occurrence. Such simulation may influence expectations, emotional reactions, attentional orientation, decision-making, and behavioral preparation. In depression, individuals frequently engage in maladaptive forms of internal simulation, including repetitive anticipation of failure, recollection of negative experiences, rumination about personal inadequacy, and pessimistic projection of future events. These processes may strengthen hopelessness, avoidance, and reduced engagement with rewarding experiences. Bigdeli Mind Simulation seeks to intervene in these patterns by teaching individuals to recognize and modify internal sequences and to practice more adaptive mental and behavioral responses. The method has been introduced as a potentially rapid intervention applicable to stuttering and several psychological problem domains (Bigdeli Shamloo et al., 2021). Its relevance to depression may therefore lie in its potential to interrupt rigid negative simulations, strengthen alternative cognitive-emotional pathways, and improve the individual's perceived capacity to manage distressing internal experiences.

The emerging empirical literature on Bigdeli Mind Simulation has primarily focused on stuttering, communication attitudes, psychological problems,

adjustment, and skill learning. Early applied work reported the use of the method for reducing stuttering severity and improving communication attitudes, suggesting that changes in anticipatory mental patterns and response preparation may influence speech-related functioning (Kamarzarin, Golestani, et al., 2021). Additional research and presentations have examined virtual delivery of Mind Simulation Therapy for individuals with stuttering and psychological problems, highlighting the possibility of adapting the intervention to technology-mediated therapeutic formats (Kamarzarin, Beygi, et al., 2021a). A closely related presentation also described virtual mind simulation treatment for patients experiencing stuttering and associated psychological difficulties (Kamarzarin, Akbari, et al., 2021). These studies are relevant to depression because they indicate that the method may extend beyond the modification of observable speech behavior to emotional and psychological processes that accompany functional disorders.

Fallahi's investigation of Bigdeli Mind Simulation among children and adolescents with stuttering reported reductions in stuttering and communication-attitude difficulties, providing further support for the structured application of the method across therapeutic sessions (Fallahi, 2021). Subsequent published research also demonstrated the effectiveness of the Mind Simulation method in reducing stuttering and improving communication attitudes (Kamarzarin et al., 2023). More recent evidence has continued to support effects on stuttering and communication-related outcomes, reinforcing the potential clinical value of the intervention and the need to evaluate its application to additional psychological conditions (Kamarzarin & Bigdeli Shamloo, 2025). A broader examination of the effectiveness of mind simulation has likewise proposed that the approach may be useful across domains in which maladaptive mental representations and response patterns contribute to ongoing difficulty (Kamarzarin & Shamloo, 2024). Research presented on patients with moderate-to-severe stuttering and adjustment problems further suggests that the intervention may influence psychological adaptation in addition to its primary behavioral target (Kamarzarin & Bigdeli Shamloo, 2024).

The applicability of Mind Simulation has not been limited to clinical speech problems. Studies examining its use in adolescent soccer training have suggested that systematic mental simulation may contribute to skill acquisition and performance preparation (Kamarzarin, Fallahi, et al., 2021). A related conference study similarly reported the

effectiveness of mind simulation in teaching soccer skills to adolescents, implying that mentally rehearsed sequences may facilitate learning and behavioral execution (Kamarzarin, Beygi, et al., 2021b). These findings are conceptually relevant because they support the broader assumption that structured internal rehearsal can affect observable performance. In depression treatment, an analogous process may involve rehearsing adaptive responses to stressful situations, reconstructing anticipated outcomes, increasing readiness for social or behavioral engagement, and reducing avoidance. Psychological concepts necessary for interpreting these mechanisms—including cognition, emotion, learning, motivation, mental representation, and behavioral adaptation—have been articulated within applied psychological terminology (Kamarzarin, Akbar, et al., 2021). Accordingly, Mind Simulation may be understood as an integrative technique that draws on cognitive rehearsal, attentional control, mental representation, behavioral preparation, and repeated practice.

The proposed value of Bigdeli Mind Simulation for depression is also supported by several characteristics of its treatment structure. First, the intervention is individualized according to symptom severity and the patient's ability to master each technique. Such flexibility is important because individuals with moderate-to-severe depression may differ in concentration, energy, motivation, cognitive speed, and readiness to engage in new exercises. Second, the method introduces techniques progressively and requires adequate practice before advancement, which may support skill consolidation and reduce the risk of overwhelming the patient. Third, the therapist reviews performance continuously and adjusts subsequent instruction according to the individual's response. This feature is consistent with measurement-informed and patient-centered care, in which treatment decisions are guided by observed progress rather than by a rigid protocol alone. Fourth, the intervention emphasizes active patient participation. Rather than relying solely on discussion, patients are expected to practice specific techniques and transfer them to daily psychological functioning.

Despite promising findings in stuttering, communication attitudes, adjustment, virtual treatment, and performance learning, the direct effect of Bigdeli Mind Simulation on depression and multidimensional mental health has not yet been sufficiently investigated. Previous studies have provided a preliminary empirical foundation, but the generalizability of their findings to adults with moderate-to-

severe depressive symptoms remains uncertain. Depression involves a broader set of emotional, cognitive, somatic, behavioral, sleep-related, and social impairments than those typically assessed in research on speech or performance outcomes. It is therefore necessary to determine whether Mind Simulation can reduce not only depressive affect but also anxiety, stress, somatic symptoms, sleep disturbance, and social dysfunction. Examining these outcomes together is particularly important because improvement in depression may not be fully reflected by a single symptom score. A patient may experience reduced sadness while continuing to report severe sleep problems, bodily distress, anxiety, or impaired social functioning. The use of both the Depression, Anxiety, and Stress Scale and the General Health Questionnaire permits a more comprehensive evaluation of treatment effects across these interconnected domains.

The present investigation also responds to the need for brief and potentially scalable psychological interventions. A five-session protocol may be clinically useful when service settings face limited resources, high patient demand, or barriers to long-term treatment. However, brevity alone is not evidence of effectiveness, and innovative approaches must be assessed through systematic comparison and appropriate statistical analysis. A quasi-experimental pretest–posttest design with experimental and control groups provides an initial framework for determining whether symptom changes are greater among individuals receiving the intervention than among those who do not. By assessing participants before and after treatment, the study can examine both the direction and magnitude of change in general mental health and psychological symptoms. Furthermore, evaluating distinct outcomes allows the analysis to identify whether the intervention’s effects are broad or concentrated in particular domains.

The theoretical and empirical literature therefore provides a plausible rationale for evaluating Bigdeli Mind Simulation in depression, while simultaneously revealing a clear research gap. Established psychotherapies and behavioral interventions demonstrate that depressive symptoms can be modified through changes in cognition, emotional processing, problem-solving, activity patterns, metacognitive regulation, and social functioning. Bigdeli Mind Simulation may contribute to this therapeutic landscape by offering a structured method for identifying maladaptive internal patterns, rehearsing alternative responses, and progressively consolidating new mental and behavioral sequences. Nevertheless, its effectiveness for adult patients with clinically meaningful depressive

symptoms must be established directly rather than inferred from studies of stuttering, communication, or performance. The aim of the present study was to examine the effectiveness of Bigdeli Mind Simulation in reducing depression, anxiety, stress, somatic symptoms, sleep disturbance, and social dysfunction and in improving the general mental health of adults with moderate-to-severe depressive symptoms.

2. Methods and Materials

2.1. Study Design and Participants

This applied study was conducted to evaluate the effectiveness of Bigdeli Mind Simulation in reducing psychological symptoms and improving mental health among individuals with depression. A quasi-experimental pretest–posttest design with an experimental group and a control group was employed. The statistical population included all men and women aged 18 years or older who presented with moderate-to-severe depressive symptoms and attended the Mind and Psyche Specialized Psychology Clinic in Tehran during 2024. From this population, 30 eligible individuals were recruited through convenience sampling and subsequently assigned at random to either the experimental group or the control group, with 15 participants in each group. The experimental group received the Bigdeli Mind Simulation intervention, whereas the control group did not receive this intervention during the study period. Both groups completed the research instruments at the pretest and posttest stages. Before participation, all individuals received comprehensive explanations regarding the purpose, procedures, potential benefits, and voluntary nature of the study and provided written informed consent. Participants were informed that they could withdraw from the research at any stage without adverse consequences. All personal and research-related information was treated as confidential and used exclusively for scientific purposes.

2.2. Measures

The 28-item Goldberg General Health Questionnaire was used to assess participants’ general mental health and identify psychological distress. The GHQ-28 is a widely used screening instrument designed to detect probable psychiatric and psychological problems in clinical and community populations. It consists of four subscales: somatic symptoms, anxiety and sleep disturbance, social dysfunction, and severe depression. Each subscale contains

seven items, allowing the instrument to provide both an overall measure of psychological distress and separate scores for specific dimensions of mental health. Higher scores indicate greater psychological distress and poorer general mental health. The questionnaire has demonstrated satisfactory psychometric properties across different populations. Williams reported an average reliability coefficient of approximately .84 in a meta-analytic examination of the instrument, indicating that the GHQ-28 possesses acceptable reliability for screening and research purposes. In the present study, the questionnaire was administered before and after the intervention to determine whether Bigdeli Mind Simulation produced significant changes in somatic complaints, anxiety and sleep-related difficulties, social functioning, severe depressive symptoms, and overall mental health.

The 21-item Depression, Anxiety, and Stress Scale was administered to assess the severity of participants' depression, anxiety, and stress symptoms. The DASS-21 is the abbreviated form of the original scale developed by Lovibond and Lovibond in 1995 and contains three seven-item subscales measuring depression, anxiety, and stress. The depression subscale evaluates symptoms such as hopelessness, lack of interest, reduced motivation, and low positive affect; the anxiety subscale assesses physiological arousal, situational anxiety, and subjective fear; and the stress subscale measures irritability, tension, difficulty relaxing, and heightened emotional reactivity. Higher scores on each subscale indicate greater symptom severity. Lovibond and Lovibond evaluated the original instrument in a normative sample of 717 individuals and reported satisfactory internal consistency coefficients of .81 for depression, .73 for anxiety, and .81 for stress. The Persian version investigated by Sahebi and colleagues in 2005 also demonstrated satisfactory internal consistency, with reliability estimates broadly comparable to those obtained for the original version. In this study, the DASS-21 was completed by participants at the pretest and posttest stages to evaluate intervention-related changes in depression, anxiety, and stress.

2.3. Intervention

The Bigdeli Mind Simulation intervention consisted of five individual or clinically tailored sessions, each lasting approximately 60 minutes. The content and pace of the intervention were adjusted according to the severity of each participant's depressive symptoms, therapeutic needs, and

ability to learn and apply the techniques. During the first session, the therapist conducted an initial evaluation, identified the participant's principal psychological difficulties, determined the anticipated therapeutic needs, and introduced the fundamental principles and initial techniques of Bigdeli Mind Simulation. The intervention techniques were presented progressively so that participants could understand, practice, and consolidate each technique before proceeding to more advanced exercises. During subsequent sessions, the therapist reviewed the participant's performance, experiences, and completion of assigned practices. When the previously introduced techniques had been performed successfully, additional techniques were taught and practiced. When a participant had not sufficiently learned or applied an earlier technique, the introduction of new material was postponed until adequate mastery had been achieved. This flexible progression was intended to prevent cognitive overload and ensure that each participant acquired the intervention skills in a systematic manner. Throughout the treatment period, therapists continuously monitored participants' responses, adherence, psychological condition, and progress. After completion of the five sessions, follow-up contacts and therapeutic reviews were conducted to support continued practice and facilitate the stabilization of the treatment gains.

2.4. Data Analysis

The collected data were analyzed using SPSS software version 26. Descriptive statistical methods, including means and standard deviations, were used to summarize the participants' scores on psychological symptoms and mental-health variables at the pretest and posttest stages. Inferential analyses were conducted using repeated-measures analysis of variance to examine changes in the dependent variables over time and to determine whether the pattern of change differed significantly between the experimental and control groups. Separate analyses were performed for depression, anxiety, stress, somatic symptoms, anxiety and sleep disturbance, social dysfunction, severe depression, and overall mental health. The analysis evaluated the main effect of time, the main effect of group, and the interaction between time and group, with the interaction effect representing the principal indicator of intervention effectiveness. Statistical significance was determined on the basis of the predefined significance threshold, and the findings were interpreted by comparing post-intervention changes in the experimental group with those observed in the control group.

3. Findings and Results

Before testing the research hypotheses, descriptive statistics were calculated to provide an initial overview of participants' general health and anxiety scores before and

after the intervention. Table 1 presents the number of observations, minimum and maximum scores, means, and standard deviations for the study variables across the pretest and posttest assessments.

Table 1

Descriptive Statistics for the Study Variables

Variable	n	Minimum	Maximum	Mean	Standard Deviation
General health, pretest	30	1.46	2.86	2.3119	0.39813
Anxiety, pretest	30	1.43	3.57	2.5018	0.64049
General health, posttest	30	1.46	2.25	1.6976	0.20148
Anxiety, posttest	30	1.24	3.00	1.9603	0.46305

As shown in Table 1, the mean general health score decreased from 2.31 at the pretest assessment to 1.70 at the posttest assessment. Because higher General Health Questionnaire scores represent greater psychological distress and poorer mental health, this reduction indicates an improvement in participants' general mental health following the intervention. The variability of general health scores also decreased from a standard deviation of 0.40 at pretest to 0.20 at posttest, suggesting that participants' post-intervention scores were more homogeneous. Similarly, the mean anxiety score declined from 2.50 at pretest to 1.96 at posttest, indicating an overall reduction in anxiety symptoms. The standard deviation of anxiety scores decreased from 0.64 to 0.46, while the observed score range narrowed from 1.43–3.57 at pretest to 1.24–3.00 at posttest. These descriptive changes suggest improvements in general mental health and anxiety symptoms following the implementation of Bigdeli Mind Simulation; however, inferential analysis was required to determine whether the observed changes were statistically significant.

Before conducting the repeated-measures analysis of variance, the normality of the distributions was examined

using the Kolmogorov–Smirnov and Shapiro–Wilk tests. For pretest general health scores, the Kolmogorov–Smirnov test was significant, $D(30) = 0.171$, $p = .026$, whereas the Shapiro–Wilk test was nonsignificant, $W(30) = 0.933$, $p = .059$. Thus, although the two tests produced slightly different results, the Shapiro–Wilk finding indicated that the distribution was sufficiently close to normal. Both normality tests were nonsignificant for pretest anxiety scores, with $D(30) = 0.091$, $p = .200$, and $W(30) = 0.957$, $p = .253$. For posttest general health scores, the Kolmogorov–Smirnov test was nonsignificant, $D(30) = 0.136$, $p = .164$, whereas the Shapiro–Wilk test was significant, $W(30) = 0.877$, $p = .002$, indicating some departure from normality. Both tests supported the normality of posttest anxiety scores, with $D(30) = 0.125$, $p = .200$, and $W(30) = 0.959$, $p = .286$. Overall, most distributions met the normality assumption, although posttest general health scores demonstrated a deviation according to the Shapiro–Wilk test. Given the equal group sizes and the relative robustness of analysis of variance to moderate violations of normality, the planned inferential analyses were retained.

Table 2

Analysis of Variance Results for the Effects of Bigdeli Mind Simulation

Outcome	Source	Sum of Squares	df	Mean Square	F	p	Partial η^2
Overall psychological symptoms and mental health	Intervention effect	241.139	1	241.139	2318.433	< .001	—
	Error	3.016	29	0.104	—	—	—
Depressive symptoms	Intervention effect	220.417	1	220.417	832.826	< .001	.966
	Error	7.675	29	0.265	—	—	—
Anxiety and stress symptoms	Intervention effect	4.613	1	4.613	13.969	.001	.325
	Error	9.577	29	0.330	—	—	—
Somatic symptoms	Intervention effect	8.384	1	8.384	106.674	< .001	.786
	Error	2.279	29	0.079	—	—	—

Sleep disturbance	Intervention effect	11.767	1	11.767	73.211	< .001	.716
	Error	4.661	29	0.161	—	—	—
Social dysfunction	Intervention effect	4.041	1	4.041	27.153	< .001	.484
	Error	4.316	29	0.149	—	—	—

The analysis of variance results presented in Table 2 demonstrated that Bigdeli Mind Simulation had a statistically significant effect on the combined outcome of psychological symptoms and mental health, $F(1, 29) = 2318.433$, $p < .001$. This finding supports the principal research hypothesis and indicates that the observed changes in psychological symptoms and mental health were unlikely to have resulted from random variation. The intervention also produced a significant reduction in depressive symptoms, $F(1, 29) = 832.826$, $p < .001$, partial $\eta^2 = .966$. The effect size indicates that approximately 96.6% of the variance associated with changes in depressive symptoms was explained by the intervention effect, representing a very large effect. A statistically significant effect was also identified for anxiety and stress symptoms, $F(1, 29) = 13.969$, $p = .001$, partial $\eta^2 = .325$, indicating that Bigdeli Mind Simulation accounted for approximately 32.5% of the variance in the reduction of anxiety and stress. Somatic symptoms decreased significantly following the intervention, $F(1, 29) = 106.674$, $p < .001$, partial $\eta^2 = .786$, with approximately 78.6% of the variance attributable to the intervention effect. The effect on sleep disturbance was also statistically significant, $F(1, 29) = 73.211$, $p < .001$, partial $\eta^2 = .716$, demonstrating that approximately 71.6% of the variance in sleep-related improvement was associated with Bigdeli Mind Simulation. Finally, the intervention significantly improved social functioning, as reflected in the reduction of social dysfunction scores, $F(1, 29) = 27.153$, $p < .001$, partial $\eta^2 = .484$. This result indicates that approximately 48.4% of the variance in social functioning changes was explained by the intervention. Taken together, the findings confirm that Bigdeli Mind Simulation was associated with significant improvements in depression, anxiety, stress, somatic complaints, sleep disturbance, social functioning, and overall mental health among the participants.

4. Discussion and Conclusion

The findings of the present study demonstrated that Bigdeli Mind Simulation was effective in reducing psychological symptoms and improving general mental health among adults with moderate-to-severe depressive symptoms. The inferential analyses showed a statistically

significant overall intervention effect on the combined domain of psychological symptoms and mental health, $F(1, 29) = 2318.433$, $p < .001$. More specifically, the intervention produced significant reductions in depressive symptoms, $F(1, 29) = 832.826$, $p < .001$, partial $\eta^2 = .966$; anxiety and stress symptoms, $F(1, 29) = 13.969$, $p = .001$, partial $\eta^2 = .325$; somatic symptoms, $F(1, 29) = 106.674$, $p < .001$, partial $\eta^2 = .786$; and sleep disturbance, $F(1, 29) = 73.211$, $p < .001$, partial $\eta^2 = .716$. A significant improvement was also observed in social functioning, $F(1, 29) = 27.153$, $p < .001$, partial $\eta^2 = .484$. The descriptive results were consistent with these inferential findings, as the mean general-health score declined from 2.31 at pretest to 1.70 at posttest, while the mean anxiety score decreased from 2.50 to 1.96. Because higher scores represented greater psychological distress, these reductions indicated improved mental health and lower symptom severity after treatment. Collectively, the findings support the effectiveness of Bigdeli Mind Simulation as a brief intervention with multidimensional effects on emotional, somatic, sleep-related, and social aspects of depression.

The significant reduction in depressive symptoms is consistent with the broader psychotherapy literature demonstrating that psychological interventions can meaningfully change the cognitive, emotional, and behavioral processes involved in major depression. Systematic evidence has shown that several psychotherapeutic approaches are effective in reducing depressive symptoms among adults, although their mechanisms and delivery structures differ (Cuijpers et al., 2020). Bigdeli Mind Simulation may share certain functional characteristics with these interventions while retaining its own conceptual and technical framework. Depression is commonly maintained by repetitive negative thinking, pessimistic anticipation, reduced engagement, negative self-representation, and rigid interpretations of experience. Mind Simulation appears to address these processes by helping patients identify maladaptive internal patterns, mentally reconstruct alternative responses, and repeatedly rehearse more adaptive sequences. This interpretation corresponds with the foundational description of the method as a systematic approach to the language and programming of the mind, through which established mental

patterns may be recognized and modified (Bigdeli Shamloo, 2017a). Similar conceptualizations emphasize that thought, emotion, expectation, and behavior can be influenced by reorganizing internal mental representations and practicing alternative responses (Bigdeli Shamloo, 2017b, 2017c).

The very large effect observed for depressive symptoms may also be explained by the individualized and mastery-based structure of the intervention. In the present protocol, the therapist adjusted the progression of techniques to the severity of each patient's symptoms and did not introduce new material until previously taught techniques had been sufficiently practiced. This procedure may have increased therapeutic adherence, reduced cognitive overload, and enhanced the likelihood that participants would integrate each skill before advancing. Individuals with depression often experience diminished concentration, low motivation, impaired decision-making, and reduced confidence in their capacity to change. A gradual intervention that emphasizes successful practice may create repeated experiences of competence and thereby weaken helplessness. Comparable evidence has shown that interventions enhancing active coping and perceived control can reduce depressive symptoms. For example, problem-solving training reduced depression and increased hope among infertile women, suggesting that structured instruction can counteract passivity and pessimism by strengthening practical and cognitive coping abilities (Kiani Fasqandi & Zarei, 2018). Emotional schema therapy has similarly reduced rumination and depression severity, indicating that interventions targeting maladaptive patterns of emotional interpretation can produce substantial clinical improvement (Rezaei et al., 2015). Bigdeli Mind Simulation may operate through related pathways by interrupting repetitive negative simulations and replacing them with practiced adaptive responses.

The reduction in anxiety and stress symptoms also supports the proposed capacity of Bigdeli Mind Simulation to influence broader emotional-regulation processes rather than depression alone. Depression, anxiety, and stress commonly overlap, and individuals with moderate-to-severe depression may simultaneously experience physiological arousal, excessive anticipation of threat, tension, worry, irritability, and difficulty relaxing. The significant effect on anxiety and stress, with partial $\eta^2 = .325$, indicates that the intervention accounted for a meaningful proportion of symptom change in these domains. Mental simulation may influence anxiety by modifying catastrophic anticipation and reducing the automatic repetition of threatening future scenarios. Through guided rehearsal, patients may become

better able to imagine manageable responses, anticipate coping rather than failure, and reduce the uncertainty associated with stressful situations. This explanation is compatible with metacognitive research showing that anxiety can be reduced when individuals learn to alter their relationship with distressing thoughts and the beliefs that maintain repetitive worry (Ghahvechi-Hosseini et al., 2015). The finding is also important in the Iranian context, where systematic evidence has demonstrated that anxiety is a prevalent mental-health concern across different groups and therefore warrants direct therapeutic attention (Modara et al., 2017).

The effects on anxiety and stress may additionally be understood through the stress-buffering role of perceived control, coping resources, and supportive therapeutic interaction. Stress becomes more psychologically damaging when individuals perceive environmental demands as uncontrollable and their coping resources as insufficient. The therapeutic process in Bigdeli Mind Simulation involved continuous therapist monitoring, performance review, corrective guidance, and gradual progression. Such a structure may have provided both instrumental and emotional support, thereby reducing patients' sense of isolation and uncertainty. The stress-buffering hypothesis proposes that social support can reduce the harmful psychological effects of stressful events by changing appraisal, enhancing coping resources, and increasing feelings of security (Cohen & Wills, 2020). Although the intervention was not designed primarily as a social-support program, the consistent therapist–patient interaction may have strengthened perceived support while teaching patients to regulate internal responses. This mechanism may be especially relevant for depressed individuals whose social withdrawal and negative expectations often limit their use of available interpersonal resources.

The significant reduction in somatic symptoms is another notable finding. Depression and anxiety are frequently expressed through bodily complaints such as fatigue, headaches, muscular tension, gastrointestinal discomfort, reduced energy, and nonspecific physical distress. These symptoms may result from the interaction of heightened physiological arousal, disrupted sleep, persistent stress, attentional bias toward bodily sensations, and reduced activity. The large effect for somatic symptoms, partial $\eta^2 = .786$, suggests that the intervention influenced more than consciously reported mood states. One possible explanation is that modifying distressing mental sequences reduced sustained physiological activation. When patients repeatedly

anticipate negative events or mentally rehearse failure, the body may respond as though the anticipated threat were immediate. By replacing these simulations with more organized and manageable response patterns, the intervention may have reduced autonomic arousal and bodily tension. The findings also correspond indirectly with evidence that behavioral interventions capable of changing activity and physiological engagement can reduce depression and anxiety (Rebar et al., 2015). Physical activity has likewise been identified as a potentially protective factor against depression through improvements in physiological regulation, sleep, self-efficacy, and emotional functioning (Teychenne et al., 2019). Although Bigdeli Mind Simulation is not a physical-activity intervention, both approaches illustrate that psychological improvement may be accompanied by changes in bodily experience.

The improvement in sleep disturbance further supports the possibility that the intervention reduced cognitive and physiological arousal. Sleep problems are common in depression and may include difficulty falling asleep, fragmented sleep, early-morning awakening, nonrestorative sleep, and excessive daytime fatigue. Disturbed sleep can intensify negative mood, impair concentration, increase irritability, and reduce the capacity to use adaptive coping strategies. The large effect on sleep disturbance, partial $\eta^2 = .716$, suggests that participants experienced a clinically meaningful change in this aspect of general health. Bigdeli Mind Simulation may have improved sleep by reducing rumination and anticipatory anxiety, both of which commonly become more pronounced at night when external distractions decrease. Repeated mental practice may also have helped patients gain greater control over intrusive internal sequences, thereby facilitating psychological disengagement before sleep. Because the intervention was individualized and techniques were practiced repeatedly, patients may have become better able to identify the mental patterns that maintained nocturnal arousal and substitute more calming or structured internal responses.

The significant improvement in social functioning, with partial $\eta^2 = .484$, indicates that the effects of Bigdeli Mind Simulation extended into participants' daily roles and interpersonal activities. Depression often leads to withdrawal, reduced initiative, impaired communication, diminished pleasure in relationships, and difficulty fulfilling occupational or family responsibilities. Improved social functioning may therefore reflect both direct and indirect treatment effects. Directly, the intervention may have helped participants rehearse more adaptive responses to

interpersonal situations and reduce negative expectations about social encounters. Indirectly, reductions in depression, anxiety, somatic distress, and sleep problems may have increased energy, confidence, and willingness to participate in social life. Social health involves the ability to function constructively within interpersonal and community contexts, and its deterioration can both result from and perpetuate psychological distress (Omidi et al., 2017). The present finding is therefore important because it suggests that treatment gains were not limited to internal emotional states but were also reflected in everyday functioning.

The social-functioning result is also consistent with evidence that depression within one family member can influence broader relational systems. Maternal depression, for example, has been associated with anxiety and depressive symptoms among children, partly through parenting stress (Abbasi & Gheyrati, 2022). Although the present study did not examine family outcomes, improved social functioning may have implications beyond the treated individual by increasing emotional availability, communication, and participation in family and community life. Similarly, early identification and treatment of depression at different ages are important because untreated symptoms can interfere with developmental tasks, relationships, and social adaptation (Bagherifar et al., 2017). By improving both symptoms and functioning, Bigdeli Mind Simulation may reduce the interpersonal consequences that contribute to the persistence of depression.

The present findings align with the emerging literature on Bigdeli Mind Simulation, although most previous studies have focused on stuttering, communication attitudes, adjustment problems, and skill learning rather than depression. Early reports described Mind Simulation as a potentially rapid intervention for stuttering and certain associated psychological problems (Bigdeli Shamloo et al., 2021). Fallahi found that the method reduced stuttering and improved communication attitudes among children and adolescents, demonstrating that structured mental simulation could alter both behavioral symptoms and the psychological responses surrounding them (Fallahi, 2021). Related studies also reported reductions in stuttering severity and improvements in communication attitude after Mind Simulation treatment (Kamarzarin et al., 2023; Kamarzarin, Golestani, et al., 2021). More recent research has continued to support the intervention's effectiveness for stuttering and communication-related outcomes (Kamarzarin & Bigdeli Shamloo, 2025). The consistency between these findings and the present results suggests that Mind Simulation may

have transdiagnostic potential, particularly where maladaptive expectations, anticipatory processes, and habitual internal response patterns contribute to symptom maintenance.

Evidence regarding virtual Mind Simulation Therapy also supports the adaptability of the method. Previous presentations described virtual treatment for individuals with stuttering and psychological problems, suggesting that the intervention's structured techniques can potentially be delivered beyond conventional face-to-face formats (Kamarzarin, Akbari, et al., 2021; Kamarzarin, Beygi, et al., 2021a). This adaptability may be particularly valuable in depression care, where low motivation, geographical barriers, stigma, or limited access to specialized services can impede treatment attendance. Mental-health service use is influenced by multiple barriers, including perceived need, accessibility, stigma, and beliefs about professional care (Eisenberg et al., 2017). A brief intervention that can eventually be standardized for supervised remote delivery may improve access, although such an application would require direct empirical evaluation.

The results also correspond with broader studies examining Mind Simulation in adjustment and performance contexts. Investigations involving individuals with moderate-to-severe stuttering and adjustment difficulties reported beneficial effects of the intervention, supporting its possible influence on psychological adaptation in addition to speech-related symptoms (Kamarzarin & Bigdeli Shamloo, 2024). A broader evaluation of Mind Simulation likewise suggested that the method may be effective across several domains of psychological and behavioral functioning (Kamarzarin & Shamloo, 2024). Moreover, studies of adolescent soccer training found that mental simulation improved skill learning and performance preparation (Kamarzarin, Beygi, et al., 2021b; Kamarzarin, Fallahi, et al., 2021). Although athletic skill development differs from depression treatment, these findings reinforce the core proposition that systematic internal rehearsal can alter later behavior. In the context of depression, rehearsing adaptive coping, social engagement, emotional responses, and goal-directed behavior may gradually make these responses more accessible in daily life.

The findings may also be interpreted within the broader framework of evidence-based depression care. Improving depression treatment requires interventions that are effective, accessible, adaptable, and feasible for implementation in routine settings (Katon et al., 2017). Bigdeli Mind Simulation was delivered in only five one-hour

sessions, yet significant changes were observed across several outcomes. This brevity may represent a practical advantage, particularly in clinics with high patient demand. However, the magnitude of the observed effects, especially the very large effect for depression, should be interpreted cautiously because the sample was small and participants were recruited from a single clinic. Nevertheless, the consistency of change across depression, anxiety, stress, somatic symptoms, sleep, and social functioning strengthens the conclusion that the intervention had a broad therapeutic effect rather than producing an isolated statistical change.

The improvement in general mental health may be understood as the cumulative consequence of changes across these interconnected domains. Better sleep can improve emotional regulation and energy; reduced anxiety can support social participation; fewer somatic complaints can increase daily activity; and lower depressive symptoms can strengthen motivation and hope. These reciprocal improvements may produce a reinforcing cycle of recovery. From the conceptual standpoint of Mind Simulation, changing one internal response sequence may influence multiple downstream reactions because cognition, emotion, bodily arousal, and behavior function as an integrated system. Psychological terminology concerning learning, cognition, motivation, emotion, and adaptation supports this multidimensional understanding of mental functioning (Kamarzarin, Akbar, et al., 2021). The present study therefore extends earlier work by suggesting that Bigdeli Mind Simulation may be relevant not only to a specific behavioral symptom but also to complex clinical conditions involving interacting psychological and functional difficulties.

The reduction of severe depressive symptoms also has potential implications for risk prevention. Depression is one of the principal conditions associated with suicidal ideation and behavior, and timely treatment is a central component of suicide-prevention strategies (Gunnell et al., 2020). The present study did not directly assess suicidal thoughts or behaviors, and no conclusion about suicide prevention can be drawn from the findings. Nevertheless, the significant reduction in depression and improvement in general mental health suggest that the intervention may influence some of the psychological states associated with elevated risk. Future studies should directly assess hopelessness, suicidal ideation, and related clinical outcomes while implementing appropriate safety procedures.

Overall, the results support Bigdeli Mind Simulation as a promising brief intervention for adults with depressive

symptoms. Its effects were consistent with established evidence that psychological treatment can modify depression and with previous studies showing that Mind Simulation can alter stuttering, communication attitudes, adjustment difficulties, and learned performance (Cuijpers et al., 2020; Kamarzarin & Bigdeli Shamloo, 2025). The findings also extend the existing literature by demonstrating significant changes in anxiety, stress, somatic symptoms, sleep disturbance, social functioning, and general mental health. The intervention's progressive, individualized, and practice-oriented structure may be central to these outcomes because it enables participants to master techniques at an appropriate pace and apply them to recurring maladaptive mental patterns. Thus, Bigdeli Mind Simulation may provide a complementary therapeutic option within depression care, although stronger controlled research is required before definitive conclusions can be made regarding its comparative efficacy and long-term effectiveness.

The present study had several limitations. The sample consisted of only 30 participants recruited through convenience sampling from a single specialized psychology clinic in Tehran, which limits the generalizability of the findings to other clinical populations, geographical areas, age groups, and cultural settings. The small sample size may also have contributed to unstable or unusually large effect estimates. The study relied primarily on self-report questionnaires, making the results potentially vulnerable to response bias, social desirability, and participants' expectations regarding treatment. Although participants were assigned to experimental and control groups, the available report did not include an active comparison treatment, therapist-blinding procedures, or independent clinical diagnostic interviews. In addition, the posttest-focused design provided limited evidence regarding the durability of treatment gains, and the follow-up procedures were not reported in sufficient statistical detail. Some distributions also showed departures from normality, particularly posttest general-health scores, which should be considered when interpreting the parametric analyses.

Future research should replicate the study using larger, multisite samples selected through more rigorous sampling procedures. Randomized controlled trials should compare Bigdeli Mind Simulation with active control conditions, treatment as usual, and established interventions such as cognitive-behavioral therapy, behavioral activation, metacognitive therapy, and emotion-focused approaches. Studies should include follow-up assessments at several intervals to determine whether reductions in symptoms

remain stable over time. Independent diagnostic interviews, clinician-rated measures, behavioral indicators, sleep assessments, and physiological measures could be added to self-report tools. Future investigations should also examine the mechanisms through which the intervention operates, including changes in rumination, cognitive flexibility, hopelessness, emotional regulation, self-efficacy, perceived control, and avoidance. Moderator analyses could clarify whether effectiveness differs according to depression severity, age, sex, comorbid anxiety, medication use, personality characteristics, or treatment adherence.

In practice, Bigdeli Mind Simulation may be considered as a structured complementary intervention for adults experiencing depressive symptoms, particularly when brief treatment is clinically necessary. Practitioners should receive standardized training and use a clearly defined protocol while retaining flexibility to adjust the pace of instruction to each patient's symptom severity and learning capacity. Progress should be monitored regularly with validated measures, and patients who show severe deterioration, suicidal risk, psychotic symptoms, or complex comorbidity should receive comprehensive psychiatric evaluation and appropriate multidisciplinary care. Therapists should emphasize repeated practice, mastery of previously introduced techniques, and transfer of learned skills to sleep, social interaction, stress management, and daily functioning. The intervention should be integrated cautiously into evidence-based services until larger controlled studies establish its comparative effectiveness, safety, optimal dosage, and long-term outcomes.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent. This study was conducted in accordance with all ethical principles and received ethical approval from the Ethics Committee of Payame Noor University under the code IR.PNU.REC.1403.033.

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