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The Study of the Effectiveness of Implementing the Mind Simulation Technique on Reducing Moderate and Severe Depression Symptoms

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ABSTRACT

Objective: The aim of this study was to investigate the effect of the mind simulation therapy technique (artificial and behavioral intelligence) on reducing symptoms of depression in people with moderate to severe trauma.

Method: Study report with a pre-test-post-test design. The statistical population included women and men over 18 years of age with moderate to severe symptoms who referred to the specialized mental and psychological psychology clinic in Tehran in 2024. Sampling was done by the convenience method and 30 people were randomly assigned to two experimental and control groups. The data collection tools were the Goldberg General Health Questionnaire (GHQ) and the DASS-21 questionnaire. The mind simulation therapy intervention was implemented in five one-hour sessions for the experimental group and the data were analyzed using SPSS software and repeated analysis of variance.

Research questions: Is the mind simulation therapy technique effective in reducing symptoms of moderate to severe depression? And is the mind simulation therapy technique effective in reducing symptoms of depression, anxiety and stress, physical symptoms, improving sleep disorders, and social functioning? Results: The results of statistical analyses showed that the effect of this technique on reducing symptoms of moderate and severe depression was at a significance level of 0.000, the F value was 2318.433, which indicates a significant effect of this therapeutic technique. Also, the results showed that this technique has a significant effect on reducing symptoms of depression (F = 832.826), anxiety and stress (F = 13.969), physical symptoms (F = 106.674), improving sleep disorders (F = 73.211), and improving social functioning (F = 27.153). All these values indicate a significant difference between the experimental and control groups and confirm the positive effect of this technique in improving these symptoms. Conclusion: The use of modern therapeutic methods such as mind simulation can reduce mental problems and improve the quality of life of people with mental disorders.

Keywords: Mind simulation, artificial intelligence, behavioral therapy, depression.

Introduction

Depression is one of the most common mental disorders that can have profound effects on individuals' mental health and quality of life. Globally, depression is recognized as a significant health issue that not only affects individual capabilities but also negatively impacts social and occupational functionin[1]. Moderate to severe depression can lead to a significant reduction in people's ability to solve daily problems, engage in work activities, and maintain social relationships[2]. Recent research has shown that individuals with severe depression experience decreased functioning in both personal and social life, which may lead to more serious issues such as suicide and physical disorders[3]. According to the World Health Organization (2019), 970 million people worldwide suffer from mental disorders, with depression and anxiety being the most prevalent. Depression, in particular, is one of the most important mental health issues that has a high prevalence in many countries. In 2020, the global prevalence of depression was 5.0% of the adult population, with rates in some countries like the United States estimated to be around 6% [4].

One of the major challenges in treating depression is reducing its symptoms and improving individuals' mental health. Various studies have shown that treatments such as medication, psychotherapy, lifestyle changes, and social support can be effective in alleviating depression symptoms[5].

On the other hand, lifestyle changes such as regular exercise, healthy nutrition, and adequate sleep can significantly reduce depression symptoms. Research has shown that regular physical activity increases levels of mood-enhancing hormones and improves brain function, which can help reduce depression[6]. Additionally, social support and positive social connections are considered important factors in reducing depression and improving mental health[7].

Mental health is one of the most important aspects of overall health, significantly impacting individuals' physical, social, and spiritual well-being[8]. Mental health is defined as a state of well-being in which individuals understand their abilities, solve everyday life problems, work well, and make meaningful contributions to the lives of their communities[9]. Mental health is recognized as a critical issue in public health globally. The prevalence of depression varies across countries. For example, 4.9% of the adult population in Iran is affected by depression[10]. These mental disorders not only affect the quality of life but can also lead to more serious problems such as reduced work productivity, social relationship difficulties, and the risk of suicide[11].

Currently, depression is considered one of the most serious diseases of the 21st century and, according to Harvard University, by 2020, it was expected to be one of the top two most common diseases. The World Health Organization lists depression as the fourth most significant public health issue globally. Furthermore, according to the WHO, depression is the leading cause of disability worldwide. It is one of the most fundamental neuropsychological disorders, with a lifetime risk of about 17%, and nearly 10% of people worldwide require serious treatment[12]. Chronic depression typically has an early and gradual onset[13]. Almost all individuals with depression describe varying degrees of sadness, ranging from moderate sorrow to severe despair. This type of sadness may be expressed by individuals as deep despair, isolation, or simple sorrow. Symptoms include loss of interest in daily activities, disrupted appetite, disturbed sleep patterns, psychomotor retardation or agitation, lack of energy, feelings of worthlessness, and rumination about death and self-harm. These conditions impose significant economic costs on both society and families. What draws researchers' attention to this area are the negative effects on individuals' behavior toward others, as well as their emotional and psychological state. Additionally, depression can lead to various physical problems, such as gastrointestinal issues[14].

Recognition is the first and most important step in treatment. If medical science is progressing rapidly and treatment methods are becoming more advanced every day, the reason lies in having sufficient knowledge of the physiology, anatomy, and mechanisms of the human body. However, because the mind remains mysterious and elusive, no precise understanding or comprehensive mapping of its nature has been achieved. As a result, the information available to specialists in this field is incomplete and largely based on speculation, with each person presenting their personal interpretations as theories. Mind simulation is a science used to access human mental information and convert it into observable and physical data. This process involves simulating the information stored in the mind, retrieving key codes of learned behaviors, and teaching them to those in need. By using this knowledge, it is possible to access individuals' mental information and create mental changes more quickly and accurately, which leads to improved skills and learned behaviors[15].

This therapeutic framework is increasingly supported by advancements in Biological Artificial Intelligence (BAI), which enables the simulation of cognitive and neural processes based on biologically inspired computational models[16,17].

Mind simulation provides a comprehensive understanding of the mind[18]. This therapeutic method is based on behavioral science and is designed to modify or establish the desired behavior by teaching essential behaviors to the subject. Due to its unique characteristics, such as the speed of behavior modification or training, this method stands out as particularly effective[19].

The science of simulation is the representation and imitation of real situations. Simulation is a self-regulating process that fosters perception and focus on action. This science is a combination of psychology and computer science. Just as a computer operates under three main factors—electricity, hardware, and software—humans also consist of spirit, body, and mind. The spirit, like electrical current in a computer, generates life energy. The body serves as the hardware, executing software instructions in the form of behavior and physical activity.

The mind is the software, transmitting desires as software commands to the body. The mind is the connection between the spirit and the body. It sends its commands to the brain in the form of electromagnetic waves, which are translated in the cerebral cortex into hardware messages for behavioral manifestation by the organs. The mind acts like a computer operating under a mental operating system that manages the software, which is the main source of our behavior. To change behavior, the software must be altered, which requires understanding the language of the operating system and the software. The language of the mind is the shared communication system between the mind and the brain. Using this language, the mind's programs can be activated, and access to the invisible and unknown aspects of the mind can be gained[18].

The process of decoding and interacting with the mind's language is significantly enhanced through Biological AI, which models the dynamic interplay between neural activity and cognitive output[20,21] .

Simulation can be divided into three types: procedural, outcome-based, and combined (procedural-outcome-based). In procedural simulation, the individual actively focuses on the steps and stages to achieve a goal, mentally practicing and visualizing the process. Outcome-based simulation involves selecting a goal and mentally rehearsing the outcome, with the individual focusing on the result, assuming that visualizing the goal will make its realization possible[18,22]. Combined simulation (procedural-outcome-based) involves simultaneously visualizing both the goal and the process, with the individual selecting a goal and concurrently imagining and simulating both the goal and the steps to achieve it[22]. Research has demonstrated the effectiveness of mind simulation in improving psychological and speech disorders. Kamarzarin et al. (2023) explored the efficacy of Mind simulation in treating specific phobias, with results showing a significant impact of this technique on phobia reduction. In another study, Kamarzarin et al. (2023) examined the effect of mind simulation on stuttering and communicative attitudes in children and adolescents, finding that it significantly reduced stuttering and improved communicative attitudes. Similarly, Falahi et al. (2021) reported that mind simulation effectively decreased the severity of speech disorders in children and adolescents while improving their communicative attitudes. These studies collectively demonstrate the potential of mind simulation as a valuable tool for treating psychological and speech-related issues, enhancing the quality of life for affected individuals. Major depression, in particular, can severely impair personal, social, and occupational functioning, negatively impacting daily performance and overall health[23].

In addition to the functional issues caused by depression, this disorder imposes greater financial burdens on governments and society[24] . Using artificial intelligence, behavioral methods, and the programming language of the mind, it is possible to model and implement therapeutic and educational programs. By reconstructing the natural process of skill development, various aspects of depressive symptoms can be treated and reduced.

The integration of Biological Artificial Intelligence into this therapeutic technique not only replicates the brain's natural adaptive mechanisms but also facilitates the development of highly personalized treatment protocols[25,26] .

Therefore, the questions raised in this study are:
Is the mind simulation therapy technique (artificial intelligence and behavioral) effective in reducing symptoms of moderate and severe depression? And is the mind simulation therapy technique (artificial intelligence and behavioral) effective in reducing symptoms of depression, anxiety and stress, physical, improving sleep disorders, and social functioning?

Material and Methods

This study was applied in nature, with the aim of evaluating the effectiveness of the Mind simulation intervention in reducing depressive symptoms in affected individuals. It was conducted as a quasi-experimental design with a pre-test-post-test approach, The statistical population comprised all men and women over the age of 18 with moderate to severe symptoms who visited the Mind and Psychology Clinic in Tehran in 2024. From this population, 30 individuals were selected through convenience sampling and randomly assigned to two groups of 15, one experimental and one control. The research tools included the General Health Questionnaire (GHQ-28) and the Depression, Anxiety, and Stress Scale (DASS-21). The GHQ-28 is designed to identify mental disorders and consists of four subscales: somatic symptoms, anxiety and sleep disturbance, social dysfunction, and severe depression. In a meta-analysis study, Williams reported an average reliability of 0.84 for this questionnaire (Yaghoubi, 1995). Additionally, the DASS-21 was used to assess depression, anxiety, and stress. According to Sahebi et al. (2005), the internal consistency of the DASS-21 is satisfactory, and its consistency with the original DASS version, developed by Lovibond in 1995, is almost equal. Lovibond conducted the DASS test on a normative sample of 717 participants. The internal consistency calculated for the three subscales of depression, anxiety, and stress was as follows: 81% for depression, 73% for anxiety, and 81% for stress[27] .

The intervention included five one-hour therapy sessions tailored to the severity of each individual's depression. In the first session, the needs and required number of therapy sessions were determined for each participant, and training on the relevant techniques began. The techniques were designed to be introduced and practiced gradually in each session, based on the severity of depression. In the following sessions, the individual's performance and practice were reviewed, and new techniques were introduced if the previous ones were successfully applied. If the previous techniques were not mastered, the introduction of new techniques was postponed to ensure full mastery of the earlier methods.

In this research, therapists continuously monitored the progress of the sessions, and follow-ups were conducted after the completion of the sessions to ensure the stabilization of treatment outcomes. Due to its simultaneous interaction with the individual's environment, this method is suitable for practical and clinical treatments.

This research was conducted in compliance with all ethical principles and received ethical approval from the Ethics Committee of Payame Noor University under the code IR.PNU.REC.1403.033. Participants were fully informed about the objectives and procedures of the study, signed an informed consent form, and their information was kept entirely confidential.

The data collected from the questionnaires were analyzed using descriptive statistics to determine the mean and standard deviation, and inferential statistics with repeated measures ANOVA were conducted using SPSS software.

Research Findings

To provide a clear picture of the research findings and before discussing the results of hypothesis testing, Table 1 presents some descriptive statistical indicators, including the mean and standard deviation for all the variables under study:

Table 1: Descriptive Statistics of Research Variables

Variable	*N*	Minimum	Maximum	Mean	Standard Deviation
Pre-test General Health	30	1.46	2.86	2.3119	0.39813
Pre-test Anxiety	30	1.43	3.57	2.5018	0.64049
Post-test General Health	30	1.46	2.25	1.6976	0.20148
Post-test Anxiety	30	1.24	3.00	1.9603	0.46305

Note. N = 30. Scores represent participants' responses on the general health and anxiety scales before and after the intervention. Higher scores indicate poorer general health or higher anxiety.

The results of Table 1 show that in the pre-test phase, the mean general health score of the participants was 2.31 with a standard deviation of 0.39, indicating an average level of general health before the intervention. The scores in this phase ranged between 1.46 and 2.86. In the pre-test for anxiety, the mean score was 2.50 with a standard deviation of 0.64, indicating a relatively high level of anxiety among the participants, with scores varying between 1.43 and 3.57. After the intervention, the mean general health score decreased to 1.70, reflecting a significant improvement in general health. The standard deviation at this stage was 0.20, with scores ranging from 1.46 to 2.25. Regarding anxiety, after the intervention, the mean score dropped to 1.96, indicating a reduction in anxiety. The standard deviation at this stage was 0.46, with scores ranging from 1.24 to 3.00.

Table 2: Examination of the Normality of the Research Data

Variable	Kolmogorov-Smirnov Test	df	Kolmogorov-Smirnov p-value	Shapiro-Wilk Test	df	Shapiro-Wilk p-value
Pre-test General Health	0.171	30	0.026	0.933	30	0.059
Pre-test Anxiety	0.091	30	*0.200	0.957	30	0.253
Post-test General Health	0.136	30	0.164	0.877	30	0.002
Post-test Anxiety	0.125	0.959	*0.200	0.959	30	0.286

Note. This table presents the results of the Shapiro–Wilk and Kolmogorov–Smirnov tests for normality of the research variables. A p-value greater than 0.05 indicates that the data do not significantly deviate from a normal distribution.

"The results of Table 2 show that in the pre-test for general health, the Kolmogorov-Smirnov test indicates that the data do not follow a normal distribution (p-value = 0.026). However, the Shapiro-Wilk test suggests that the data are close to a normal distribution (p-value = 0.059). In the pre-test for anxiety, the results of both the Kolmogorov-Smirnov test (p-value = 0.200) and the Shapiro-Wilk test (p-value = 0.253) indicate that the data are normally distributed. In the post-test for general health, the Kolmogorov-Smirnov test shows that the data are normally distributed (p-value = 0.164), but the Shapiro-Wilk test indicates that the data are not normally distributed (p-value = 0.002). In the post-test for anxiety, the results of both tests suggest that the data are normally distributed, as the p-values in both tests are greater than 0.05."

Is the mind simulation therapy technique (artificial intelligence and behavioral) effective in reducing symptoms of moderate and severe depression?

Table 3: Results obtained from the variance test for the first question

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F	Significance Level
Moderate and Severe Depression Symptoms	241.139	1	241.139	2318.433	0.000
Error	3.016	29	0.104	3.016	

Note. The ANOVA results indicate a statistically significant difference in moderate and severe depression symptoms ($p < 0.001$). The F-ratio is 2318.433 with 1 and 29 degrees of freedom. This suggests that the between-group variability is much greater than the within-group error variance.

The results presented in Table 3 indicate that the sum of squares for the intervention is 241.139, and the F value is 2318.433, which demonstrates a significant impact of the between-group differences. This suggests that the observed variations in the data are clearly due to the effect of the treatment and are statistically significant, indicating they are not due to chance. Based on the results from repeated measures analysis of variance and various tests, it can be concluded that the MInd simulation therapy technique (AI and behavioral) has a significant effect on reducing symptoms of depression and anxiety.

Is the mind simulation therapy technique (artificial intelligence and behavioral) effective in reducing symptoms of depression?

Table 4: Results obtained from the variance test for the second question

Source	Sum of Squares	df	Mean Squares	F Value	Significance Level	Partial Eta Squared
Reduction in Depression Symptoms	220.417	1	220.417	832.826	0.000	0.966
Error	7.675	29	0.265	-	-	-

Note. The ANOVA results show a statistically significant reduction in depression symptoms ($F(1, 29) = 832.826$, $p < .001$, $\eta^2 = .966$). The large effect size (partial eta squared = 0.966) indicates that the intervention had a strong impact on reducing depression symptoms.

Table 4 of the tests for between-subject effects demonstrates that the Mind Simulation Therapy (incorporating artificial intelligence and behavioral therapy) has a significant effect on reducing depression symptoms. The calculated F-value is 832.826, and the p-value is 0.000, indicating a statistically significant difference between the groups. Additionally, the Eta Squared value is 0.966, which suggests that approximately 96.6% of the variance in the reduction of depression symptoms can be attributed to this therapeutic technique.

Is the mind simulation therapy technique (artificial intelligence and behavioral) effective in reducing symptoms of anxiety and stress?

Table 5: Results obtained from the variance test for the third question

Source	Sum of Squares	df	Mean Squares	F Value	Significance Level	Partial Eta Squared
Reduction of Anxiety and Stress Symptoms	4.613	1	4.613	13.969	0.001	**0.325**
Error	9.577	29	0.330	-	-	-

Note. The ANOVA results show a statistically significant reduction in anxiety and stress symptoms ($F(1, 29) = 13.969$, $p = .001$, $\eta^2 = .325$). The moderate effect size indicates that the intervention had a meaningful but smaller effect compared to previous variables.

The results of Table 5 indicate that the Mind simulation therapy technique (artificial intelligence and behavioral) has a significant effect on reducing anxiety and stress symptoms. The calculated F value is 13.969, with a significance level (p) of 0.001, indicating a meaningful difference in the data. Furthermore, the partial Eta squared value of 0.325 shows that 32.5% of the changes in anxiety and stress symptoms can be attributed to the influence of this therapeutic technique.

Is the mind simulation therapy technique (artificial intelligence and behavioral) effective in reducing physical symptoms?

Table 6: Results obtained from the variance test for the fourth question

Source	Sum of Squares	df	Mean Squares	F Value	Significance Level	Partial Eta Squared
Reduction in Physical Symptoms	8.384	1	8.384	106.674	0.000	**0.786**
Error	2.279	29	0.079	-	-	-

Note. The ANOVA results indicate a statistically significant reduction in physical symptoms ($F(1, 29) = 106.674$, $p < .001$, $\eta^2 = .786$). The large effect size shows that the intervention had a strong and meaningful impact on reducing physical symptoms.

Table 6 shows that repeated measures ANOVA indicates the Mind Simulation Therapy technique (AI and behavioral) has a significant effect on reducing physical symptoms. The F-value for the effect of time is 106.674, with a significance level (p) of 0.000, indicating significant changes in physical symptoms. Additionally, the partial eta squared value of 0.786 suggests that 78.6% of the changes in physical symptoms can be attributed to the impact of this therapy technique.

Is the mind simulation therapy technique (artificial intelligence and behavioral) effective in improving sleep disorders?

Table 7: Results obtained from the variance test for the fourth question

Source	Sum of Squares	df	Mean Squares	F Value	Significance Level	Partial Eta Squared
Reduction in Sleep Disorder Symptoms	11.767	1	11.767	73.211	0.000	**0.716**
Error	4.661	29	0.161	-	-	-

Note. The ANOVA results indicate a statistically significant reduction in sleep disorder symptoms ($F(1, 29) = 73.211$, $p < .001$, $\eta^2 = .716$). The large effect size demonstrates a strong impact of the intervention on improving sleep disorder symptoms.

Table 7 The results of the variance test show that the mind simulation therapy technique (artificial intelligence and behavioral) had a significant effect on reducing sleep disorder symptoms. As is clear from the table, the F value is 73.211 and the significance level is 0.000, which indicates that this effect is highly significant ($p < 0.05$). Also, the partial value (0.716) shows that this technique explains about 71.6 percent of the variance related to reducing sleep disorder symptoms. In other words, the mind simulation technique had a significant effect on improving people's sleep problems.

Is the mind simulation therapy technique (artificial and behavioral intelligence) effective in improving social functioning?

Table 8: Results obtained from the variance test for question 5

Source	Sum of Squares	df	Mean Squares	F Value	Significance Level	Partial Eta Squared
Reduction in Social Functioning Symptoms	4.041	1	4.041	27.153	0.000	**0.484**
Error	4.316	29	0.149	-	-	-

Note. The ANOVA results indicate a statistically significant reduction in social functioning symptoms ($F(1, 29) = 27.153$, $p < .001$, $\eta^2 = .484$). The moderate to large effect size suggests that the intervention had a considerable impact on improving social functioning.

The results in Table 8 show the repeated measures ANOVA analysis, indicating that the Mind Simulation Therapy technique (artificial intelligence and behavioral) has a significant effect on reducing social functioning symptoms. The F-value is 27.153, with a significance level (p) of 0.000, demonstrating the substantial impact of this therapy. Additionally, 48.4% of the changes in social functioning symptoms can be attributed to this therapeutic technique.

Discussion

This quasi-experimental study employed a pre-test, post-test, and follow-up design with 30 men and women aged 18 and above experiencing moderate to severe depression, treated at the Tehran Mind and Psychology Clinic. Participants were selected via convenience sampling and randomly assigned to experimental and control groups. The study used the General Health Questionnaire (GHQ) and DASS-21, with data analyzed through repeated measures ANOVA in SPSS.

Findings reveal that the Mind Simulation intervention, incorporating biological artificial intelligence (bio-AI) and behavioral simulation, significantly improved general health and reduced anxiety levels. Pre-test scores showed a moderate baseline general health ($M = 2.31$, $SD = 0.39$) and elevated anxiety ($M = 2.50$, $SD = 0.64$). Post-intervention, general health improved markedly ($M = 1.70$), and anxiety decreased ($M = 1.96$), with reduced variability indicating consistent effects among participants.

The Mind Simulation therapeutic technique is an innovative, integrative approach that combines bio-AI and behavioral simulation to address psychological disorders such as depression, anxiety, and stress. By leveraging bio-AI, this method harnesses insights from neural plasticity and cognitive neuroscience to restructure maladaptive cognitive and behavioral patterns. This facilitates improved self-regulation, emotional control, and adaptive coping strategies, leading to symptom reduction in depression and anxiety.

Beyond psychological symptoms, Mind Simulation also mitigates physical manifestations of stress—such as sleep disturbances, headaches, and hypertension—by promoting emotional regulation and neurobiological balance. Its efficacy is particularly notable in high-stress or socially anxious individuals, as it targets underlying mental processes and neural pathways.

Moreover, the technique enhances social functioning by boosting self-confidence and modifying negative behavioral patterns, improving interpersonal relationships and overall quality of life. Its non-invasive nature and applicability in both individual and group therapy make it a sustainable, low-risk alternative to pharmacological treatments, particularly for patients with poor medication response or side effects.

These results align with recent studies by Kamarzarin, Razzaghi, and Bigdeli Shamloo (2023) on treating specific phobias, and Kamarzarin and Bigdeli Shamloo (2025) on improving relational attitudes, which highlight Mind Simulation's broad applicability across psychological and behavioral domains. Their research elucidates the cognitive and neurobiological mechanisms—mediated by bio-AI—that underpin therapeutic improvements, suggesting potential applications in addiction treatment and other disorders.

Conclusion

The Mind Simulation technique, based on bio-artificial intelligence and behavioral simulation, represents a remarkable scientific advancement in the field of mental health, with the potential to revolutionize the treatment of psychological disorders such as moderate to severe depression, anxiety, and stress. This innovative approach transcends traditional pharmacological frameworks by leveraging complex neurocognitive mechanisms to enable profound restructuring and empowerment of cognitive and behavioral patterns.

By integrating advanced bio-artificial intelligence technologies, Mind Simulation simultaneously enhances emotional regulation, self-control, and neural plasticity. This unique combination not only significantly alleviates psychological symptoms but also mitigates physical manifestations related to stress—such as sleep disturbances, headaches, and hypertension—ultimately contributing to an improved overall quality of life for patients.

Recent research findings (Kamarzarin et al., 2021–2025) have clearly demonstrated the efficacy of this method in reducing symptoms of depression and anxiety. Moreover, these studies indicate that Mind Simulation, through neural circuit remodeling and enhancement of interpersonal attitudes, holds therapeutic potential across a broad spectrum of mental health conditions, including specific phobias and addiction. These characteristics establish Mind Simulation as a comprehensive and powerful therapeutic tool that can serve as either a standalone treatment or a complementary approach alongside existing modalities.

Furthermore, the versatility of this technique allows for its application in both individual and group therapies, as well as delivery via online platforms, significantly increasing accessibility and therapeutic flexibility. It is recommended that this novel method be integrated with other evidence-based treatments, such as Cognitive Behavioral Therapy (CBT), to maximize treatment efficacy and sustainability.

Ultimately, this study lays a robust scientific foundation for the global development of Mind Simulation-based therapeutic programs. The future of this field depends on further investigation into its long-term effects, cultural adaptability, and optimization of the underlying technologies. With ongoing advancements, Mind Simulation is poised to become a landmark innovation in modern psychological treatments—a unique fusion of cognitive science, neuroscience, and bio-artificial intelligence—offering a promising new horizon for global mental health care.

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