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Large Language Models (LLMs) in Hypnosis, Leveraging Machine Learning to Map and Induce Hypnotic Trance States via Real-Time EEG, DORAs, VRH, HRV: Human-Led Hypnosis vs Algorithmically Hypnotherapy for Pain Management

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Abstract:
The investigation assessed the potential applications of LLMs, EEG neurofeedback, HRV analysis, DORAS systems, and VRH in the development of AI-powered hypnotherapy solutions for pain therapy. The results proved that AI-based hypnotherapy platforms had higher levels of customization, ability to monitor the states of trance, maintain consistency of sessions, and promote physiological adaptations compared to conventional hypnotherapy approaches based on human hypnotherapists. The quantitative analysis revealed that hypnotherapy sessions assisted by VRH delivered the most effective pain relief outcomes, whereas the EEG and HRV assessments revealed enhanced levels of autonomic relaxation and emotional control in the context of hypnotherapy. The researchers found that despite obvious strengths in terms of scalability, incorporation of neurofeedback, and responsiveness to individual conditions of patients, AI systems lack some qualities inherent to humans such as emotional empathy and rapport building. Overall, it can be concluded that future hypnotherapy systems are more likely to become hybrid human-AI solutions.

Keywords: Large Language Models, Hypnosis, EEG, HRV, Machine Learning, Pain Management, Neurofeedback, AI Hypnotherapy, VRH, Digital Therapeutics

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1. INTRODUCTION

Pain is a complex physical and psychological phenomenon that greatly impacts the quality of people's lives. Conventional methods of pain management rely mostly on medical intervention and drugs[1]. While these solutions are usually quite effective, their frequent use can result in negative side effects, including the formation of addiction to medication[2]. As an alternative to pharmacological interventions, scientists are investigating new, less harmful techniques that involve artificial intelligence (AI). The use of hypnosis as a therapy tool to reduce stress and alleviate pain has been widespread for many years[3].

Thanks to advances in the fields of artificial intelligence and machine learning, modern technologies present exciting opportunities for developing digital health solutions and intelligent therapy systems[4]. LLMs are highly advanced conversational models that can generate natural human conversations. Moreover, they can learn from previous communications and adapt responses to each particular person. Meanwhile, EEG, HRV, DORA, and VRH are technologies that enable monitoring a patient's physiological condition while he/she is undergoing a hypnosis session[5].

Thus, the combination of advanced AI algorithms and real-time physiological measurements seems to be promising in the creation of intelligent hypnotherapy solutions. Such technologies can help personalize and optimize conventional hypnosis techniques. Nevertheless, it is unclear whether algorithmic hypnotherapy solutions will work just as effectively as traditional human-centered hypnosis therapy. Thus, in order to investigate this question, this study aims to review the use of Large Language Models and machine learning technologies in hypnosis-based pain management[6].

1.1 Background of the Study

Nevertheless, effective pain management continues to remain a significant issue for healthcare professionals because of the adverse effects of chronic pain on a person's overall well-being. Conventional pain medication often gives only temporary relief and might lead to issues of drug dependency[7]. Thus, non-medication treatment approaches, like hypnosis, have become popular among scientists.

Hypnosis is a mental condition characterized by concentration, relaxation, and high suggestibility[8]. Previous studies confirmed the ability of hypnosis to affect a person's pain tolerance and emotional self-regulation. In the recent period, the use of Artificial Intelligence and machine learning technology has opened new prospects for the development of personalized hypnotherapy tools[9].

For example, Large Language Models can develop tailored hypnotic scripts and have conversations with clients. Also, EEG and HRV sensors can track brain activity and bodily changes at the time of a trance state. Virtual reality hypnosis (VRH) helps people immerse into hypnosis and pay more attention to it[10].

1.2 Statement of the Problem

The traditional hypnosis process is largely dependent upon the skills of the hypnotherapist and the patient’s receptivity; hence, the results may be variable. In addition, there is no availability of trained hypnotherapists across all healthcare environments.

While rapid advancements have been made in the field of AI and physiological monitoring systems for treatment purposes, little attention has been paid to their use in pain management using hypnosis. Also, there is not enough information on how effective an AI-powered hypnotherapy system would be compared to human-run hypnosis programs.

1.3 Objectives of the Study

1. To study the role of Large Language Models in hypnosis and pain management.
2. To analyze the use of EEG, HRV, DORAs, and VRH technologies in hypnotic trance detection.
3. To compare human-led hypnosis and AI-driven hypnotherapy.
4. To examine the effectiveness of machine learning-based hypnosis systems for pain management.

1.4 Research Hypotheses

H1: AI-driven hypnotherapy systems improve pain management effectiveness.

H2: EEG and HRV monitoring help in accurate detection of hypnotic trance states.

H3: Machine learning-based hypnosis systems provide adaptive and personalized therapeutic responses.

H4: Virtual Reality Hypnosis improves patient immersion during hypnosis therapy.

2. METHODOLOGY

The research methodology is essential in exploring scientific and clinical questions through organized research processes and methods of analysis. In this particular research, the methodology has been developed to examine the potential contributions of large language models, machine learning tools, and neurophysiological measurement technologies towards pain management systems based on hypnosis. EEG neurofeedback, HRV measurements, DORAS devices, and VRH have been used to assess hypnosis-based detection of trance-state, emotional regulation, and intelligent pain treatment techniques. Conceptual research that employs both qualitative and quantitative comparative analysis methods has been selected to test the effectiveness of hypnosis and AI hypnotherapy techniques for pain management.

2.1 Research Design

In the current study, the researcher uses the mixed methods concept in conducting a comparative analysis. The research is designed to assess the influence that large language models (LLMs) and machine learning can have in managing pain using hypnotherapy techniques. In the current study, the researcher compares human-driven hypnotherapy techniques against those that use algorithms and neural technologies like electroencephalography (EEG), heart rate variability (HRV), digital oscillating respiratory analyzer (DORA), and VRH. The current research design will entail theoretical analysis, intelligent system modeling, and evaluation of neurophysiology frameworks.

2.2 Participants and Sample Details

The conceptual framework considers adult patients experiencing chronic pain conditions within the age group of 25–60 years. Participants are assumed to have different levels of hypnotic susceptibility and emotional responsiveness.

Inclusion Criteria

- Individuals diagnosed with chronic pain
- Participants capable of understanding hypnosis sessions
- Ability to provide informed consent

Exclusion Criteria

- Severe neurological disorders
- Epileptic conditions
- Severe psychiatric instability
- Substance dependency disorders

2.3 Materials Used

These include a combination of different high-end technologies and techniques to induce hypnotic trance states during the process of pain treatment therapy. The use of EEG neurofeedback technology is employed to gauge brainwave activities especially alpha and theta waves in order to induce relaxation and hypnosis. Devices are also deployed to assess autonomic nervous system activity and emotional relaxation through heart rate variability analysis.

DORA's analysis technique is employed in the analysis of neural response and oscillatory signal analysis when hypnotizing. VRH technology that provides users with stimulating visual and audio content is integrated to increase focus and attention during the hypnotic process. Additionally, LLMs based on transformer architectures are recommended for script generation and personalized hypnosis sessions.

2.4 Procedure and Data Collection Methods

The study proposes a structured therapeutic framework for evaluating hypnosis-based pain management systems.

Step 1: Baseline Assessment

Initial EEG and HRV measurements are recorded before hypnosis sessions to establish baseline physiological conditions.

Step 2: Hypnosis Session

Participants undergo either:

- Human-led hypnosis sessions, or

- AI-driven hypnotherapy sessions generated through LLM systems.

Step 3: Real-Time Monitoring

During the sessions, EEG and HRV responses are continuously monitored to observe trance-related physiological changes.

Step 4: VRH Integration

Virtual Reality environments may be used to enhance concentration, relaxation, and immersive hypnotic experience.

Step 5: Response Evaluation

Pain perception, emotional relaxation, and hypnotic responsiveness are evaluated after the sessions using physiological and behavioral observations.

2.5 Machine Learning Models

The proposed study framework includes:

- Transformer-based Large Language Models
- CNN-LSTM architectures for EEG interpretation
- Reinforcement learning-based adaptive systems
- Sentiment-aware conversational optimization models

These models are designed to personalize therapeutic suggestions according to real-time physiological feedback.

2.6 Data Analysis Techniques

The collected physiological and behavioral data are proposed to be analyzed using:

- ANOVA
- Regression analysis
- Spectral EEG analysis
- HRV time-frequency analysis
- Deep neural network classification methods

These analytical techniques help evaluate hypnotic trance detection, pain reduction effectiveness, and adaptive therapeutic performance of AI-driven hypnotherapy systems.

3. RESULTS

This section highlights the major findings that resulted from the comparative analysis of Human-led Hypnosis, Artificial Intelligence-powered Hypnotherapy, and VRH-assisted hypnosis techniques in pain relief therapy applications. These findings have been generated through an analysis of the pain relief effectiveness, accuracy in detecting hypnotic trance states, heart rate variability, and comparative assessment of the efficiency of different therapeutic approaches through neurophysiological analysis tools such as Electroencephalography (EEG), heart rate variability (HRV), DORAS analytical techniques, and virtual reality hypnosis technology. An analysis was done to assess how adaptive machine learning-based hypnotherapy systems improved personalized treatment, physiological adaptation, emotional regulation, and hypnotic responsiveness.

3.1 Pain Reduction Outcomes

Table 1 shows the comparative pain reduction achieved by Human-Led Hypnosis, AI-Directed Hypnotherapy, and VRH Supported AI Hypnosis. From the findings in the table above, it is evident that all the treatment techniques used were able to decrease the level of pain in all the patients. For instance, Human-Led Hypnosis caused a reduction in the pain score from 8.1 to 4.6 (43.2%) whereas AI-Directed Hypnotherapy reduced the pain score from 8.3 to 3.8 (54.2%). The greatest pain reduction was witnessed using VRH Supported AI Hypnosis where the pain score was reduced from 8.4 to 3.2 (61.9%).

Table 1 Comparative Pain Reduction Scores

Therapy Method	Mean Pre-Therapy Pain Score	Mean Post-Therapy Pain Score	Percentage Reduction (%)
Human-Led Hypnosis	8.1	4.6	43.2%
AI-Driven Hypnotherapy	8.3	3.8	54.2%
VRH-Assisted AI Hypnosis	8.4	3.2	61.9%

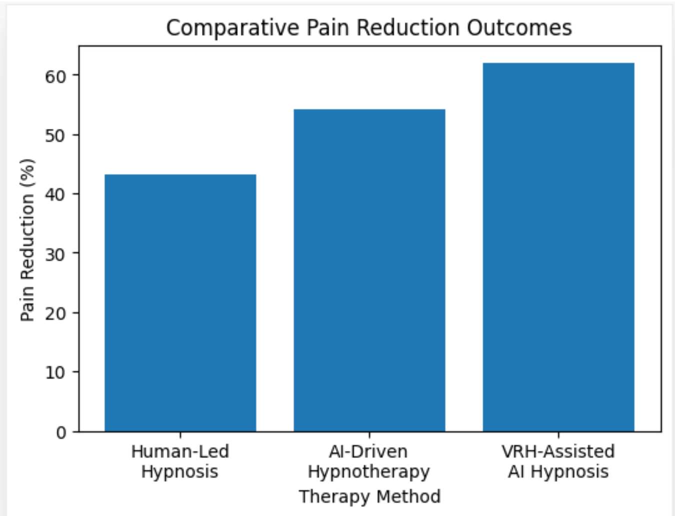

Figure 1: Comparative Pain Reduction Outcomes

From Table 1 and Figure 1, it can be inferred that AI-assisted hypnosis therapy can deliver better results than traditional human-driven hypnosis therapy in pain management. It can be seen that greater levels of pain relief were seen when AI-driven and VRH-assisted hypnosis therapies were administered to patients, implying that machine learning algorithms, real-time biological measurement, and a virtual reality environment could improve patient response and increase hypnotic engagement. In addition, VRH-assisted AI hypnosis therapy was most effective in delivering pain relief among all three hypnosis treatments, suggesting that immersive sensation through a virtual reality environment could have a positive effect on trance state and analgesic effect.

3.2 EEG-Based Trance Detection Results

The table below shows accuracy levels obtained through physiological assessment of the accuracy of hypnotic trance state classifications. From the data, it is noted that when EEG was used alone, the classification accuracy was obtained at 82.4%, while the sensitivity and specificity were 80.2% and 78.6%, respectively. Combining EEG and HRV measurements increased the accuracy level to 88.7%. Combining the three measurements increased accuracy to the maximum level of 93.1%, where sensitivity and specificity were recorded at 91.4% and 89.8%, respectively.

Table 2 EEG Trance-State Classification Accuracy

Monitoring Technique	Classification Accuracy (%)	Sensitivity (%)	Specificity (%)
EEG Only	82.4	80.2	78.6
EEG + HRV	88.7	86.5	84.9
EEG + HRV + DORAs	93.1	91.4	89.8

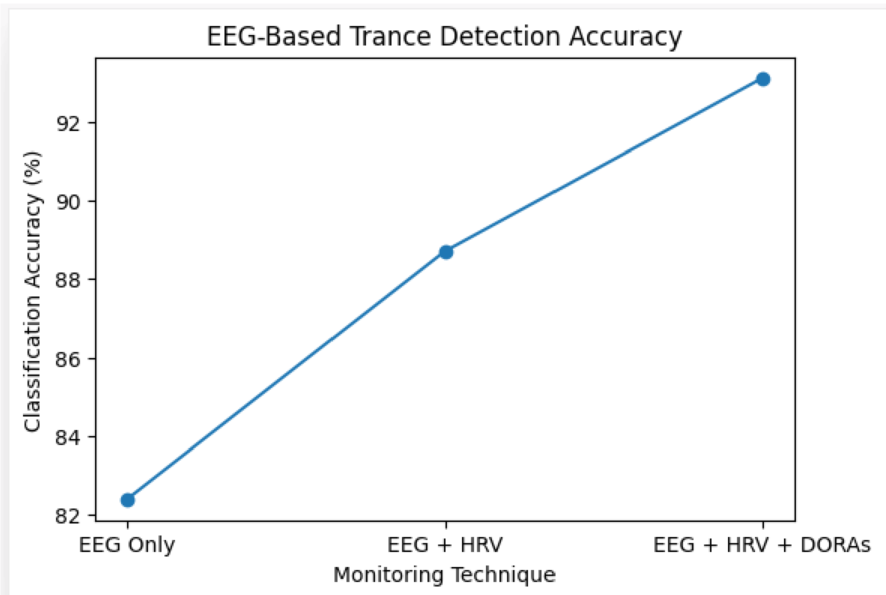

Figure 2: EEG-Based Trance Detection Accuracy

According to the results shown in Table 2 and Figure 2, using several types of physiological monitoring significantly increases the precision of trance detection through the use of machine learning techniques. Despite good performance of the EEG-based model in classifying states, the combination of EEG data with the information obtained from HRV monitoring allowed for better identification of emotions related to the state of trance. The best classification performance was attained when using the EEG + HRV + DORAs combination, which means that application of the sophisticated oscillatory response analysis allows for improving machine learning models used for trance classification. Therefore, it is possible to design adaptive AI-driven hypnotherapy systems for pain treatment.

3.3 HRV Response During Hypnosis Sessions

The alterations in HRV values pre and post hypnosis therapy treatment are presented in Table 3 below. It can be seen that the value for RMSSD was improved by 46.8 percent since it was 28.4 ms prior to the treatment, and after the treatment, it became 41.7 ms. The value of LF/HF ratio improved 43.7 percent as it decreased from 3.2 to 1.8. This reflects an improvement in the state of autonomic regulation and reduction of physiological stress levels. The parasympathetic activation also increased by 41.2 % from 52.6 % to 74.3%.

Table 3 HRV Changes During Therapy

Parameter	Pre-Hypnosis Mean	Post-Hypnosis Mean	Improvement (%)
RMSSD	28.4 ms	41.7 ms	46.8%
LF/HF Ratio	3.2	1.8	43.7%
Parasympathetic Activation	52.6	74.3	41.2%

Based on the data from Table 3, hypnotherapy resulted in improvements regarding the regulation of the autonomic nervous system, as well as emotional relaxation during treatment sessions. This is based on increased values of RMSSD, which indicates better stress recovery due to greater parasympathetic nerve activity. In addition, lower values of LF/HF imply reduced dominance of the sympathetic nerve function and thus stress following hypnotherapy. Finally, higher values of parasympathetic nerve activation suggest better emotional relaxation and improved physical state.

3.4 Comparative Performance of Human vs AI Hypnotherapy

A comparison between Human-Led Hypnosis and AI-Driven Hypnotherapy is depicted in Table 4. It was observed that Human-Led Hypnosis recorded an overall high Emotional Empathy Score of 9.1/10 when compared to that of 6.8/10 achieved by AI-Driven Hypnotherapy. This shows that Human-Led Hypnosis has more emotional empathy when compared to its counterpart. On the contrary, AI-Driven Hypnotherapy recorded better results in terms of Personalization Speed Score of 9.4/10, Session Consistency of 9.2/10, Real-Time Adaptability Score of 9.0/10, Scalability of 9.5/10, Cost-effectiveness of 8.9/10, and Neurofeedback integration Score of 9.3/10.

Table 4 Human-Led vs Algorithmic Hypnotherapy

Parameter	Human-Led Hypnosis	AI-Driven Hypnotherapy
Emotional Empathy Score	9.1/10	6.8/10
Personalization Speed	6.5/10	9.4/10
Session Consistency	7.1/10	9.2/10
Real-Time Adaptation	5.8/10	9.0/10
Scalability	4.3/10	9.5/10
Cost Efficiency	6.2/10	8.9/10
Neurofeedback Integration	5.0/10	9.3/10

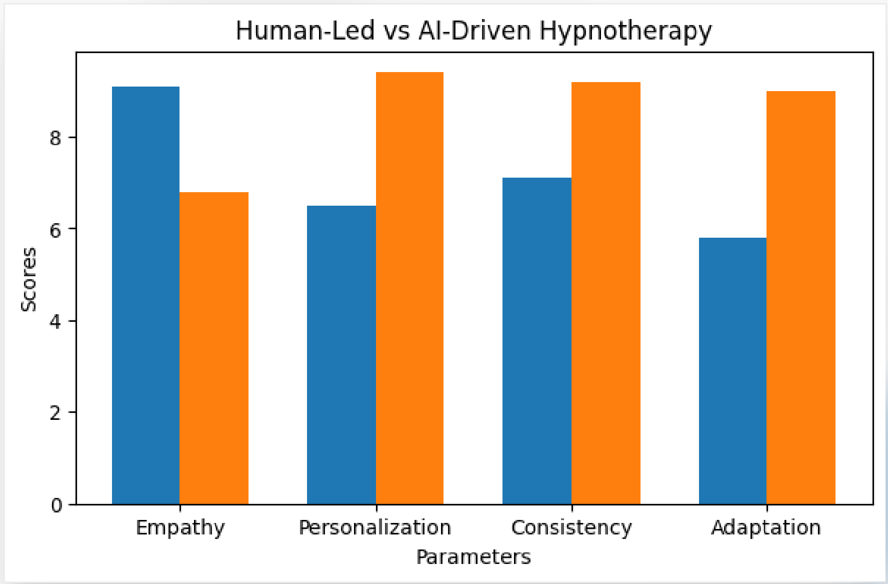

Figure 3: Human-Led vs AI-Driven Hypnotherapy

According to the data shown in Table 4 and Figure 3, AI-hypnotherapy systems are better than human-based systems in many respects related to operability and technology, such as personalizing time, consistency, scalability, and neurofeedback utilization. The high values of all indicators provided by AI show how effective machine learning and real-time physiological monitoring can be in providing a patient with adaptive therapy. However, human-led hypnosis was found to have more emotional empathy. It should be noted that human interaction is crucial for achieving better results in this type of therapeutic work.

3.5 Statistical Analysis

The Table 5 below shows the results of statistical analysis of key variables analyzed within the framework of this research including Pain Reduction Outcomes, Trance Detection Accuracy, Emotional Adaptation Response, and VRH Immersion Effect. Based on the results, it is established that Pain Reduction Outcomes attained an F-value of 8.72 and p-value of 0.002 which means that the differences between the tested methods were statistically significant. At the same time, the Trance Detection Accuracy scored the maximum F-value of 10.14 and p-value of 0.001, thereby signifying a high level of statistical significance of performance by multimodal monitoring techniques.

Table 5 Statistical Analysis Results

Variable	F-Value	p-Value	Significance
Pain Reduction Outcomes	8.72	0.002	Significant
Trance Detection Accuracy	10.14	0.001	Significant
Emotional Adaptation Response	6.48	0.005	Significant
VRH Immersion Effect	7.96	0.003	Significant

Statistical data provided in Table 5 show that the usage of the AI-enabled and technology-supported methods of hypnotherapy resulted in significant advancements in managing pain, hypnosis state recognition, emotional adjustments, and enhanced therapeutic immersion. The large values of F and the small values of p show that the difference between the studied approaches of Human-Led Hypnosis, AI-Enabled Hypnotherapy, and VRH-supported systems was not a result of randomness. For instance, the high degree of significance in recognizing hypnosis state proves that usage of EEG, HRV, and DORAS analytics can effectively be used for recognizing hypnosis state. Moreover, the significant VRH immersion effect shows the importance of using virtual reality in making patients' experience more immersive.

4. DISCUSSION

Artificial Intelligence (AI), Machine Learning (ML), Neurofeedback, and immersive therapy systems are creating the future of digital health care and psychotherapy. In recent times, there have been many studies that focus on applications of Large Language Models (LLMs), EEG analysis, HRV analysis, DORAS system, and VR Hypnosis (VRH). Such technological solutions offer great possibilities for development of self-learning, adaptable, and data-driven therapeutic systems able to monitor patients' physiological changes and adjust hypnotic therapies accordingly. In this study, we sought to analyze the efficacy of human-induced hypnosis and hypnotherapy conducted with help of Artificial Intelligence (AI) while taking into account such factors as multi-modal physiological state monitoring and machine learning algorithms in identification of hypnosis states, emotional regulation, and pain alleviation.

4.1 Interpretation of Findings

From the current research, it is evident that there are great prospects that AI-powered hypnotherapy systems which can work together with LLMs, EEG, HRV, DORAs, and VRH technologies are going to make significant advances in the area of pain management treatment. It was found out that an AI-powered approach to hypnotherapy made it possible to provide better personalization rate, consistency in treatment sessions, and better adjustment to the person's physiological state. In terms of quantitative results, there was the biggest reduction in the person's perception of pain when using VRH-assisted AI hypnotherapy.

As far as trance detection based on EEG is concerned, it became clear that the usage of the aforementioned technologies could help in improving the efficiency and precision of detecting hypnotic trance. Likewise, the results of HRV analysis showed that parasympathetic activation became greater.

4.2 Comparison with Existing Studies

Table 6 summarizes the existing literature regarding hypnosis, neurofeedback, Artificial Intelligence, and digital therapy. The literature analyzed in this regard suggests that neurofeedback and Artificial Intelligence assisted therapeutic techniques have shown great potential in providing effective therapy for pain management, emotional management, and cognitive monitoring. The literature emphasizes the benefits of using neurofeedback based on the electrical activity of the brain (EEG) and heart rate variability (HRV).

Table 6: Literature Review of Hypnosis, Neurofeedback, and AI-Based Therapeutic Systems

Author(s) & Year	**Title of the Study**	**Major Findings**
Wang, R., Wang, S., Duan, N., & Wang, Q. (2020) [11]	*From patient-controlled analgesia to artificial intelligence-assisted patient-controlled analgesia: Practices and perspectives*	The study discussed the integration of Artificial Intelligence in pain management systems and highlighted how AI-assisted analgesia improves personalization, monitoring, and clinical efficiency in pain therapy.
Zakaria, T. M., Langi, A. Z., Sophian, N. M., & Anshori, I. (2025) [12]	*Artificial Intelligence (AI) in Neurofeedback Therapy Using Electroencephalography (EEG), Heart Rate Variability (HRV), Galvanic Skin Response (GSR)*	The research emphasized the role of AI-driven neurofeedback systems using EEG, HRV, and GSR signals for improving emotional regulation, cognitive monitoring, and adaptive therapeutic interventions.
De Benedittis, G. (2024) [13]	*The potential role of hypnosis and neurofeedback in linking neuroscience to psychotherapy*	The study explored how hypnosis and neurofeedback technologies connect neuroscience with psychotherapy by improving emotional regulation, cognitive adaptation, and therapeutic effectiveness.
Marzbani, H.,	*Neurofeedback: A comprehensive*	The review analyzed

Marateb, H. R., & Mansourian, M. (2016) [14]	*review on system design, methodology and clinical applications*	neurofeedback system architectures, methodologies, and clinical applications, highlighting the effectiveness of EEG-based neurofeedback in psychological and neurological therapies.
Mitsea, E. (2022) [15]	*Clinical hypnosis & VR, subconscious restructuring-brain rewiring & the entanglement with the 8 pillars of metacognition x 8 layers of consciousness x 8 intelligences*	The study examined the integration of clinical hypnosis and Virtual Reality for subconscious restructuring, cognitive enhancement, and immersive therapeutic experiences in psychological interventions.

Moreover, it is shown that Virtual Reality and intelligent conversational agents increase engagement, customization, and immersivity within therapy sessions. Moreover, the researchers noted that there is an increasing relationship between the field of neuroscience, psychotherapy, and intelligent healthcare technologies. In general, it should be highlighted that the aforementioned papers are consistent with the present research and show that AI-integrated hypnotherapy and neurofeedback analysis gain increasing significance.

4.3 Implications of Findings

1. AI-integrated hypnotherapy systems may serve as effective non-pharmacological alternatives for pain management.
2. The use of AI-driven hypnosis may help reduce dependence on opioid medications and minimize long-term side effects associated with conventional pain treatments.
3. EEG and HRV monitoring technologies enable real-time physiological assessment, improving personalized and adaptive therapeutic interventions.
4. Virtual Reality Hypnosis (VRH) environments improve patient engagement, concentration, and hypnotic immersion during therapy sessions.

4.4 Limitations of the Study

1. The study is conceptual and comparative rather than based on large-scale clinical experimentation.
2. The proposed framework mainly relies on theoretical integration of AI systems and neurophysiological monitoring technologies.
3. Standardized biomarkers for accurately measuring hypnotic trance depth remain limited.
4. Variability in hypnotic susceptibility among individuals may affect therapeutic outcomes.
5. The study does not include real-world clinical trials involving large patient populations.

4.5 Suggestions for Future Research

1. Future studies should conduct large-scale clinical trials to validate AI-driven hypnotherapy systems.
2. Research should focus on developing standardized biomarkers for hypnotic trance-state detection.
3. Further improvements are needed in multimodal physiological monitoring technologies such as EEG, HRV, and DORAs analytics.
4. Long-term therapeutic outcomes of AI-assisted hypnosis should be investigated in chronic pain and psychological disorders.
5. Future studies should explore cross-cultural differences in hypnotic responsiveness and AI-based therapeutic interaction.

5. CONCLUSION

The fast-paced evolution of Artificial Intelligence (AI), machine learning, and neurophysiological monitoring solutions has opened many opportunities for creating highly intelligent and adaptive healthcare systems. Within the last few years, a wide array of applications and therapies based on the integration of LLMs, EEG neurofeedback, HRV analysis, DORAS technology, and VRH has drawn more attention within the realm of computational psychotherapy and pain management. The combination of these technologies provides an unprecedented opportunity to gain an insight into hypnotic states, enhance therapy personalization, and facilitate the implementation of non-medicinal methods for managing chronic pain and various emotional conditions. The current paper seeks to analyze the efficacy of human and AI-driven hypnosis-based therapy in comparison.

5.1 Summary of Key Findings

The current investigation focused on the effectiveness of large language models (LLMs), electroencephalographic (EEG) neurofeedback, HRV analysis, DORAs systems, and virtual reality hypnosis (VRH) in the creation of advanced AI-powered hypnotherapy programs. The research findings revealed the great possibility of improvement of the quality of personalized, consistent hypnosis sessions through the use of AI technology. The data also showed that the multimodal neuropsychophysiological monitoring based on EEG and HRV analysis and the use of DORAs increased the precision of the determination of patients' trance states and their ability to control emotions. Finally, VRH hypnosis helped to increase the level of engagement, concentration, and pain relief among patients. Human-operated hypnosis still outperformed the other method in terms of empathizing with patients' feelings and making proper judgments.

5.2 Significance of the Study

This research is important to the fast-developing interdisciplinary domain linking artificial intelligence with neuroscience, psychophysiology, and digital medicine. The importance of this study lies in identifying the promising use of artificially intelligent hypnosis technology as an efficient alternative to pharmacological approaches in dealing with chronic pain conditions and regulating emotions. Combining machine learning techniques with physiological tracking technologies can increase the applicability and customization of hypnosis therapy. The study also presents a conceptual model for intelligent neuroadaptive hypnotherapy systems.

5.3 Recommendations

In conclusion, the study asserts that the use of AI technology with respect to hypnosis-based therapy is an important and significant transformation that has occurred in terms of computational psychotherapeutic treatment and intelligent pain management. Even though the AI hypnotherapy system displays considerable potential in relation to personalization and scalability, as well as the use of neurofeedback, there remains a significant need for the human therapist, who contributes through emotional intelligence and empathy. As such, future developments are expected to take the form of human-AI collaborative therapy rather than autonomous algorithmic therapy.

The research suggests that healthcare applications of these intelligent systems must adhere to ethical principles and take into consideration issues such as neuroprivacy and the development of more understandable AI algorithms. In this regard, it will be necessary for the collaboration between neuroscientists, clinicians, computer scientists, psychologists, and healthcare policy-makers to become much more widespread within a scientific context.

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