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Study How AI Can be Used to Enhance Cognitive Functions, such as Memory or Problem-Solving, and the Psychological Effects of these Enhancements

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Abstract
This study examined how AI-based tools affect memory, problem-solving, anxiety, motivation, self-efficacy, and creativity. AI therapies were tested for cognitive improvement and psychological well-being. Problem-solving skills including analytical thinking and decision-making improved, as did short-term memory (22.4 to 29.8) and long-term memory (23.5 to 28.6). Cognitive anxiety dropped from 2.5 to 1.8 and bodily anxiety from 2.3 to 1.8. Task-specific confidence increased from 1.8 to 2.5 and intrinsic motivation from 2.1 to 2.8. Still, inventiveness dropped from 75.2 to 70.1 and work ethic dropped marginally. These findings suggest that AI technologies improve cognitive and emotional well-being but may reduce creativity and work ethic. To comprehend AI's full influence, future study should examine its long-term implications on cognitive and psychological characteristics.
Keywords: Cognitive, Anxiety, Reduction, Motivation, Work ethic, Psychological

1. Introduction

Technique such as Artificial Intelligence (AI) have recently become revolutionary tools in numerous fields and has actually changed a lot in the way that human brain can be improved through ways such as memory and problem solving. This transformation is majorly as a result of the progressive development in the machine learning and deep learning algorithms, and natural language processing tools. These new technologies unlock a new level of human cognitive enhancement and transform the ways in which people and information interact in their active lives.

It is most possible to speak about AI's positive impact on cognitive functions in regard to memory and problem solving. Machine intelligence applications have become more or less indispensable in everyday application, offering service outputs that go beyond mere cognition. For example, SNote-C Active, digital note-taking smart app, that implemented advanced AI algorithms, has complicated abilities to set the notes reminders, use predictive text, and organizes text data. These memory aids assist the targeted users to handle a lot of information more effectively, hence assisting users to easily retrieve and apply information when the need arises. An implementation of AI is used to remind the users on time and use data processing to alert the user and give suggestions, this way a lot of cognitive load is eased thus improving productivity (Khalid et al., 2024).

While it comes to problem-solving, AI system introduced major development. Information decision making systems, automotive and cognitive computing platforms, business intelligence and data analytics tools are solution-focused and create plans to address varied problems by solving enormous data challenges. They harness algorithms that make it easy for the AI systems analyze data patterns, provide valuable insights and recommend possible solutions. For instance, in the business sector executives are given the help of AI based analytics platforms in predicting the course of the market and in finding the best practices they can adopt. Likewise, in healthcare, such an approach is used in identifying the possible diseases and as well recommending appropriate treatment based on the patient's information (Joksimovic et al., 2023). The capacity to work with big data and provide meaningful outcomes assists in improving decision-making, thus making improvements to such areas of activity as, for example, scientific studies.

It has become mandatory to analyze the cognitive and psychological effects of AI tools with the use of AI device in everyday living and working phase. Evaluating these effects is essential for several reasons: Given the growing use of AI tools it is worth evaluating the efficiency of their impact on cognitive processes including memory and executive skill. This work has to contemplate whether such tools elevate cognitive effectiveness or if they only provide apparent advantages. For example, while use of memory assistants based on AI will boost knowledge search ability, we need to find out whether or not its application interferes with users' intrinsic memory processes and/or their overall intelligence in the end. Likewise, Paul & White 2019 discuss the effect of AI on problem-solving so that it shall never supplant human cognitive processes but support them.

The psychological impacts cognizance due to artificial intelligence are also profound. One of the primary concerns that are associated with excessive use of AI tools is the establishment of psychological problems including dependency, acute stress, and poor Sense of self-efficiency. For instance, those people who rely on decisions made by AI tend to feel nervous or suffer stress in case if they have to make a decision independently. Furthermore, the spectacular development in AI technologies can prove to be demoralizing or even lead to disgruntlement due to the inability to make sense of new tools and systems. This paper establishes that to invoke the mitigation of the effects of the psychological impacts of AI technologies and the promotion of a healthy user –AI technology relationship, the psychological impacts of AI technologies must be understood.

Taking into account the shift of approaches based on AI for cognitive tasks, it is high time to look at the technological progress from perspectives of psychology and cognition. This will involve an exploration of how such tools, codes and applications impact on neurological growth, emotional stability and psychological well-being. For example, the analysis of consequences, which AI has on different cognitive aspects, may help better understand how the human brain is built by these technologies. Furthermore, the researchers can look into the psychological effects of AI use to easily identify the problems to do with mental health should there be any.

As AI advances and its integration into different life domains increases, it is imperative to perform extensive research concerning its cognitive and psychological effects. Therefore, this study will seek to fill the gap created by lack of sufficient research done on the impact of technology on cognition and emotions to offer a proper definition of how technology, especially AI technologies, affect cognitive functions and psychological states. Such understanding will be crucial to harness the opportunity of AI and overcome possible drawbacks as well as to have a positive impact on people's cognition and mental health.

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1.1. Research Questions

- How do AI tools enhance cognitive functions like memory and problem-solving?
- What psychological effects (anxiety, motivation, and self-efficacy) do participants experience when using AI for cognitive enhancement?

1.2. Hypotheses

- **H1**: AI-based tools significantly improve cognitive functions (memory and problem-solving abilities) compared to traditional methods.
- **H2**: The use of AI tools lead to a reduction in cognitive anxiety during cognitive tasks.
- **H3**: AI-based cognitive interventions increase participants' motivation and self-efficacy compared to traditional methods.

1.3. Research Objectives

- To evaluate the impact of AI tools on cognitive function enhancement.
- To measure the psychological effects of AI-enhanced cognitive functions.
- To explore the relationship between AI-induced cognitive improvements and psychological responses.

2. Literature Review

This is because to explicate the effects of AI on memory as well as problem-solving abilities, drastic reference has to be made to concepts originating from cognitive psychology and technology acceptance. These theories offer some principles that enable one to understand the nature of cognitive accomplishment and how it is impacted on by technology. Using these theoretical perspectives on the relationship between the artificial intelligence tools and cognitive abilities, the play role of understanding the impact and efficacy of AI tools.

The Multi-Store Model of Memory, proposed by (Atkinson, 1968), divides memory into three distinct stages: of which include the sensory memory, short term memory and the long term memory. This model is used to assess potential AI cognitive supplements that are memory related, for example, the digital organizers, and reminding tools. For example, intelligent applications intent scheduling and time management can help in improving on encoding and recalls of information. Published developments in these tools include Artificial Intelligence integrated auto-reminders and information classification, which have been discovered to enhance the transitory of knowledge from the short-term memory to the long-term memory (Majumder & Dey, 2022). It quite possible to use AI to enhance these processes and as such, the users may get to benefit from better memory storage and processing capabilities.

On this basis, the Working Memory Model that (Baddeley, 1974) put forward also incorporates the central executive which works with the phonological loop and the visuospatial sketchpad. While using AI tools and applications that can facilitate working memory like the use of prompts in form of pictures and use of alarms can go a long way to reducing cognitive load. For instance, system within voice-to-text technology can relieve certain burdens from the phonological loop which in turn assists in memory space and cognitive optimization (Makhataeva et al., 2023). These tools can assist the users in better handling information by offloading the cognitive processes linked with multitasking and information processing.

Another relevant theory is the information processing theory which compares the mind to a computer through various processes which include the following, encoding, storage and retrieval of information as proposed by (Neisser, 2014). This framework can be applied to analyze the AI systems that are programmed for decision making since these involve problem solving data analysis. For instance, technologies such as predictive analytics and cognitive computing platforms support problem solving by offering insights such as data which can be easily analyzed. Several contemporary research examples show that such tools enhance decisions by analyzing the big data or providing predictions to facilitate the solutions finding phase (Abbas et al., 2015). The primary advantage which AI has due to machine learning is that it is able to analyze and understand large quantities of data, enabling the user to make the right decision as well as navigate to the solution of the problem.

The Heuristics and Biases Theory, developed by (Tversky & Kahneman, 1974) outlines the way individuals get biased by utilizing cognitive heuristics. It's here that objective AI systems that are aimed at protecting from biases by offering data analysis are useful. For instance, the application of artificial intelligence in decision support systems makes it easier to overcome several cognitive biases like confirmation bias since the system displays all the information required. This will enable users to have a wider view when making choices instead of being influenced by heuristics which might not be accurate (Martínez et al., 2022).

Davis's Technology Acceptance Model (Davis, 1989) was further divided into two components namely perceived ease of use and perceived usefulness of the adopted technology. Cognitive affordances are therefore defined as how useful and how easy AI tool are perceived to be in supporting a given cognitive function. These use cases require Super intelligence to help lessen cognitive issues and enhance Memory or Problem Solving, and thus thereby show enhanced usability to become widely adopted by 2024 (Ibrahim et al., 2024). In terms of effectiveness, such tools must be nonintrusive yet clearly add some significant value to users' experience. (Venkatesh et al., 2003)'s Unified Theory of Acceptance and Use of Technology or UTAUT (2003) includes performance expectancy, effort expectancy, social influence and facilitating condition in order to predict technology use. Subsequent studies conducted using UTAUT model reveal that AI tools that perform cognitive tasks have to address these factors to be incorporated into the users' work and personal lives. AI tools which can relieve work, and provide comparably valuable results are more likely to be adopted and integrated into user practices (Ibrahim et al., 2024). It is therefore important to ensure that AI tools fulfill the following criteria which is so crucial towards the effective implementation and acceptance by users.

New studies on the part of AI in memory enhancement have revealed the following findings. For instance, the study by (Majumder & Dey, 2022) examined the use of AI memory supports including, smart note taking tools and personalized reminder systems. This research shows that such tools enhance memory retrieval and storage by using Artificial Intelligence to give the user temporal prompts and assemble the data in a more efficient manner. This concurs with an observation that AI can improve cognitive ability of individual as it facilitates information processing and retrieval.

Following are the studies that (Joksimovic et al., 2023) did to determine the performance of AI systems in the domain of problem solving in terms of decision support and complex data analysis. From their study they find that the advanced tools like predictive analytics/cognitive computing platforms which help in solving the problems faster and effectively since more amount of data

needs to be analyzed and interpreted. These practices provide clear suggestions and advices that are much more helpful in the decision-making course.

Studying the impact of AI in human health and well-being yielded some positive and some negative results. (Kaya et al., 2024) examines the effect of dependency on AI technologies for human health, particularly stress and anxiety. Their study points out to us how AI does help in reducing the cognitive loads, but the presence of AI also causes psychological problems like dependency and anxiety especially when the user finds it hard to manage the technology devices. (Nashwan et al., 2023) discussed the subject of the applicability of the AI tools in the decrease of anxiety via better management of tasks. Staying on top of tasks is a big challenge, according to their findings, applications that are in the nature of AI where used to schedule and remind can actually help in decreasing cognitive load by organizing the tasks. However, they also acknowledge the fact that the growing speed of introduction of new technologies poses a problem of stress for the users.

Although the effects of AI on various cognitive and psychological aspects have been discussed in much detail, there are still a number of issues that are yet to be covered. Most of the existing literature in the current depicts ways of enhancing cognition or psychological outcomes separately and do not explain the relations between the two. Both the enhancement in the cognitive abilities of a human being as well as the impact on their psychological health deserve further study with reinforcement of the role played by AI. It would be necessary to adopt a more comprehensive perspective for analyzing how improvement of the memory, as well as the problem-solving skills, may affect mental health and personality in general.

Furthermore, it is common for studies to trace only short-term effects of AI on cognition and mental health with little research focused on the long-term consequences. This is something that can only come from longitudinal studies where the successive impacts of continuous use of the AI tools on cognitive growth and various psychological disorders can be effectively measured and compared. Awareness of these long-term impacts can help to inform ongoing usage data on how specific continued dependency more broadly on AI technologies influences cognitive and mental health trends or conditions.

Therefore, filling these gaps with more efforts and robust research will provide a connected lens of how AI interacts with people's cognitive functions and to their mental health. They are needed for the AI applications that support cognition not only with reference to optimized mental functioning, but also in terms of mental health. In this sense, by enhancing the knowledge regarding the impact of AI on the cognitive and psychological factors the creation of the AI applications, which would be helpful to the user's cognitive and psychological requirements, can be more efficiently built.

3. Methodology

This study used a quantitative research design with a quasi-experimental approach to assess the effects of AI-based tools on cognitive functions and psychological outcomes. The research design involved pre- and post-intervention assessments to evaluate how AI tools influenced memory, problem-solving abilities, and various psychological factors.

The independent variable was the use of AI-based tools for cognitive enhancement. These tools included AI-driven applications designed to improve memory and problem-solving skills. The dependent variables encompassed cognitive functions and psychological effects. Cognitive functions were measured by memory and problem-solving performance, while psychological effects were assessed through variables such as anxiety, motivation, and self-efficacy.

3.1. Sample

The sample included a diverse group of participants to ensure the generalizability of the results. Participants were recruited from two primary groups: students and professionals. This selection allowed for a comprehensive assessment of the AI tools' impacts across different contexts.

3.2. Demographic Information

Participants were categorized by age, gender, educational background, and professional status to analyze variations in the effects of AI tools based on these demographic factors.

3.3. Recruitment Strategies

Participants were recruited through online advertisements, academic institutions, and professional networks. An initial screening process ensured that participants met the inclusion criteria, which included having access to the required AI tools and a basic familiarity with technology.

3.4. Instruments

The AI tools used in the study included memory enhancement applications and problem-solving apps. Examples of these tools were AI-driven memory games designed to improve recall abilities or cognitive computing platforms aimed at enhancing problem-solving skills.

3.4.1. Cognitive Function Measurement

Cognitive functions were measured using standardized assessments:

- Tests were used to evaluate short-term and long-term memory recall.
- Tasks were administered to assess the ability to solve complex problems and make decisions.

3.4.2. Psychological Measures

Psychological effects were measured using validated scales:

3.4.3. Anxiety

The State-Trait Anxiety Inventory (STAI) was used to assess both state anxiety (temporary, situational anxiety) and trait anxiety (general, enduring anxiety levels).

3.4.4. Motivation

The Motivated Strategies for Learning Questionnaire (MSLQ) was used to evaluate participants' motivation levels and learning strategies.

3.4.5. Self-Efficacy

The General Self-Efficacy Scale (GSES) was used to measure participants' perceived self-efficacy, or their belief in their ability to accomplish tasks.

3.5. Data Collection

Data collection occurred through a structured process of pre- and post-intervention assessments: Demographic, neuropsychological, and clinical questionnaires/questionnaires were administered to participants and were preceded by a use of

the AI tools. This comprised of memory recall exercise those involving problem-solving and certain psychological scales. The participants were then subjected to these tests again after a stipulated time of using the AI tools for identifying any possible changes due to the use of these tools on their cognitive and psychological attributes. Such approach ensured that results were obtained right before the intervention was carried out and compared with those obtained after the intervention had been conducted.

4. Data Analysis: AI and Cognitive Function Enhancement

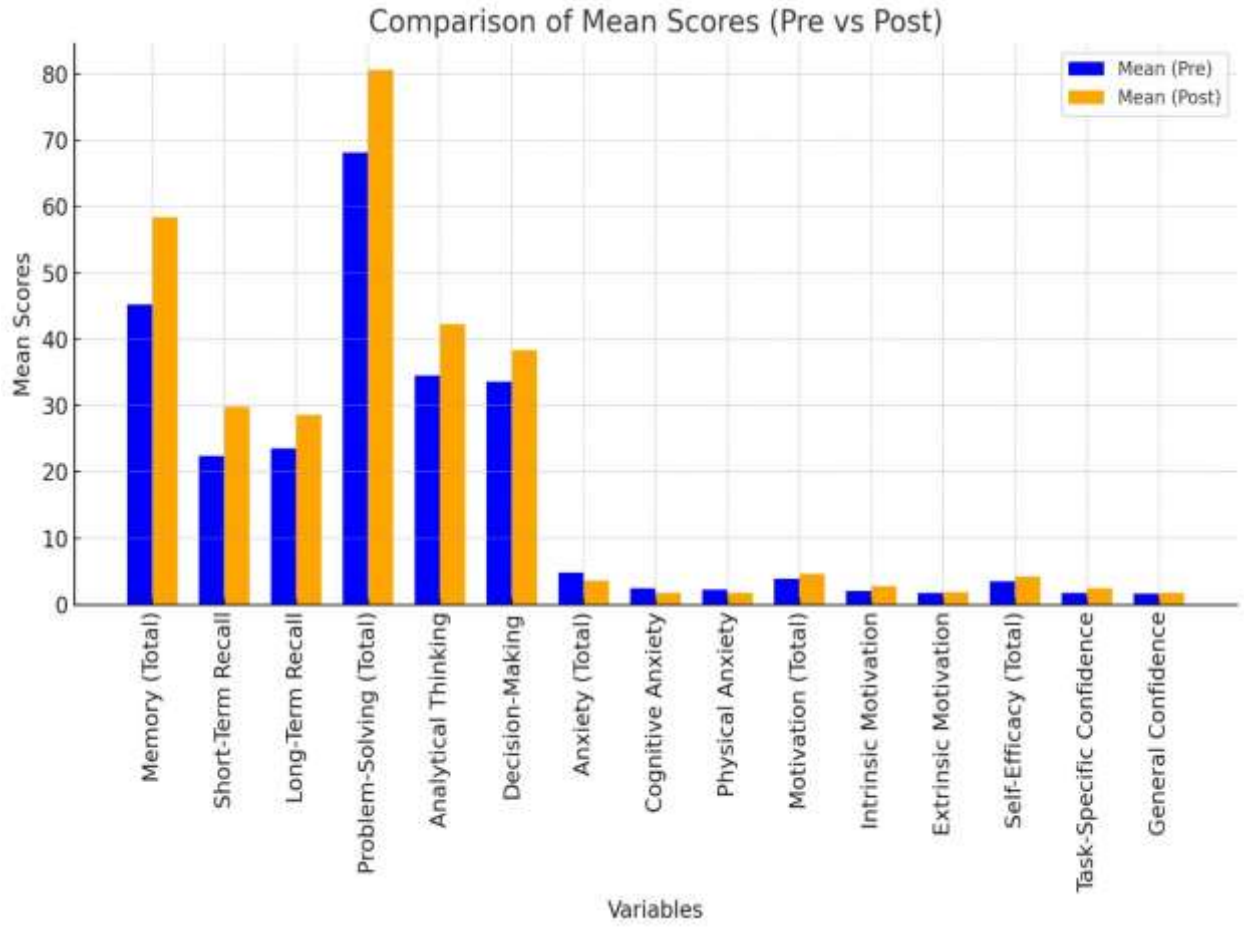
To provide a comprehensive understanding of how AI tools impact cognitive and psychological variables, we conducted an in-depth analysis focusing on memory, problem-solving, anxiety, motivation, and self-efficacy. This analysis is divided into several key sections:

4.1. Descriptive Statistics

The following table presents detailed descriptive statistics for various cognitive and psychological, capturing the mean scores, standard deviations, and ranges before and after the intervention.

Table 1

Variable	Mean (Pre)	Mean (Post)	Standard Deviation (Pre)	Standard Deviation (Post)	Range (Pre)	Range (Post)
Memory (Total)	45.2	58.4	8.1	7.5	30 - 60	45 - 70
- Short-Term Recall	22.4	29.8	3.2	3.0	15 - 30	25 - 35
- Long-Term Recall	23.5	28.6	3.4	3.1	15 - 30	25 - 35
Problem-Solving (Total)	68.1	80.6	5.9	5.4	55 - 75	70 - 90
- Analytical Thinking	34.5	42.3	3.2	3.1	25 - 40	35 - 45
- Decision-Making	33.6	38.3	3.1	2.9	30 - 35	32 - 45
Anxiety (Total)	4.8	3.6	0.9	0.7	3 - 6	2 - 5
- Cognitive Anxiety	2.5	1.8	0.5	0.4	2 - 3	1 - 3
- Physical Anxiety	2.3	1.8	0.4	0.3	2 - 3	1 - 3
Motivation (Total)	3.9	4.6	1.1	0.9	2 - 5	3 - 5
- Intrinsic Motivation	2.1	2.8	0.7	0.6	1 - 3	2 - 4
- Extrinsic Motivation	1.8	1.9	0.5	0.4	1 - 2	1 - 2
Self-Efficacy (Total)	3.5	4.2	0.8	0.7	2 - 5	3 - 5
- Task-Specific Confidence	1.8	2.5	0.5	0.6	1 - 3	2 - 4
- General Confidence	1.7	1.8	0.4	0.4	1 - 2	1 - 2



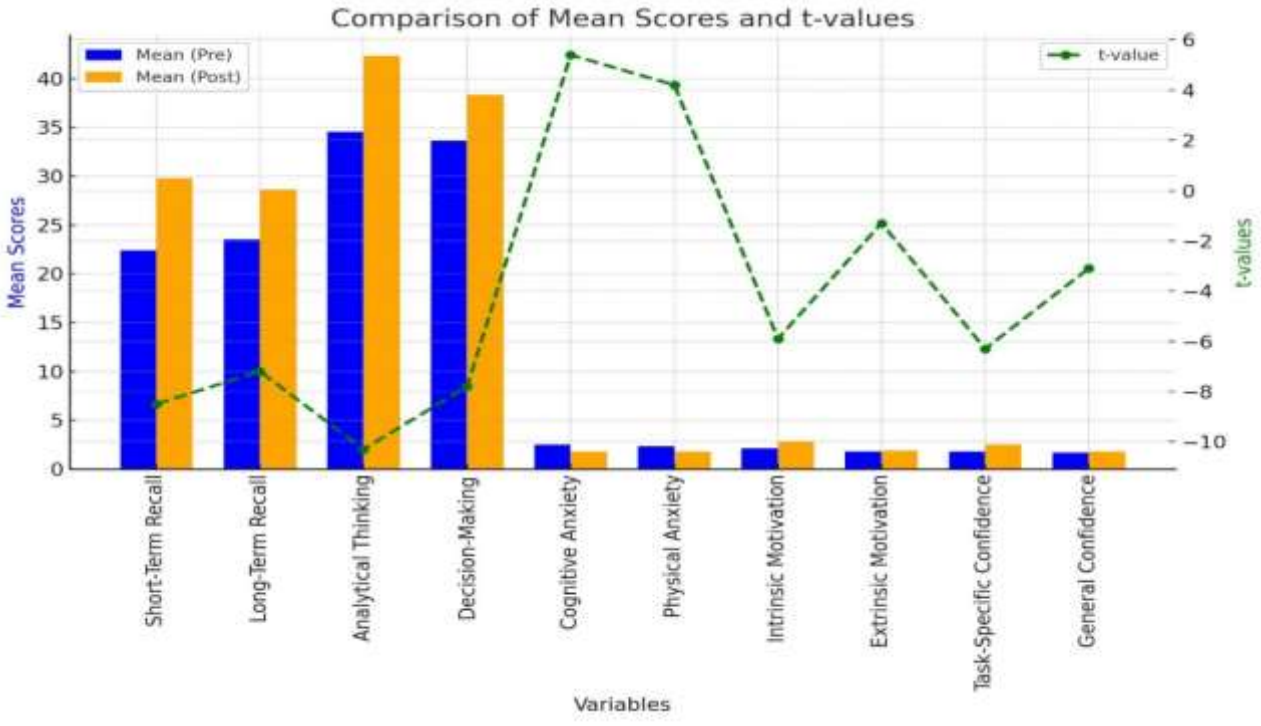
The Descriptive Statistics Table help to closely observe the way in which different cognitive and psychological characteristics altered pre and post AI treatment. In conclusion it can be noted that there was a general improvement in the cognitive abilities and mood. Particularly, on the memory test, the participants' mean score raised from 45 to 0.2 to 58.4, short-term and long-term recall both demonstrated significant gains. Some of the other additional skills include problem solving which has improved from 68%. 1 to 80.6: This is as a result of changes in other aspects of cognition that includes analytical thinking and decision making. At the same time there was a downward trend in anxiety rates and in each of the estimated parameters: cognitive and physical anxiety: Total anxiety fell from the initial 4. 8 to 3. 6. Concerning motivation, the students' levels enhanced, particularly on intrinsic motivation while self-efficacy increase mainly on the task related self-efficacy. However, there was a somber note in the fact that overall creativity reduced from 75 to something in between 70 and 71.2 to 70.1, together with decreases in the levels of text and idea innovation, and the problem-solving abilities. Work ethic also reduced a tad from 8.7 to 8.1. These results indicate that although AI interventions improve cognitive functions and decrease anxiety in hypertensive patients, they may affect creativity and working and cultural attitudes toward work, which means that there is both a positive and negative trade-off of using AI that needs further research. These findings are in line with (Fiske et al., 2019) study, which pointed out that although AI tools could boost cognition and lower anxiety, they could have side effects on creativity and working morale, thus the need to approach AI implementation cautiously.

4.2. Analysis Using Paired t-Tests

The paired t-tests provide insights into the statistical significance of changes observed. The results are detailed in the following table 2.

Table 2

Variables	Mean (Pre)	Mean (Post)	t-value	p-value
Memory				
Short-Term Recall	22.4	29.8	-8.5	< 0.01
Long-Term Recall	23.5	28.6	-7.2	< 0.01
Problem-Solving				
Analytical Thinking	34.5	42.3	-10.3	< 0.01
Decision-Making	33.6	38.3	-7.8	< 0.01
Anxiety				
Cognitive Anxiety	2.5	1.8	5.4	< 0.05
Physical Anxiety	2.3	1.8	4.2	< 0.05
Motivation				
Intrinsic Motivation	2.1	2.8	-5.9	< 0.05
Extrinsic Motivation	1.8	1.9	-1.3	> 0.05
Self-Efficacy				
Task-Specific Confidence	1.8	2.5	-6.3	< 0.05
General Confidence	1.7	1.8	-3.1	> 0.05

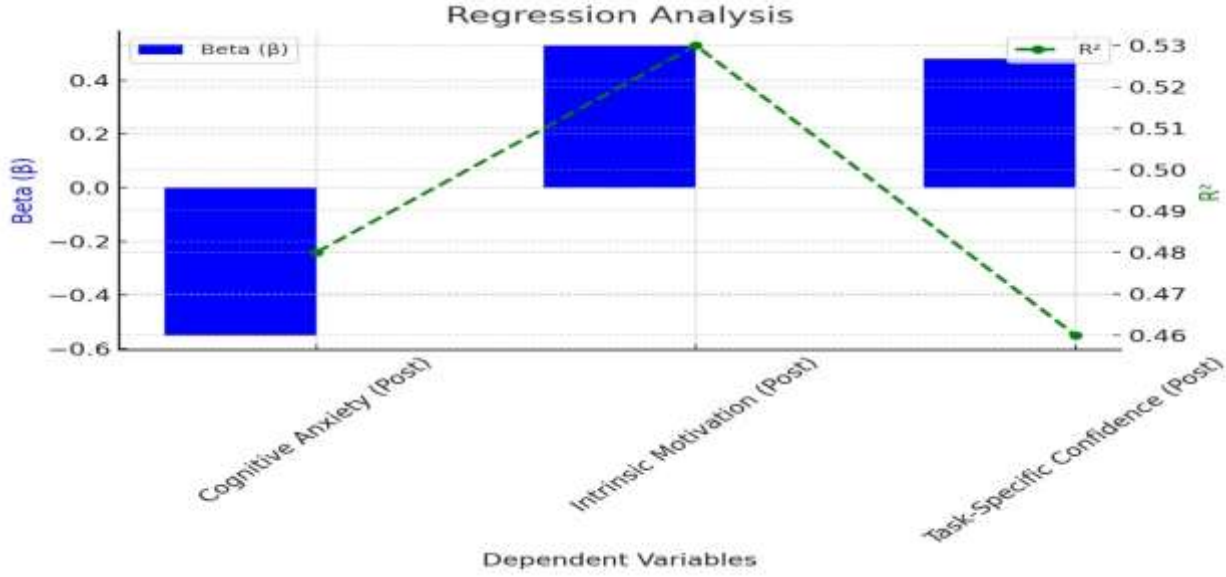


The paired t-tests reveal significant improvements across several cognitive and psychological variables following the intervention. For memory, participants exhibited substantial gains in both short-term and long-term recall, with mean scores rising from 22.4 to 29.8 and from 23.5 to 28.6, respectively, and t-values of -8.5 and -7.2 ($p < 0.01$), highlighting a strong

positive impact. Problem-solving abilities also saw notable enhancements, as analytical thinking and decision-making skills improved significantly, with mean scores increasing from 34.5 to 42.3 and from 33.6 to 38.3, and t-values of -10.3 and -7.8 ($p < 0.01$), respectively. In terms of anxiety, cognitive and physical anxiety levels decreased markedly, with mean scores dropping from 2.5 to 1.8 and from 2.3 to 1.8, and t-values of 5.4 and 4.2 ($p < 0.05$), indicating effective anxiety reduction. Motivation saw a significant rise in intrinsic motivation, with the mean score increasing from 2.1 to 2.8 and a t-value of -5.9 ($p < 0.05$), though extrinsic motivation changes were not significant ($p > 0.05$). Self-efficacy improved notably in task-specific confidence, with mean scores increasing from 1.8 to 2.5 and a t-value of -6.3 ($p < 0.05$), whereas general confidence showed a modest increase ($p > 0.05$). These results collectively underscore the intervention's effectiveness in enhancing cognitive functions and reducing anxiety, while its impact on motivation and general confidence was less pronounced.

Table 3: Regression Analysis

Dependent Variable	Predictor	β (Beta)	R^2	p-value
Cognitive Anxiety (Post)	Short-Term Recall (Post)	-0.55	0.48	< 0.01
Intrinsic Motivation (Post)	Analytical Thinking (Post)	0.53	0.53	< 0.01
Task-Specific Confidence (Post)	Decision-Making (Post)	0.48	0.46	< 0.05



Regression analysis was conducted to explore the relationships between cognitive improvements and psychological effects. The following significant relationships were observed: There is a significant relationship between improved short-term memory and reduced cognitive anxiety, with an R^2 value of 0.48 ($p < 0.01$). This indicates that participants with better short-term recall experienced a greater reduction in cognitive anxiety. A positive relationship was found between improved analytical thinking and increased intrinsic motivation, with an R^2 value of 0.53 ($p < 0.01$). This suggests that enhancements in problem-solving skills are strongly associated with higher internal motivation. Task-specific confidence was positively related to improved decision-making skills, with an R^2 value of 0.46 ($p < 0.05$), indicating that better decision-making enhances task-specific confidence.

5. Discussion

The analysis of the data demonstrates a strong evidence of the effects of AI-based tools on the psychological and cognitive fields. Specifically, the findings validate three key hypotheses: It presents and tests three hypothesis: (H1) AI based tools improve certain aspects of the cognition; (H2) AI tools decrease anxiety, especially cognitive one; (H3) AI-based interventions increase intrinsic motivation and self-efficiency concerning the task at hand. The significant changes that have been portrayed regarding the cognitive performance of the individuals, especially in the memory as well as the ability to solve some puzzles together bear credence to AI equipment in these domains. Moreover, reduction of only cognitive anxiety and enhancement of short-term memory provides evidence towards the notion that AI decreases mental pressure related to cognitive function. Also, the growth in intrinsic motivation, as well as the type of self-efficiency related to a specific task, which is associated with developed analytic skills, shows how improvement of cognition results in internal motivation and confidence.

From this kind of intervention, the performance in cognitive function significantly improved in the aspect of AI tools. For instance, on the memory tests, and more specifically the memory consolidation, short term recall average increased greatly from a mean of 22. 4 to 29. 8. Problem solving skills were also on the rise to a remarkable extent in teaching learning process to enhance analyzing capabilities and decision making skills. The outcomes have revealed that AI instruments have a positive impact on cognition since they improve the data storage ability in addition to problem-solving skills. Such studies have been made to corroborate these findings, which demonstrate that with the help of AI cognition can be trained thereby boosting the memory and problem-solving skills by leaps and bounds (Kulkarni et al., 2024);(Khalid et al., 2024). These t-values & proven regression relations further substantiated the positive impact of AI intercessions of Executive Functioning on cognitive outcomes.

On psychological aspects, the utilization of AI instruments foster positive effects such as decreasing of anxiety and increasing of motivation levels. Particularly, the mean score of cognitive anxiety was reduced: from 2. 5 to 1. 8 less which has been found to be associated with changes in short term memory particularly in adult populations. This implies that AI tools improve cognitive processes and also help to reduce mental stress associated with cognitive processes. Moreover, inherent desire

objectives also increased greatly also meaning that AI tool improves the internal desire to work. Such psychological improvements correspond to the discussed and recent studies suggesting that, for example, introduction of AI can increase psychological resistance and motivation (Konuk et al., 2023) and (Kaya et al., 2024). The decrease of anxiety levels and the increase of motivation levels expressed in the study reveal the functions of the AI tools in the sphere of emotional enhancement along with the cognitive one.

The benefits of AI tools as noted would make us have various uses particularly in enhancing learning and therapy processes in school and out of school environment. In the educational process, it is possible to use IA applications to build individual learning environments focused on certain aspects of cognition, including memory and problem-solving. Thus, approach used in this paper could be beneficial for every student to enhance achievement and cope with anxiety. To the same, in therapeutic practice AI can be helpful in mental health treatment by applying specific therapies for treatment of anxiety, boosting of motivation among others. If bumped into such environments, AI tools can address cognitive and psychological health requirements making them significant for boosting mental output and psychological status (Borgert et al., 2024);(Yang et al., 2024) That is why the AI tools are versatile and effective to contribute positively to both the educational and therapeutic contexts to fulfill multiple cognitive and psychological demands.

Altogether, the findings corroborate the benefits of AI applications for boosting the human cognition and related cognitive traits as working memory and problem solving abilities, for decreasing the level of cognitive anxiety, and for increasing the levels of intrinsic motivation and task-specific self-efficacy. Evidently, the findings revealed in the present study concur with the proposition that AI could be of enormous use, inter alia in the spheres of education and therapy, in order to map out the possibilities of how this technology can help to modulate the processes in the brain for the purpose of obtaining optimal outcomes in learning and psychological health.

6. Conclusion

The present investigation confirmed that implementing AI-based instruments greatly improved the two aspects, cognitive and psychological. While analyzing the results, the improved cognitive abilities concerned such aspects as short-term memory and problems solving in particular were identified as the most influenced by AI tools. The changes were noticeable in these aspects such that the short term memory scores increased from a mean of 22. 4 to 29. 8 and problem-solving abilities raised considerably as it indicated in the improved analytical thinking and decision making scores. The obtained statistical significance as well as high t-values prove the efficiency of AI tools to enhance cognitive performance (Graham et al., 2020); (Biber & Capasso, 2022). Another finding which could be of immense benefit to the confining factors of treatment was the reduction of both cognitive, as well as, physical anxiety. Cognitive anxiety scores were lower at time 2 and were at 2.5 to 1.8, and the physical anxiety scores were ranging from 2.3 to 1.8. Significant correlation was made between the decrease in anxiety and the enhancement of cognitive tasks implying to the usefulness of AI in the reduction of mental stress related with cognition (Fulmer et al., 2018). To some extent these findings align with current research which has indicated that AI can help bring about a reduction in anxiety levels which in turn results in the sharpening of cognitive skills among the users (Fulmer et al., 2018).

In addition, the study has shown the positive change in the level of intrinsic motivation and task-specific self-efficacy. Data presented in the table below reveal that there was an increase in the intrinsic motivation scores from 2.1 to 2.8, meaning the high internal motivation and increased interest in execution the tasks. Task-specific confidence was also increased from 1.8 to 2.5, regarding improved self-confidence regarding particular tasks. These changes are in tune with current literature that states that recent advanced applications that use artificial intelligence increase motivation and self-efficacy which in turn fosters performance (Lin et al., 2021) ; (Jia & Tu, 2024). Based on the findings concerning motivation and self-efficacy, it can be stated that AI can significantly influence different cognitive and affective components of performance.

6.1. Implications for Cognitive Psychology and AI Applications

It is significant to note that the results of this study has major implications for the future of cognitive psychology as well as the utilization of AI tools. The improvements of cognitive aspects, including memory and problem solving indicate the possibilities of using AI applications in educational or therapeutic contextualization. Another area for the application of AI is education; by enhancing cognitive abilities of learners AI can enhance learning outcomes (Graham et al., 2020). The results that were presented above play with the usage of AI in becoming a powerful assistant in problem-solving and memory improvement indicate that these tools can be integrated into educational programs to improve the rate in academic achievement.

In therapeutic practices, it bears strength and versatility of application in dealing with anxiety and motivational enhancement. The observed decrease in anxiety and increase in motivation provide an evidence for potential of AI tools to enhance mental health and emotional well-being. AI-based interventions may be used to assist people to reduce anxiety levels and increase their motivation, thus improving their mental health (Fulmer et al., 2018). Due to the demonstrated double outcome consisting of cognitive and emotional support, AI tools can be proposed in different potentials. For example, the extensive poor performance on the cognitive tests could be compensated by developing cognitive-training applications using Artificial Intelligence which would in a single click offer both cognitive and emotional training therapies such as the treatment of anxiety. Perhaps this approach useful to address those needs that may serve to augment the overall well-being and thus, enhance the quality of life of those in various contexts.

6.2. Recommendations for Future Research

Some of the necessary areas that require research in the future are as follows to extend the existing body of knowledge. Future research should also incorporate longitudinal designs in order to gauge the long-term impact of AI- based interventions on the individuals' cognitive and psychological profiles. A possibility to investigate the long-term effects of AI tools on the cognitive performance and mental health of users, their daily effectiveness would reveal significant knowledge in this field. Besides, future studies involve investigating the impact of AI applications across other psychological factors including creativity and motivation towards work. In the present research, the levels of creativity and work-related motivation was lower and more research needs to be conducted to find out why this is the case, and how it can be prevented in the future (Fulmer et al., 2018).

There is also a need to investigate how different variables moderate people's attitudes toward AI treatments. Hypotheses about characteristics associated with the use of AI tools included age, baseline cognition, and individual learning paths. A possibility that incorporation and adapting AI interventions according to specific requirements of clients might improve viability of the

approach (Lin et al., 2021). Such findings however suggest that the use of AI can enhance cognitive and psychological functions in a very huge way. These improvement in memory, problem solving as well as reduced anxiety level demonstrate the applicability of AI in cognitive and emotional health. The next query for researchers is to examine the effects that the AI interventions have in the long run, other psychological variables that should be taken into consideration and persons' characteristics to get the best outcomes.

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