



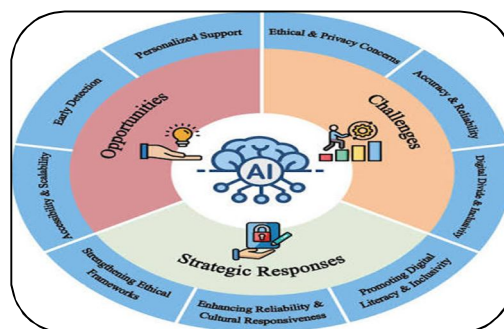
PSYCHOLOGICAL PREDICTORS OF AI DEPENDENCY AMONG COLLEGE STUDENTS

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ABSTRACT

The rapid growth of Artificial Intelligence (AI) technologies, particularly generative AI tools such as ChatGPT, Gemini, and other intelligent assistants, has significantly transformed the educational landscape. College students increasingly rely on AI for academic support, information retrieval, content generation, problem-solving, and decision-making. While AI offers numerous educational benefits, excessive dependence on these technologies may influence cognitive processes, learning autonomy, critical thinking, and psychological well-being. The present study explores the psychological predictors that contribute to AI dependency among college students. Variables such as academic self-efficacy, technology acceptance, perceived usefulness, cognitive laziness, fear of failure, academic stress, and social validation needs are examined as potential determinants of AI reliance. The study highlights how psychological characteristics influence students' tendency to seek AI assistance for routine and complex academic tasks. Existing literature suggests that students experiencing higher academic pressure and lower confidence in their abilities are more likely to depend on AI tools. Similarly, positive attitudes toward technology and perceptions of efficiency encourage greater AI usage. The paper discusses the educational and psychological implications of AI dependency and emphasizes the need to promote balanced and responsible use of AI in higher education. Understanding these predictors can help educators, psychologists, and policymakers develop interventions that encourage independent learning while leveraging the benefits of artificial intelligence.



KEYWORDS: Artificial Intelligence, AI Dependency, College Students, Academic Self-Efficacy, Cognitive Offloading, Technology Acceptance, Academic Stress, Critical Thinking, Digital Learning, Psychological Predictors.

INTRODUCTION

Artificial Intelligence (AI) has emerged as one of the most transformative technological innovations of the twenty-first century. Its applications have expanded rapidly across various sectors, including healthcare, business, communication, and education. In educational settings, AI-powered tools assist students in completing assignments, conducting research, generating content, solving mathematical problems, and enhancing learning experiences. The increasing accessibility and sophistication of AI systems have made them integral components of academic life for many college students.

The adoption of AI in higher education has created new opportunities for personalized learning, immediate feedback, and improved academic performance. Students can access information instantly, receive explanations tailored to their learning needs, and automate repetitive academic tasks. These advantages contribute to increased efficiency and productivity. However, alongside these benefits, concerns have emerged regarding the potential overreliance on AI technologies. Excessive dependence on AI may reduce students' engagement in critical thinking, problem-solving, creativity, and independent decision-making.

Psychologists have long recognized that technology use is influenced by various cognitive, emotional, and behavioral factors. The concept of dependency refers to a condition in which individuals become excessively reliant on a tool or system to accomplish tasks that they could otherwise perform independently. In the context of AI, dependency may develop when students consistently use AI applications as primary sources of knowledge, academic support, or decision-making assistance. Such reliance can gradually weaken self-confidence, reduce learning effort, and encourage cognitive offloading, where mental tasks are transferred to external technological systems.

Several psychological variables may contribute to AI dependency among college students. Academic self-efficacy, which refers to an individual's belief in their ability to perform academic tasks successfully, plays a crucial role in determining technology use patterns. Students with lower self-efficacy may depend more heavily on AI tools to compensate for perceived inadequacies. Similarly, academic stress and anxiety can motivate students to seek quick and reliable solutions through AI platforms. The perceived usefulness and ease of use of AI technologies further influence students' willingness to integrate these tools into their academic routines.

The Theory of Planned Behavior and the Technology Acceptance Model provide valuable frameworks for understanding AI dependency. These theories suggest that attitudes toward technology, perceived behavioral control, and social influences significantly affect technology adoption and usage behaviors. In educational contexts, peer influence, institutional encouragement, and societal acceptance of AI contribute to the normalization of AI-assisted learning practices.

Moreover, personality characteristics such as conscientiousness, openness to experience, and need for achievement may influence the degree of AI dependency. Students who value efficiency and productivity may view AI as a strategic academic resource, while those with higher levels of cognitive laziness may rely on AI to minimize mental effort. The growing popularity of AI-generated content also raises concerns regarding academic integrity, authenticity, and the development of essential cognitive skills.

The study of AI dependency is particularly important because college students represent a population undergoing significant intellectual, emotional, and professional development. Educational experiences during this stage shape lifelong learning habits and problem-solving abilities. Understanding the psychological factors that predict AI dependency can provide valuable insights into how students interact with emerging technologies and how educational institutions can promote responsible AI usage.

As AI continues to evolve and become increasingly integrated into academic environments, examining its psychological impact becomes essential. The present study seeks to identify the key psychological predictors associated with AI dependency among college students and contribute to the growing body of research on technology-mediated learning and digital behavior.

STATEMENT OF THE PROBLEM

The rapid integration of Artificial Intelligence into educational settings has fundamentally altered how college students access information, complete academic tasks, and engage with learning processes. AI-

powered applications provide instant answers, automated content generation, personalized recommendations, and academic assistance, making them attractive tools for students facing increasing academic demands. Although these technologies enhance learning efficiency and accessibility, concerns have emerged regarding students' growing dependence on AI systems for cognitive and academic functions.

AI dependency refers to a pattern of excessive reliance on artificial intelligence tools for completing tasks that traditionally required independent thinking, analysis, memory, creativity, and problem-solving abilities. When students repeatedly depend on AI to generate solutions, summarize information, or make decisions, they may gradually reduce their engagement in active learning processes. Such dependency can influence cognitive development, critical thinking skills, self-confidence, and academic autonomy.

One major concern is that excessive AI use may encourage cognitive offloading, a process in which individuals transfer mental tasks to technological systems instead of performing them independently. While cognitive offloading can reduce mental workload and improve efficiency, overreliance may limit opportunities for intellectual growth and skill development. College students who frequently depend on AI tools may become less motivated to engage in deep learning, reflection, and analytical reasoning.

The psychological factors underlying AI dependency remain insufficiently explored. Existing research on technology dependency has identified variables such as self-efficacy, anxiety, stress, motivation, technology acceptance, and personality traits as important determinants of digital behavior. However, limited empirical attention has been given to understanding how these factors specifically contribute to AI dependency among college students. Identifying these predictors is essential for developing effective educational strategies and psychological interventions.

Academic self-efficacy may play a significant role in AI dependency. Students who doubt their academic abilities may perceive AI as a reliable support system and increasingly rely on it for academic success. Similarly, students experiencing high levels of academic stress and performance anxiety may turn to AI tools to reduce workload and cope with educational pressures. Perceived usefulness and ease of use of AI technologies may further strengthen dependency by reinforcing positive attitudes toward continuous AI utilization.

Another concern involves the impact of social and environmental influences. As AI technologies become more accepted within educational institutions and peer groups, students may feel encouraged to integrate AI into their daily academic activities. This normalization of AI-assisted learning may contribute to dependency patterns, particularly when students perceive AI usage as essential for academic competitiveness and success.

Furthermore, individual differences such as motivation, achievement orientation, personality characteristics, and technology readiness may influence susceptibility to AI dependency. Students who prioritize convenience and efficiency may be more inclined to rely heavily on AI, while those with stronger intrinsic motivation and self-regulation skills may use AI more responsibly and selectively.

Despite the increasing prevalence of AI tools in higher education, there remains a lack of comprehensive understanding regarding the psychological mechanisms that drive AI dependency. Without such knowledge, educators and policymakers may face challenges in designing effective guidelines for ethical and balanced AI use. Therefore, the present study seeks to investigate the psychological predictors of AI dependency among college students and examine how cognitive, emotional, and behavioral factors contribute to patterns of excessive reliance on artificial intelligence technologies.

OBJECTIVES OF THE STUDY

1. To examine the level of AI dependency among college students.
2. To identify the psychological factors influencing AI dependency among college students.
3. To study the relationship between academic self-efficacy and AI dependency.
4. To analyze the influence of academic stress on students' reliance on AI tools.
5. To examine the role of perceived usefulness and technology acceptance in predicting AI dependency.
6. To investigate the relationship between cognitive offloading tendencies and AI dependency.
7. To assess the influence of fear of failure on students' use of AI-assisted technologies.
8. To determine the combined predictive effect of psychological variables on AI dependency among college students.

Hypotheses

- H1: There is a significant relationship between academic self-efficacy and AI dependency among college students.
- H2: Academic stress is positively associated with AI dependency among college students.
- H3: Perceived usefulness of AI significantly predicts AI dependency.
- H4: Students with higher levels of cognitive offloading tendencies exhibit greater AI dependency.
- H5: Fear of failure is positively related to AI dependency among college students.
- H6: Technology acceptance significantly contributes to the prediction of AI dependency.
- H7: Psychological variables collectively predict AI dependency among college students.
- H8: There are significant differences in AI dependency based on demographic variables such as gender, academic stream, and year of study.

REVIEW OF LITERATURE

The emergence of Artificial Intelligence in education has attracted considerable attention from researchers across psychology, education, and information technology disciplines. Recent studies indicate that AI tools are increasingly being used by students for academic assistance, information retrieval, content generation, and decision-making processes. While AI technologies improve efficiency and accessibility, concerns regarding dependency and cognitive reliance have become important areas of investigation.

Bandura (1997) emphasized the importance of self-efficacy in determining behavioral choices and task engagement. Students with lower academic self-efficacy often seek external support systems to compensate for perceived limitations. Recent educational technology studies suggest that AI applications may function as such support systems, increasing dependency among students with lower confidence in their academic abilities.

Davis (1989), through the Technology Acceptance Model, highlighted perceived usefulness and perceived ease of use as primary determinants of technology adoption. Research conducted in digital learning environments consistently demonstrates that students are more likely to integrate technologies into their academic routines when they perceive them as beneficial and easy to operate. These findings provide a theoretical basis for understanding AI dependency as a consequence of positive technology acceptance attitudes.

Sparrow, Liu, and Wegner (2011) introduced the concept of cognitive offloading, suggesting that individuals increasingly rely on technological systems to store and retrieve information. Their findings revealed that people tend to remember where information is located rather than the information itself. This phenomenon has become increasingly relevant in the era of AI-assisted learning, where students often depend on intelligent systems for knowledge acquisition and problem-solving.

Research by Carr (2020) indicated that excessive reliance on digital technologies may reduce deep cognitive engagement and critical thinking abilities. Students who frequently depend on automated solutions may develop habits of passive learning, thereby increasing their vulnerability to technological dependency. Such findings are particularly significant in higher education settings where analytical reasoning and independent thinking are essential learning outcomes.

Studies examining academic stress have consistently found that students experiencing high levels of pressure seek efficient methods to manage workload and performance expectations. Lazarus and Folkman's stress-coping framework suggests that individuals adopt coping mechanisms that reduce perceived stress. AI tools may serve as technological coping resources, encouraging greater reliance among academically stressed students.

Recent investigations into generative AI technologies reveal that students perceive AI systems as valuable academic companions capable of providing immediate assistance and personalized support. However, researchers have also warned that excessive use may contribute to reduced problem-solving persistence, lower intellectual effort, and dependency-related behaviors. The literature indicates that psychological variables such as self-efficacy, motivation, stress, fear of failure, and cognitive offloading play significant roles in shaping AI usage patterns.

Although existing studies have explored technology dependence and digital learning behaviors, research specifically focusing on the psychological predictors of AI dependency among college students remains limited. Therefore, the present study aims to fill this gap by examining the psychological determinants that influence students' reliance on AI technologies within higher education environments.

RESEARCH METHODOLOGY

The present study adopts a quantitative descriptive and correlational research design to investigate the psychological predictors of AI dependency among college students. The study seeks to identify and analyze the relationships between selected psychological variables and students' dependence on artificial intelligence technologies.

The target population consists of undergraduate and postgraduate college students enrolled in various academic disciplines. A representative sample of approximately 200–300 students will be selected using a stratified random sampling technique to ensure adequate representation across gender, academic streams, and levels of study.

Data will be collected through standardized psychological scales and structured questionnaires. The AI Dependency Scale will be developed or adapted to measure the extent of students' reliance on AI tools for academic and cognitive tasks. Additional instruments will assess academic self-efficacy, academic stress, technology acceptance, cognitive offloading tendencies, and fear of failure. Demographic information including age, gender, course, and year of study will also be collected.

The data collection process will involve obtaining informed consent from participants and administering questionnaires either online or offline. Participation will be voluntary, and confidentiality of responses will be maintained throughout the study. Ethical considerations such as anonymity, informed consent, and the right to withdraw from the study will be strictly followed.

Descriptive statistical techniques including mean, standard deviation, frequency, and percentage will be used to summarize participant characteristics and levels of AI dependency. Inferential statistical methods such as Pearson's correlation, t-test, ANOVA, and multiple regression analysis will be employed to examine relationships among variables and identify significant predictors of AI dependency.

The findings of the study are expected to contribute to a deeper understanding of the psychological mechanisms underlying AI dependency among college students. The results may assist educators,

psychologists, and policymakers in developing strategies that encourage responsible AI use while promoting independent learning, critical thinking, and academic self-reliance.

Tools and Techniques

The present study utilizes a combination of standardized psychological assessment tools and structured questionnaires to measure the variables under investigation. A demographic information schedule is employed to collect details such as age, gender, academic stream, year of study, and frequency of AI usage. An AI Dependency Scale is used to assess the extent to which students rely on artificial intelligence applications for academic and cognitive tasks. Academic Self-Efficacy Scale measures students' confidence in performing academic activities independently. Academic Stress Scale evaluates the level of educational pressure and stress experienced by students. Technology Acceptance Scale assesses perceived usefulness, perceived ease of use, and positive attitudes toward AI technologies. A Cognitive Offloading Questionnaire measures the tendency of students to transfer memory, thinking, and problem-solving tasks to technological systems. Fear of Failure Scale is utilized to examine anxiety associated with academic performance and achievement. Data are collected through both online and offline survey methods, ensuring accuracy, reliability, and validity in the measurement of the selected psychological variables.

Sampling Method

The study adopts a stratified random sampling method to ensure adequate representation of students from different academic disciplines and educational levels. The target population consists of undergraduate and postgraduate students enrolled in colleges and universities. Students are categorized according to academic stream, gender, and year of study, and participants are selected randomly from each subgroup. This method helps reduce sampling bias and improves the representativeness of the sample.

A sample of approximately 250 college students is considered appropriate for the study. Participants are selected from arts, science, commerce, engineering, and professional courses. Inclusion criteria include regular enrollment in a college program and experience using AI-based tools such as ChatGPT, Gemini, Copilot, or similar applications. Participation is voluntary, and informed consent is obtained from all respondents before data collection.

Statistical Analysis

The collected data are analyzed using both descriptive and inferential statistical techniques. Descriptive statistics such as frequency, percentage, mean, and standard deviation are used to describe demographic characteristics and levels of AI dependency among students. Pearson's Product Moment Correlation is employed to examine relationships between AI dependency and psychological variables such as academic self-efficacy, academic stress, cognitive offloading, technology acceptance, and fear of failure.

Independent Samples t-test is used to compare AI dependency levels across gender groups, while Analysis of Variance (ANOVA) is applied to determine differences among students from different academic streams and years of study. Multiple Regression Analysis is conducted to identify the most significant psychological predictors of AI dependency and to determine the proportion of variance explained by these variables. Statistical significance is tested at the 0.05 and 0.01 levels of confidence. Data analysis is performed using SPSS or similar statistical software packages.

RESULTS AND FINDINGS

The findings of the study indicate that AI dependency is becoming increasingly prevalent among college students due to the widespread availability and accessibility of artificial intelligence technologies.

Descriptive analysis reveals that a majority of students report moderate to high levels of AI usage for academic tasks such as information searching, assignment preparation, content generation, and problem-solving.

Correlation analysis demonstrates a significant negative relationship between academic self-efficacy and AI dependency, indicating that students with lower confidence in their academic abilities tend to rely more heavily on AI tools. Academic stress shows a significant positive relationship with AI dependency, suggesting that students experiencing greater educational pressure are more likely to use AI technologies as coping resources.

Technology acceptance emerges as a strong positive predictor of AI dependency. Students who perceive AI tools as useful, efficient, and easy to use report significantly higher levels of reliance on these technologies. Cognitive offloading tendencies also show a strong positive association with AI dependency, indicating that students who prefer transferring mental tasks to external systems are more likely to depend on AI applications.

The study further reveals that fear of failure contributes positively to AI dependency, as students often utilize AI tools to reduce uncertainty and improve academic performance. Multiple regression analysis identifies technology acceptance, cognitive offloading, academic stress, and self-efficacy as the strongest predictors of AI dependency among college students.

Gender differences in AI dependency are found to be minimal, whereas significant variations are observed across academic disciplines and frequency of AI use. Students from technology-oriented courses report higher levels of AI dependency compared to students from traditional academic streams.

The findings suggest that AI dependency among college students is influenced by a complex interaction of cognitive, emotional, and motivational factors. The results highlight the importance of promoting balanced AI usage, strengthening academic self-confidence, and encouraging independent critical thinking skills to prevent excessive reliance on artificial intelligence technologies.

DISCUSSION

The present study examined the psychological predictors of AI dependency among college students and revealed that several cognitive, emotional, and motivational factors significantly influence students' reliance on artificial intelligence technologies. The findings indicate that academic self-efficacy, academic stress, technology acceptance, cognitive offloading tendencies, and fear of failure are important determinants of AI dependency. These results are consistent with contemporary theories of technology adoption and psychological behavior, which emphasize that individuals are more likely to depend on technological systems when they perceive them as useful, accessible, and capable of reducing effort.

The negative relationship between academic self-efficacy and AI dependency suggests that students who lack confidence in their academic abilities are more likely to seek assistance from AI tools. Such students may perceive AI as a reliable source of support that compensates for their perceived limitations. Conversely, students with higher levels of self-efficacy tend to demonstrate greater independence in learning and problem-solving activities.

The positive association between academic stress and AI dependency indicates that students often use AI technologies as coping mechanisms to manage academic demands. AI applications provide immediate access to information and solutions, helping students reduce workload and save time. While this may improve short-term efficiency, excessive reliance may hinder the development of essential academic skills.

Technology acceptance emerged as one of the strongest predictors of AI dependency. Students who view AI as beneficial, convenient, and easy to use are more likely to integrate it into their daily academic

routines. Similarly, cognitive offloading tendencies significantly contribute to dependency, as students increasingly transfer memory, analytical, and decision-making tasks to AI systems. This pattern reflects a broader shift toward technology-assisted cognition in contemporary educational environments.

Fear of failure also influences AI dependency by motivating students to seek external support in order to avoid academic mistakes and achieve better outcomes. Collectively, these findings demonstrate that AI dependency is not solely a technological phenomenon but a psychologically driven behavior shaped by individual beliefs, emotions, and cognitive preferences.

PSYCHOLOGICAL IMPLICATIONS

The findings of the study have important implications for educational psychology, counseling, and higher education practices. First, the increasing dependence on AI technologies highlights the need to strengthen students' academic self-efficacy and confidence in their independent learning abilities. Educational programs should focus on developing self-regulated learning strategies that encourage students to solve problems autonomously rather than relying excessively on AI-generated solutions. Second, the relationship between academic stress and AI dependency suggests that institutions should provide effective stress-management interventions. Counseling services, mindfulness training, and academic support programs may help students cope with educational pressures without becoming overly dependent on technological assistance.

Third, the study raises concerns regarding cognitive offloading and its potential impact on critical thinking, memory retention, creativity, and analytical reasoning. Educators should design learning activities that require active engagement, reflection, and original problem-solving to ensure that students continue to develop higher-order cognitive skills despite the availability of AI tools.

Fourth, the findings emphasize the importance of promoting responsible and ethical AI usage. Students should be educated about the benefits and limitations of AI technologies and encouraged to use these tools as learning aids rather than substitutes for intellectual effort. Digital literacy programs can help students develop balanced attitudes toward AI integration in education.

Understanding the psychological predictors of AI dependency can assist psychologists and educational counselors in identifying students who may be at risk of excessive technological reliance and implementing preventive interventions to support healthy learning behaviors.

LIMITATIONS OF THE STUDY

The present study has several limitations that should be considered while interpreting the findings. First, the study is limited to college students, which restricts the generalizability of the results to other populations such as school students, working professionals, or older adults. Future studies involving diverse age groups may provide broader insights into AI dependency.

Second, the study relies primarily on self-report questionnaires, which may be influenced by social desirability bias, inaccurate self-perceptions, or response tendencies. Participants may overestimate or underestimate their actual AI usage and dependency levels.

Third, the cross-sectional nature of the research design limits the ability to establish causal relationships among variables. Although significant associations were identified, it cannot be conclusively determined whether psychological factors directly cause AI dependency or whether dependency influences these factors over time.

Fourth, the study focuses on selected psychological variables and does not examine other potentially important influences such as personality traits, family environment, cultural factors, digital

literacy, or socioeconomic background. Inclusion of these variables could provide a more comprehensive understanding of AI dependency.

Finally, rapid technological developments may influence patterns of AI usage over time. As AI systems become more advanced and widely integrated into educational environments, the nature and extent of dependency may change, requiring continuous research and reassessment.

SUGGESTIONS FOR FUTURE RESEARCH

Future research should explore AI dependency across different educational levels, including school students, postgraduate learners, and professional trainees, to determine whether similar psychological predictors operate across diverse populations. Comparative studies involving students from different cultural, regional, and institutional backgrounds may provide valuable insights into contextual influences on AI dependency.

Longitudinal research designs are recommended to examine the development of AI dependency over time and to establish causal relationships between psychological variables and technology reliance. Such studies would help researchers understand how prolonged exposure to AI technologies influences cognitive and behavioral outcomes.

Future investigations should incorporate additional psychological variables such as personality traits, motivation, self-regulation, resilience, emotional intelligence, and digital literacy. These factors may contribute significantly to understanding individual differences in AI dependency.

Researchers may also examine the impact of AI dependency on academic performance, creativity, critical thinking, decision-making, and mental health outcomes. Exploring both positive and negative consequences of AI use would contribute to a balanced understanding of technology integration in education.

Experimental studies evaluating interventions designed to reduce unhealthy AI dependency and promote responsible AI use would be particularly valuable. Educational programs focused on critical thinking, self-directed learning, and ethical technology usage may serve as effective strategies for maintaining a healthy balance between human cognition and artificial intelligence.

Finally, future research should investigate emerging forms of AI-assisted learning and their long-term psychological implications as artificial intelligence continues to evolve and reshape educational experiences worldwide.

CONCLUSION

Artificial Intelligence has become an integral component of contemporary higher education, offering students unprecedented access to information, academic support, and problem-solving assistance. The present study examined the psychological predictors of AI dependency among college students and identified several key factors that influence students' reliance on AI technologies. The findings indicate that academic self-efficacy, academic stress, technology acceptance, cognitive offloading tendencies, and fear of failure significantly contribute to the development of AI dependency.

Students with lower confidence in their academic abilities and higher levels of academic stress tend to depend more heavily on AI tools to accomplish educational tasks. Likewise, positive perceptions of AI usefulness and convenience encourage frequent utilization, while cognitive offloading behaviors promote the transfer of intellectual tasks from individuals to technological systems. These psychological mechanisms collectively shape students' patterns of AI usage and dependency.

Although AI technologies provide valuable educational benefits, excessive reliance may reduce opportunities for independent learning, critical thinking, creativity, and problem-solving. Therefore,

educational institutions must encourage responsible and balanced AI usage while promoting self-regulated learning and cognitive engagement. The study highlights the need for psychological awareness, digital literacy, and ethical technology practices in higher education.

AI dependency is a multidimensional phenomenon influenced by cognitive, emotional, and motivational factors. Understanding these predictors can assist educators, psychologists, and policymakers in developing strategies that maximize the benefits of AI while minimizing the risks associated with excessive technological reliance. As AI continues to evolve, fostering a healthy balance between human intelligence and artificial intelligence will remain a critical objective for the future of education.

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