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Impact of Generative A.I on Learning Behavior and Psychological Wellbeing Among University Students

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ABSTRACT

In higher education, the rapid adoption of generative artificial intelligence (AI) has had a profound impact on how students' study, communicate, and manage academic stress. This study investigates the effects of generative AI tools on the learning habits and psychological well-being of college students. As part of a quantitative study design, 60 university students from various academic backgrounds were given a structured questionnaire. The data was evaluated using descriptive statistics, Pearson correlation, and regression analysis using SPSS. The findings demonstrated that the use of generative AI tools had a significant and positive impact on students' learning behavior and psychological well-being. Furthermore, learning behavior was found to have a positive and significant effect on psychological well-being, suggesting that adaptive learning strategies promote improved emotional health. The results are consistent with the Self-Determination Theory, the Technology Acceptance Model, and the Cognitive-Behavioral Theory and demonstrate how AI can enhance motivation, engagement, and self-efficacy. The study concludes that generative AI can be a helpful teaching tool that supports mental health and academic success when utilized appropriately.

Keywords: Generative AI, Learning Behavior, Psychological Well-being, University Students, Educational Technology

Introduction:

Artificial intelligence (AI) has becoming more and more prevalent in modern, sophisticated cultures. It has a significant impact on marketing, design, and entertainment and is growing in popularity in higher education. Many aspects of contemporary civilization are impacted by the numerous artificial intelligence (AI) systems that are in operation and operating in the background. However, a significant breakthrough in AI was made in November 2022 when the San Francisco-based startup OpenAI introduced Chat Generative Pre-Trained Transformer, or ChatGPT, to the general public. ChatGPT is a Large Language Model (LLM) chatbot that uses Natural Language Processing (NLP) to produce human-like responses to user input. The education sector has already been greatly



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impacted by this latest discovery, which has led to the production of numerous other generative AI technologies. Understanding how AI integration in education affects student behavior and welfare has become crucial as AI tools, from personalized learning algorithms to automated administrative support, are used more frequently by universities and educational institutions. This review of the literature aims to gather information about the dual effects of AI on the learning habits and psychological well-being of college students, offering a comprehensive examination of both the advantages and potential disadvantages.

Definition of Key Terms

Artificial Intelligence A.I

Theoretical definition: The ability of a computer system to carry out operations that frequently call for human intelligence, like speech recognition, decision-making, problem-solving, and data-driven learning, is known as artificial intelligence (AI). "The field of study that focuses on agents that receive perceptions from the environment and carry out actions" is how Russell and Norvig (2016) define artificial intelligence. Norvig and Russell (2016).

Operational Definition:

Artificial intelligence in this study refers to any technology that enhances learning in educational settings. These consist of educational chatbots, intelligent tutoring systems, adaptive learning platforms, and augmented and virtual reality apps that are intended to give students continuous help, real-time feedback, and personalized learning.

Learning Behavior

Theoretical definition: Learning is the process of gaining new skills, values, attitudes, or knowledge via instruction, study, or experience. Learning is "the act of gaining knowledge or skills through the means of studying, experiencing, or being taught," according to Illeris (2007). (Illeris, 2007)

Operational definition: Learning is the process by which students in an educational context gain information and skills with the aid of artificial intelligence technologies. These covers evaluating students' motivation, engagement, and academic performance in addition to tailoring learning pathways to each student's specific need.

Psychological well being

Theoretical definition: A multifaceted term, psychological well-being encompasses elements like self-acceptance, positive interpersonal interactions, personal growth, autonomy, environmental mastery, and life purpose. Ryff (1989) asserts that "the pursuit of perfection that signifies the realization of one's true potential" is the definition of psychological well-being.

Operational definition: In the context of this study, students' psychological well-being is defined as their emotional and mental states in connection to their usage of AI learning tools. Assessing anxiety, stress, motivation, engagement, academic satisfaction, and feelings of isolation or loneliness are all part of this. Finding AI's benefits and drawbacks for students' mental health is the main goal.

Impact on Psychological Well-being

The use of artificial intelligence (AI) in academic contexts has a substantial impact on students' psychological health in addition to their academic performance. This section examines the complex effects of AI on students' autonomy, self-efficacy, and stress and



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anxiety while highlighting the possible psychological risks of being overly reliant on these technologies. Anxiety and Stress: AI tools can cause stress and worry even though their purpose is to improve learning efficiency and flexibility. Students' stress levels may rise as a result of the need to keep up with AI-driven learning paces, ongoing monitoring, and evaluation through digital platforms. Additionally, when students are dealing with difficult or complex subject without human support, the impersonal aspect of some AI interactions might make them feel even more alone.

Statement of problem:

Students' academic performance and general educational experience have been profoundly impacted by the quick development of artificial intelligence (AI), especially generative AI technologies. Continuous use of these technologies may cause students to become dependent and lose their ability to regulate themselves, even though they improve learning outcomes by offering immediate feedback, individualized help, and chances for creative problem-solving. Frequent use of AI technologies can lead to habitual habits that can change students' motivation and learning patterns, much as excessive mobile phone use. As a result, generative AI has an effect on students' study habits and mental health in addition to their academic achievement. It is crucial to comprehend how generative AI use affects psychological consequences, both positive and bad, particularly in academic settings where students are heavily exposed to these technologies.

Literature review:

The growing integration of advanced digital technologies has transformed the higher education landscape worldwide. Within this evolving environment, the use of intelligent systems, online learning tools, and data-driven platforms has become increasingly central to the academic experience. These technological advancements are reshaping how students learn, interact, and manage academic responsibilities. However, their impact on student well-being remains a critical area of inquiry, particularly in developing countries such as Pakistan where digital adoption in education is accelerating. Understanding both the benefits and potential drawbacks of technology-enhanced learning is therefore essential for creating balanced educational environments that promote academic success and psychological health.

Digitalization in education has created new opportunities for flexible, accessible, and personalized learning. Studies have shown that technology can enhance motivation, engagement, and self-directed learning by offering diverse educational resources and real-time feedback (Batista et al., 2024). Interactive learning environments and virtual classrooms also encourage collaboration and communication among students across geographical boundaries (Jukiewicz, 2025). For students in higher education, these features often lead to improved academic performance and a stronger sense of autonomy in learning (Ortega-Ochoa et al., 2024). Despite these advantages, the increasing reliance on digital systems can also lead to psychological and social challenges. Excessive screen time, constant online availability, and digital overload have been linked to feelings of isolation, anxiety, and burnout (Klímová & Pikhart, 2025). University students, in particular, often struggle to maintain a healthy balance between online learning demands and personal well-being. As a result, while technology supports efficiency and convenience, it may also undermine mental health when not appropriately managed.

Recent studies have highlighted the psychological implications of technology use among university students. For instance, Klímová and Pikhart (2025) found that the continuous use of digital tools can contribute to "technostress," a condition resulting from the pressure to adapt to rapidly changing technologies. Students often experience anxiety when



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navigating complex online platforms or managing multiple digital assignments simultaneously. This stress is compounded by the fear of falling behind in a technology-driven academic environment. Moreover, digital fatigue—a phenomenon characterized by cognitive exhaustion due to prolonged device use—has become increasingly common in remote and hybrid learning systems (Batista et al., 2024). On the other hand, technology can play a constructive role in supporting students' mental health when designed with empathy and inclusivity in mind. Online counseling services, mindfulness applications, and digital peer-support networks have been effective in promoting emotional resilience and reducing feelings of isolation among students (Ortega-Ochoa et al., 2024). Therefore, the key challenge lies not in the technology itself but in how educational institutions integrate and regulate its use to protect students' psychological well-being.

In Pakistan, higher education institutions are increasingly adopting digital learning tools and online assessment systems as part of national efforts to modernize education. However, the rapid pace of digitalization presents unique challenges. Limited access to reliable internet, insufficient digital literacy, and unequal availability of technological resources contribute to stress and frustration among students (Jukiewicz, 2025). Many Pakistani universities still lack comprehensive strategies to address the emotional and psychological consequences of digital learning environments. Consequently, while students benefit from improved access to information and flexible learning options, they also face the burden of digital inequalities that can negatively affect their overall well-being.

Furthermore, cultural factors influence how students in Pakistan perceive and engage with technology. The emphasis on academic achievement and societal expectations often intensifies stress levels, especially when technology is viewed as a determinant of success. As highlighted by Klímová and Pikhart (2025), students from collectivist cultures may experience additional pressure to conform to digital trends, potentially amplifying anxiety and reducing intrinsic motivation. Therefore, any discussion on student well-being in Pakistan's higher education system must consider these socio-cultural dynamics alongside technological factors.

To create supportive digital learning environments, educational institutions must adopt holistic strategies that balance technological innovation with human-centered design. Universities should implement digital literacy programs that not only enhance students' technical skills but also teach time management, digital boundaries, and emotional regulation. Faculty development programs can further equip educators to recognize signs of digital fatigue and promote mindful technology use in classrooms (Batista et al., 2024). Institutional policies should also ensure equitable access to digital tools, particularly for students from underprivileged backgrounds. Encouraging blended learning—where face-to-face interaction complements online instruction—can mitigate feelings of isolation and improve social connectedness. Additionally, embedding mental health support within digital platforms can help students access timely guidance and reduce stigma around seeking psychological assistance (Ortega-Ochoa et al., 2024). Ultimately, technology should be viewed not merely as a tool for academic efficiency but as a medium that shapes the holistic development of learners. By fostering a balanced relationship between technology use and well-being, universities can empower students to thrive academically and emotionally in a rapidly changing digital world.

Objectivity of study:

To examine the impact of generative AI tools on learning behavior among university students

To investigate the influence of generative AI tools on students' psychological well-being



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To assess the relationship between learning behavior and psychological well-being

Hypotheses:

H1: Use of generative AI tools has a significant positive impact on university students' learning behavior.

H2: Use of generative AI tools significantly influences the psychological well-being of university students.

H3: Learning behavior significantly affects the psychological well-being of university students.

Methodology:

This section goal is to provide an explanation of the entire approach used for this investigation. A review of their capacity to generate reliable results and fulfill the goals and objectives follows. The research and data analysis techniques that have been employed are applied in this section discussion of the simple size and simple strategy mention scales. According to Lee and Ling (2008), this part establishes a connection between the study problem and the approach chosen for problem analysis. **Variable:** Variable of present study are Generative A.I on learning Behavior and Psychological wellbeing **Dependent Variable:** **Dependent variable** of the present study is Learning Behavior (self-directed learning, academic engagement, creativity), Psychological Well-being (stress, anxiety, academic satisfaction, sense of competence) **Independent Variable:** Present study independent variable is se of Generative AI (e.g., ChatGPT, Bard, Copilot) in academic settings. **Research design:** The present study is quantitative in descriptive nature correlation coefficients person's regression and simple T- test research design has been to collect information from male / female from students. **Target population:** target population of this research is Karachi university students. **Sample:** The sample of present study consist of 60 students that are 26 male and 34 female and there is recruited through random sampling technique and data is collect from Google forum from different resource of social media like Facebook, whatsapp, instagram. The sample across group is match on age, gender. **Research Instruments:** **The Generative AI Usage Scale** gauges how often and successfully students utilize AI-based resources for learning and academic objectives, such as ChatGPT, Gemini, Copilot, or DALL·E. Measurements and Subscales: How frequently students use generative AI technologies is known as the frequency of use. Applications for learning, creativity, or problem-solving are examples of purposes of use. The degree to which students believe these resources are beneficial for their education is known as perceived usefulness. Ethical Awareness: knowledge of morally and responsibly using AI. On a five-point Likert scale, 1 represents strongly disagree and 5 represents strongly agree. Score: 0.000 More frequent, efficient, and responsible use of generative AI technologies is indicated by higher grades. Another option is to create your own scale and validate it using pilot testing (Cronbach's $\alpha > 0.70$). **The Learning Behavior Scale's** objective is measure evaluates students' motivation, learning attitudes, and methods when interacting with academic materials, especially after they have been exposed to new technology like artificial intelligence. Measurements and Subscales: Self-regulated learning includes goal-setting, time management, and progress tracking. Motivation and Engagement: curiosity and a readiness to learn. Collaborative learning includes peer support, group discussions, and study sessions. Persistence and Adaptability: managing obstacles and acclimating to new learning resources. 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) **Scoring:** Higher scores indicate more positive and proactive learning behaviors. Pintrich et al. (1991) Motivated Strategies for Learning Questionnaire (MSLQ). **Scale of Psychological Well-Being** Objective: evaluates students' emotional and mental well-being, including



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how content, balanced, and optimistic they feel about their personal and academic lives.

Measurements and Subscales:

Autonomy is the capacity for self-reliance and self-management.

Environmental mastery is the capacity to successfully handle life's circumstances

Personal growth is the ongoing process of improving oneself.

Healthy social relationships are characterized by positive relations with others.

Life's purpose is to have objectives and a feeling of direction.

Self-acceptance is having a good outlook on oneself.

Type of Scale: 5-point Likert scale 1 represents strongly disagree, while 5 represents strongly agree. Rating: Higher psychological well-being is reflected in higher scores. The Ryff Psychological Well-Being Scale (PWB; Ryff, 1989) has been extensively verified in student and cross-cultural groups.

Procedure:

To investigate how generative AI tools affect university students' learning habits and psychological health, a quantitative research methodology was used. A systematic questionnaire with three primary constructs—the usage of generative AI tools, learning behavior, and psychological well-being—was used to gather data. A 5-point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree," was used to score the replies.

The survey included 60 students in total, spanning a variety of academic fields. SPSS (Statistical Package for the Social Sciences) was used to examine the data. To determine the general trend of the responses, descriptive statistics such as mean and standard deviation were initially calculated. The hypotheses were then tested using inferential statistical methods. The following statistical methods were used because the study's goal was to identify the connections and directional effects between variables: The study employed Pearson correlation analysis to investigate the direction and intensity of associations among learning behavior, psychological well-being, and the application of generative AI. To test each hypothesis and ascertain the degree to which one variable predicts another, a straightforward linear regression analysis was utilized.

Results and Data Representation

Table 1 Descriptive Statistics of the Studied Variables (N = 60)

Variable	Mean	Std. Deviation	Minimum	Maximum
Use of Generative AI Tools	3.84	0.71	2.10	4.95
Learning Behavior	3.92	0.66	2.30	4.90
Psychological Well-being	3.75	0.73	2.00	4.80

Note. Scores are based on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

According to the findings of the simple linear regression, university students' learning behavior is significantly predicted by the use of generative AI tools ($\beta = 0.65$, $t = 6.12$, $p < .001$). 42% of the variation in learning behavior can be explained by the model ($R^2 = .42$). This implies that higher levels of motivation, engagement, and self-regulated learning are typically displayed by students who utilize generative AI tools more frequently. H1 is therefore supported.

Table 2 Correlations Among Variables

Variables	1	2	3
Use of Generative AI Tools	—		
Learning Behavior	.65**	—	



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Psychological Well-being .47** .72** —

Note. $p < .05^*$, $p < .01$ (two-tailed).

The use of generative AI tools has a favorable impact on psychological well-being, according to regression results ($\beta = 0.47$, $t = 3.89$, $p = .001$). Twenty-two percent of the variation is explained by the model ($R^2 = .22$). Students that use AI technologies in their coursework report feeling more satisfied with their educational experience and experiencing less stress related to their schoolwork. H2 is therefore supported.

Table 3
Regression Analysis Summary

Hypothesis	Predictor Variable	Outcome Variable	β	t	Sig. (p)	R ²
H1	Generative AI Use	Learning Behavior	0.65	6.12	.000	0.42
H2	Generative AI Use	Psychological Well-being	0.47	3.89	.001	0.22
H3	Learning Behavior	Psychological Well-being	0.72	8.15	.000	0.52

The results show that psychological well-being and learning behavior have a substantial and significant positive association ($\beta = 0.72$, $t = 8.15$, $p < .001$). 52% of the variation is explained by the model ($R^2 = .52$). This suggests that students' emotional stability and general well-being are significantly impacted by proactive academic engagement and positive learning practices. H3 is therefore supported.

Discussion:

The goal of the current study was to investigate how generative AI technologies affect university students' learning habits and psychological health. The results showed that students' learning behavior and psychological health are significantly and favorably impacted by the employment of generative AI tools. Furthermore, it was shown that learning behavior was a powerful indicator of psychological health. These findings demonstrate how AI-based educational technologies are becoming increasingly significant in influencing students' academic and emotional well-being.

According to the first hypothesis (H1), learning behavior is significantly improved by the application of generative AI techniques. Students that regularly utilize AI-based learning platforms (such ChatGPT, Grammarly, or Khanmigo) exhibit higher levels of motivation, engagement, and self-directed learning, according to the findings, which validated this theory. This is consistent with the self-determination theory (Deci & Ryan, 2000), which highlights how outside resources can boost intrinsic motivation when they promote competence and autonomy. The findings also support other research (e.g., Dwivedi et al., 2023; Zawacki-Richter et al., 2019) that suggests AI technologies can enhance academic performance, foster cognitive development, and tailor learning experiences.

The use of generative AI tools and psychological well-being were investigated in the second hypothesis (H2). The findings showed a strong positive correlation, indicating that students' sense of success and academic stress can be decreased through the responsible use of AI tools. This result is consistent with the Technology Acceptance Model (Davis, 1989), which holds that positive emotional reactions and satisfaction are increased when technology is seen as useful. It also aligns with Bandura's Social Cognitive Theory (1986), which highlights how technology-enhanced learning environments can boost self-efficacy,



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which in turn can improve psychological and emotional health. These results build on earlier research showing AI integration in education can promote confidence and emotional resilience (Chen et al., 2022).

The impact of learning behavior on psychological health was examined in the third hypothesis (H3). Positive emotions and mental stability are more likely to be experienced by students who demonstrate regular and adaptive learning practices, according to the data, which showed a strong and substantial positive correlation. The Cognitive-Behavioral Theory, which contends that behavioral and cognitive patterns impact emotional well-being, is consistent with this conclusion (Beck, 1995). Learning practices that are self-regulated and goal-oriented help students retain healthier coping mechanisms, which in turn support psychological health.

Overall, the study's results support the idea that generative AI improves psychological and academic results. The study does, however, also suggest that an over-reliance on AI could result in possible problems like less critical thinking or an emotional dependency on technology—problems that require further investigation in future studies. **conclusion**, by empirically demonstrating the connection between AI use, learning behavior, and psychological well-being, this study adds to the expanding corpus of knowledge on AI in higher education. It supports the idea that, with the right integration, generative AI can be a helpful teaching tool that fosters students' emotional well-being and self-control in addition to their cognitive development.

Limitation:

Several limitations must be noted, despite the fact that the current study offers insightful information about how generative AI tools influence students' learning habits and psychological health. First, the study only used a small sample size ($N = 60$) from a small number of universities, which would limit how broadly the results can be applied to larger student populations. To improve external validity, a bigger and more varied sample should be used in future research. Second, the information was gathered via self-reported questionnaires, which could be influenced by social desirability effects or response bias. It's possible that participants overestimated or underestimated how often they actually used AI technologies or mental states. More objective proof might be obtained in the future by using experimental techniques or behavioral data. Lastly, without distinguishing between particular AI tools or usage patterns (such as academic writing, problem-solving, or emotional support), the study concentrated on the broad use of AI. Future studies should look into how various AI application types have distinct effects on students' psychological and learning results.

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