



# Effects of Generative AI Dependency on Undergraduate Students' Creativity

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**Abstract:** Based on the Behavioral Dependency Framework, this study explores the influence mechanism of generative artificial intelligence dependency on undergraduate students' creativity. In this study, the generative artificial intelligence dependency was divided into three dimensions: cognitive preoccupation, negative consequences and withdrawal. 223 valid questionnaires were obtained through online surveys, and data analysis was conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM). The results show that cognitive preoccupation has a positive impact on creativity, but the negative consequences and withdrawal have no effect on creativity. This study not only refines the relationship mechanism between the generative artificial intelligence dependency and creativity, but also provides empirical reference for universities to guide students to use generative artificial intelligence rationally.

**Keywords:** Generative artificial intelligence dependency; Creativity; Behavioral Dependency Framework

## 1 Introduction

Generative artificial intelligence (AI) has been in the spotlight since the advent of ChatGPT (Cao et al., 2023). Unlike traditional AI technologies, generative AI can autonomously generate content that meets users' personalized needs by learning the underlying distribution of data, including but not limited to text, images, videos, audio, and program codes (Bordas et al., 2024). At present, the use of generative AI assisted learning is relatively frequent among undergraduate students (Wang & Huang, 2024), and it has been widely penetrated into the four typical scenarios of undergraduate students' scientific research activities, course learning, daily life, study and job search (Li et al., 2024).

However, undergraduate students are affected by the duality brought about by generative AI. From the perspective of positive impacts, generative AI not only expands the channels for information acquisition, but also reconstructs the logical framework of analyzing data information (Liu & Gou, 2023). It plays a positive role in many fields such as academic writing (Wang et al., 2025a), academic reading (Wang et al., 2023), and English learning (Wang et al., 2025b), creating favorable conditions for students to engage in personalized learning and cultivate higher-order thinking abilities (Dai et al., 2023). In terms of adverse effects, generative AI is likely to become an alternative tool due to its essential characteristics, leading to learners' excessive dependence, which weakens the construction foundation of scientific knowledge, and also gives rise to derivative problems such as "placebo effect" and "ghostwriter effect", it makes learners' self-cognition distorted (Rivera-Novoa & Duarte Arias, 2025). In addition, there is no educational value load in generative AI, which is easy to cause ethical dilemmas. For instance, it may provide distorted information of scientific facts, thereby causing an academic disorder, and may cause talents to lose their independent judgment ability on knowledge innovation, which ultimately inhibits the development of innovative thinking (Wang & Li, 2023). At the same time, limited by the algorithmic characteristics of existing data to generate specific content, students' excessive dependence on generative AI may lead to creative homogenization, which in turn limits original thinking (Rasul et al., 2023).

Creativity is a key component of undergraduate students' core literacy, and its development will directly affect the improvement of undergraduate students' comprehensive ability. Generative AI dependency, as a possible negative behavioral tendency during the usage process, has already affected the development process of undergraduate students' creativity, and the related influencing mechanisms still need to be explored. Based on this, this study focuses on the impact of generative AI dependency on creativity, aiming to provide theoretical references and practical guidance for universities in guiding undergraduate students to rationally apply generative AI tools and enhancing their creativity.

## 2 Literature Review

Generative AI dependency refers to an individual's tendency or need for excessive dependency on a generative AI system (Morales-Garcia et al., 2024). According to the Behavior Dependency Framework (Goodman, 1990) and the definition provided by Goh et al. (2025), this kind of dependency can be understood from three dimensions. The first is cognitive preoccupation, where individuals have a persistent psychological engagement at the thought level with generative AI, regarding it as the primary tool for problem-solving and decision-making, and even developing an urge to use it even in non-essential situations (Barnes et al., 2019; Chiang & Liu, 2024). The second aspect is the negative consequences, which are specifically manifested as reduced perceived competence due to excessive dependence, weakened autonomy, and impaired task performance, such as weakened critical thinking or decreased self-efficacy (Goh et al., 2025). The third



aspect is the withdrawal, which refers to the psychological discomfort such as anxiety, unease, or depression that occurs when generating AI is not available. These reactions are similar to the emotional fluctuations in other behavioral dependencies (Chen, 2015). These three dimensions constitute the dependency theory framework of generative AI.

Creativity is a key element in this study. Guilford (1967) defined creativity as the ability of an individual to generate novel and valuable ideas. Lin (2024) believes that it is an intellectual quality based on a specific purpose, which mobilizes all available information and then generates a product with unique characteristics and social significance. With the evolution of digital technology, creativity has gradually become a comprehensive quality, covering aspects such as information integration, cross-disciplinary association, and innovative responses to complex problems (Wang & Huang, 2024). It is evident that creativity is not merely a complex process of thinking operation but a comprehensive ability with a multi-dimensional structure (Lin, 2024).

At present, the relationship between Generative AI dependency and creativity has gradually attracted the attention of the academic community. According to the Behavior Dependency Theory (Goodman, 1990), when an individual develops persistent cognitive preoccupation and adopts a habitual approach, their cognitive resources will be more allocated to technical invocation rather than autonomous exploration, thereby reducing the opportunities for divergent thinking or original construction. Extending this dependency pattern to the application scenarios of generative AI, excessive dependence by individuals on the output of generative AI may further weaken the process of their independent thinking and in-depth processing, thereby triggering mental inertia and cognitive substitution phenomena, and ultimately inhibiting the development of creative potential (Wang & Li, 2023). Empirical studies have proven that excessive use or dependence on AI tools may negatively impact creativity (Zhou et al., 2025). Wang et al. (2024) found that when AI is overused, creative personality and creative subjectivity are weakened. Habib et al. (2024) pointed out that the intensity of the use of generative AI is negatively correlated with students' creativity and creative confidence. To sum up, the following research hypotheses are proposed:

H1: Generative AI dependency (H1a: Cognitive Preoccupation, H1b: Negative Consequences, H1c: Withdrawal) has a negative impact on undergraduate students' creativity.

In conclusion, the research model of this study is shown in Figure 1.

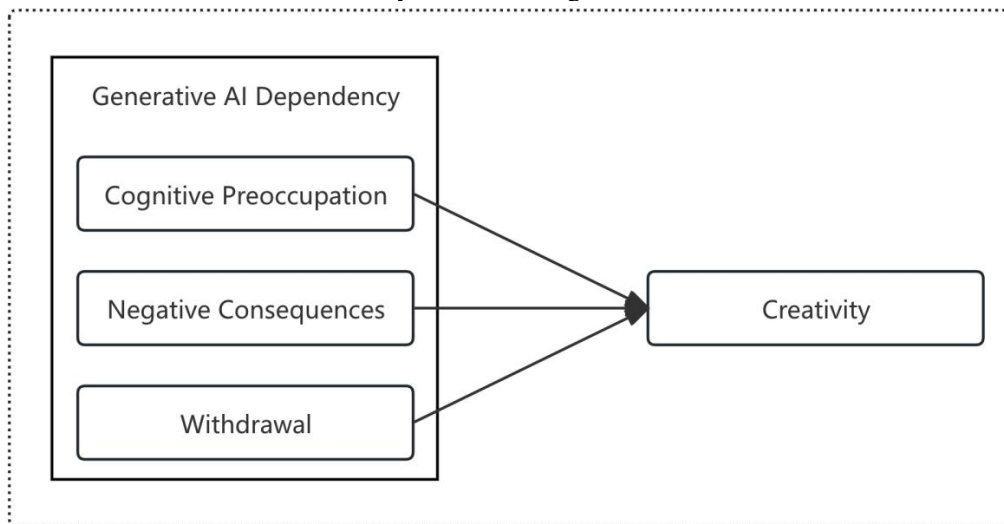


Figure 1 Research model

### 3 Methodology

#### 3.1 Questionnaire design

This study employed mature scales for measurement. Generative AI dependency was measured using the scale developed by Goh et al. (2025), while creativity was assessed using the scale from the study by Tsai et al. (2015). The questionnaire was evaluated using a 5-point Likert scale, where 5 represents “strongly agree” and 1 represents “strongly disagree”.

This questionnaire is divided into three sections. The first section presented the research purpose of this study and contained a screening question (Have you ever used generative AI software). Only those who answered “Yes” could continue to participate. The second section measured two variables: generative AI dependency and creativity. The third section consisted of participants' demographic information, including gender, grade, duration of generative AI usage, and frequency of generative AI usage. To accommodate this research context, two experts proficient in both English and Chinese translated the measurement items to ensure the accuracy of the questionnaire language. Furthermore, prior to the formal distribution of the questionnaires, 50 respondents were invited to participate in a preliminary survey to ensure that all the questions could be understood.

#### 3.2 Study site and sample collection

This study focused on undergraduate students in undergraduates and universities of Zhejiang Province. Zhejiang is a province that leads in the application of digital economy and AI education. Students have extensive exposure to generative AI. Therefore, selecting them as research participants is reasonably representative. Data for this study was collected via

Wenjuanxing (<https://www.wjx.cn>) from February 23 to February 28, 2026. To recruit more eligible participants, this study adopted a convenience sampling method. A total of 244 questionnaires were collected, and 223 valid questionnaires remained after excluding invalid responses. Among the valid responses, there were 88 male respondents (39.5%) and 135 female respondents (60.5%). The largest group consists of second-year students (33.7%). 82.5% of students have been using generative AI for more than 6 months. 26% of students use generative AI 3–5 times a week. See Table 1 for details.

Table 1 Demographics of the sample

Variable		Frequency	Percent
Gender	Male	88	39.5
	Female	135	60.5
Grade	First-year student	40	17.9
	Second-year student	75	33.7
	Third-year student	64	28.7
	Fourth-year student	44	19.7
	Less than 6 months	39	17.5
Duration of generative AI usage	6-12 months	69	30.9
	1-2 years	59	26.5
	More than 2 years	56	25.1
Frequency of generative AI usage	Use almost every day	57	25.6
	3-5 times per week	58	26
	1-2 times per week	58	26
	1-3 times per month	48	21.5
	Hardly ever use	2	0.9

## 4 Results

### 4.1 Measurement model

As shown in Table 2, all factor loadings were above 0.7. In Table 3, the Cronbach's alpha and CR values for each variable were greater than 0.7, and the AVE values were all above 0.5, indicating that this study had good reliability and validity (Hair et al., 2019). In addition, the square roots of the AVE values were all greater than the correlation coefficients between the variables (Fornell & Larcker, 1981), and all HTMT values were less than 0.9 (Henseler et al., 2015). Accordingly, the scale demonstrates satisfactory discriminant validity (Hair et al., 2017).

Table 2 Factor loadings of measurable items

	Measurement items	Factor loading
<i>Creativity</i>		
C1	Searches out new technologies, processes, techniques, and/or product ideas.	0.721
C2	Is not afraid to take risks.	0.780
C3	Promotes and champions ideas to others.	0.858
C4	Develops adequate plans and schedules for the implementation of new ideas.	0.809
C5	Comes up with creative solutions to problems.	0.841
<i>Cognitive Preoccupation</i>		
CP1	My decisions are often influenced by generative AI.	0.720
CP2	I feel an urge to use generative AI, even when it may not be necessary.	0.901
CP3	I look forward to using generative AI, even if it is unrelated to the task at hand.	0.781
<i>Negative Consequences</i>		
NC1	My use of generative AI has caused concerns for me.	0.787
NC2	I have trouble completing work or other responsibilities without generative AI.	0.873
NC3	I feel less confident in my abilities without generative AI.	0.712
NC4	My use of generative AI has negatively affected my problem-solving skills or efficiency.	0.853
<i>Withdrawal</i>		
W1	I experience restlessness if I am unable to use generative AI.	0.791
W2	I feel unsettled or distracted when I cannot use generative AI.	0.859
W3	I feel a sense of disconnection when I cannot access generative AI.	0.796
W4	I get frustrated or irritable when I am unable to use generative AI.	0.889

Table 3 Reliability, validity, Fornell-Larcker criterion, and Heterotrait-Monotrait Ratio

	Cronbach's Alpha	CR	AVE	Fornell-Larcker				Heterotrait-Monotrait Ratio (HTMT)			
				C	CP	NC	W	C	CP	NC	W
C	0.862	0.872	0.645	0.803							
CP	0.734	0.824	0.646	0.25	0.804			0.296			
NC	0.832	0.914	0.654	0.2	0.622	0.809		0.215	0.799		
W	0.858	0.915	0.697	0.209	0.601	0.744	0.835	0.222	0.737	0.883	

Cronbach's Alpha	CR	AVE	Fornell-Larker				Heterotrait-Monotrait Ratio (HTMT)			
			C	CP	NC	W	C	CP	NC	W
Note: <i>C</i> creativity, <i>CP</i> cognitive preoccupation, <i>NC</i> negative consequences, <i>W</i> withdrawal.										
Abbreviations: AVE, average variance extracted; CR, construct reliability.										

#### 4.2 Hypothesis testing

The results of the PLS-SEM analysis are shown in Figure 2. Cognitive preoccupation has a positive impact on creativity ( $\beta = 0.189$ ,  $p = 0.033$ ), and the result are contrary to the original hypothesis. Negative consequences have no impact on creativity ( $\beta = 0.026$ ,  $p = 0.809$ ), and H1b is not supported. Withdrawal has no effect on creativity ( $\beta = 0.076$ ,  $p = 0.533$ ), H1c is not supported.

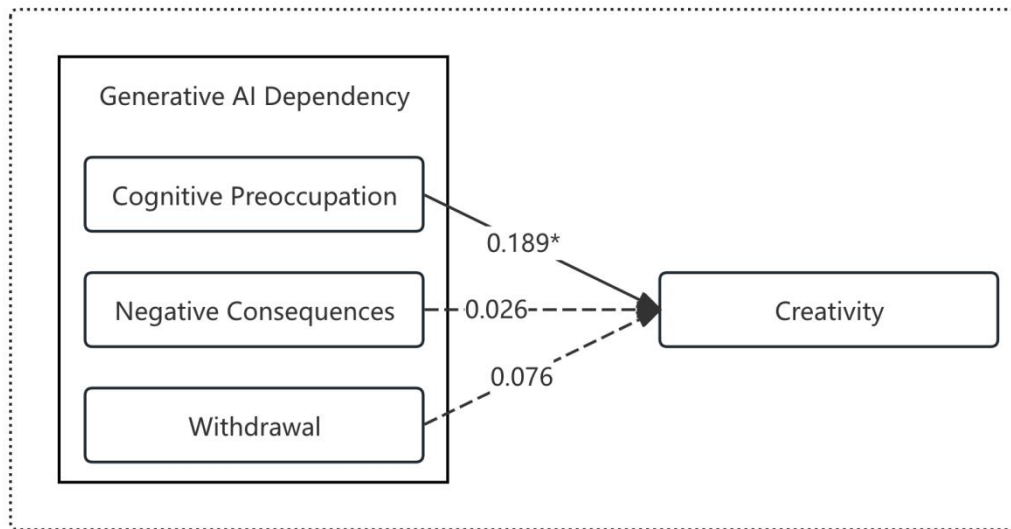


Figure 2 Results of PLS-SEM analysis

## 5 Discussion

### 5.1 Cognitive preoccupation and creativity

The research results indicate that cognitive preoccupation has a positive effect on creativity, which is contrary to the research hypothesis of this study. The core essence of cognitive preoccupation is not merely “constant attention”, but rather the cognitive process in which an individual actively engages, frequently contemplates, and deeply integrates the functions of generative AI at the level of thought. During this process, individuals not only have access to diverse information, but also can achieve problem reconfiguration and viewpoint iteration through the collision of information, thereby effectively expanding their cognitive boundaries and laying the foundation for the generation of creative thinking. According to the Structure of Intellect theory, divergent thinking, as the core component of creativity, requires the key prerequisites of diverse information input and sufficient activation of associations for its activation and enhancement (Guilford, 1967). In this study, the “active cognitive engagement” driven by cognitive preoccupation precisely aligns with the core requirements of this theory. When individuals view generative AI as an auxiliary tool rather than a replacement tool, continuous cognitive engagement will exert its influence on creativity through two pathways. First, it is to stimulate inspiration, broaden thinking paths and break the fixed cognitive patterns through the input of diverse information. Second, by using tools to assist in reducing low-level cognitive load, individuals can concentrate their limited cognitive resources on high-level creative processing.

### 5.2 Negative consequences and creativity

The research results indicate that negative consequences have no impact on creativity. Generative AI does not directly shape undergraduate students’ creativity. The impact it has depends on students’ own self-regulating learning ability and their awareness of ethical boundaries (Wang & Huang, 2024). According to Bandura’s theory of self-regulation, students have the ability of Self-Observation, Self-Judgment and Self-Reaction in the learning process (Bandura, 1991). Under the influence of this self-regulation mechanism, the negative consequences on creativity may be buffered by an individual’s self-regulation ability, and thus do not show a significant impact.

### 5.3 Withdrawal and creativity

The research results indicate that withdrawal have no significant impact on the creativity. The withdrawal is mainly manifested as the emotional experience of anxiety, unease or loss when generative AI cannot be used, while its essence is the dependence reaction at the emotional level. The formation of creativity relies more on the depth of cognitive processing and the structure of thinking rather than short-term emotional fluctuations. According to the Compensatory Control Theory, when individuals perceive a decreased sense of control in an external environment or tool use, they will

restore this sense of control by activating their own internal cognitive resources (Kay et al., 2009). In the context of the application of generative AI, when individuals cannot rely on generative AI tools, they tend to rely more on their own existing knowledge and independent thinking abilities, thereby forming a cognitive compensation mechanism. This compensation process helps maintain the normal functioning of individual cognitive activities and, to a certain extent, offsets the negative impacts brought about by technology.

## **6 Conclusion and limitations**

### **6.1 Theoretical contribution**

From the perspective of dimension segmentation, this study conducts a more in-depth exploration of the impact of generative AI dependency on creativity. In the existing related studies, scholars mostly discuss the use or dependency of AI as an overall variable, but rarely conduct a systematic analysis of its mechanism from sub-dimensions (Habib et al., 2024; Wang & Huang, 2024). Based on the generative AI dependency structure proposed by Goh et al. (2025), this study divides it into three dimensions: cognitive preoccupation, negative consequences, and withdrawal. On this basis, the study analyzes the impact of different dimensions on the creativity of undergraduate students.

Meanwhile, this study introduces generative artificial AI into the creativity research framework and combines it with Behavioral Dependency Framework for analysis. Not only has it enriched the theoretical connotation of creativity research in the digital technology context, but also has expanded the application scope of the Behavioral Dependency Framework in the emerging technology field, providing a new theoretical basis for understanding the individual cognition and creativity development in the AI environment.

### **6.2 Practical contribution**

The study found that different dimensions of generative AI dependency have varying effects on creativity. Among them, cognitive preoccupation has a significant positive effect, while negative consequences and withdrawal have not shown significant effects. This shows that under reasonable use conditions, generative AI can effectively promote the development process of creative thinking.

Based on this, universities should guide students to adopt a rational approach to using AI and emphasize its auxiliary role. Specifically, teachers can utilize course design to facilitate students' integration of the content generated by AI with their own thinking. Through processes of comparison, correction, and re-creation, students' creative thinking can be enhanced. In addition, universities still need to pay attention to the potential risk of dependency and enhance students' information judgment ability and critical thinking through AI literacy education, so as to avoid the weakening of autonomous learning ability due to excessive dependence. Moreover, by establishing an appropriate system of technical application norms and creating a learning environment that stimulates original thinking. This will promote the cultivation of undergraduate students' creativity in the process of improving learning efficiency, thereby more appropriately meeting the demand for innovative talents in the future digital society.

### **6.3 Limitations and future research**

Although this study theoretically extends the application of the Behavioral Dependency Framework and provides reference for universities to guide students to rationally use generative AI at the practical level, there are still some limitations.

On the one hand, the limitations of the sampling method. This study uses the convenience sampling method to collect samples, but this method has problems such as insufficient randomness of samples and easy introduction of sample bias, which limits the universality of the research results. Therefore, future research can adopt random sampling or stratified sampling to select a more balanced sample across different grades and different majors, in order to enhance the representativeness of the sample.

On the other hand, there are limitations in the research sample. The subjects of this study mainly come from universities in Zhejiang Province, and the sample area is relatively concentrated. However, due to the rapid development of generative AI education in Zhejiang Province, students there have more opportunities to come into contact with generative AI, and their reliance on it may differ from that of students in other regions. Therefore, the conclusions of this study may not be applicable to all regions. In future research, the sample range can be expanded and comparative studies can be conducted in different regions to systematically explore the differences in the relationship between generative AI dependence and creativity in different educational environments. This will provide more targeted guidance for universities to carry out differentiated generative AI literacy education.

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