Beyond ChatGPT: The Psychological Implications of Generative Artificial Intelligence for University Students. A Critical Review

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ABSTRACT

The rapid diffusion of generative artificial intelligence (GenAI) tools such as ChatGPT, Gemini, Claude, and Copilot has transformed how university students learn, write, seek help, and manage academic demands. While early scholarship concentrated on academic integrity and assessment redesign, the psychological consequences of sustained GenAI use remain comparatively underexamined. This critical narrative review synthesises empirical and conceptual literature published primarily between 2021 and 2026, identified through systematic searches of Scopus, Web of Science, ERIC, PsycINFO, and Google Scholar, to map what is currently known about the psychological implications of GenAI for university students. Four interrelated thematic domains are identified: (1) cognitive functioning, including cognitive offloading, critical thinking, and metacognitive engagement; (2) motivation and the self, including academic self-efficacy, autonomy, and competence; (3) emotional wellbeing, including AI anxiety, technostress, stress relief, loneliness, and chatbot companionship; and (4) academic integrity, moral emotions, and academic identity. The evidence portrays GenAI as a double-edged psychological technology. It can scaffold confidence, reduce help-seeking anxiety, and provide accessible emotional support, yet it can also foster overreliance, erode critical thinking, intensify anxiety about future employability, and destabilise students' sense of authorship and academic self-worth. A dual-pathway conceptual model is proposed in which AI literacy, self-regulation, social support, and institutional policy moderate whether GenAI use follows an enabling or an eroding trajectory. The review concludes that psychological outcomes depend less on the frequency of GenAI exposure than on the mode of engagement. Implications for university policy, counselling services, curriculum design, and assessment reform are discussed, and an agenda for longitudinal, experimental, and cross-cultural research is outlined.

Keywords: Generative Artificial Intelligence, ChatGPT, University Students, Psychological Wellbeing, Higher Education

INTRODUCTION

The public release of ChatGPT in November 2022 marked a decisive moment in the relationship between higher education and artificial intelligence. Within months, generative artificial intelligence (GenAI) systems built on large language models became embedded in the daily academic routines of university students worldwide, assisting with essay drafting, code generation, exam preparation, literature summarisation, and even emotional self-disclosure (Dwivedi et al., 2023; Kasneci et al., 2023). Survey evidence indicates that a substantial majority of students in many national contexts now use GenAI tools for their studies. In Germany, for example, almost two-thirds of surveyed students reported using ChatGPT or similar AI-based tools in their academic work within the first year of its release (von Garrel & Mayer, 2023). Comparable adoption patterns have been documented across Asia, North America, Europe, and Africa (Chan & Hu, 2023; Habibi et al., 2023; Ngo, 2023; Cavazos et al., 2025).

The first wave of scholarship responded to this disruption primarily through the lenses of pedagogy and academic integrity. Researchers asked whether ChatGPT would undermine traditional assessment (Rudolph et al., 2023), how institutions could detect or deter AI-assisted plagiarism (Cotton et al., 2024; Perkins, 2023), and how curricula and policy frameworks should adapt (Chan, 2023; Sullivan et al., 2023; Tlili et al., 2023).

These are important questions, yet they capture only part of the phenomenon. GenAI is not merely a productivity instrument or a threat to assessment validity. For students, it is increasingly a cognitive partner, a source of on-demand feedback, a study companion available at three o'clock in the morning, and in some cases a confidant for personal distress (Maples et al., 2024; Stojanov, 2023). Technologies that occupy such intimate positions in daily life inevitably carry psychological consequences that extend well beyond questions of cheating.

A growing but fragmented body of research now examines these consequences. Studies report associations between heavy GenAI use and reduced critical thinking through cognitive offloading (Gerlich, 2025; Lee et al., 2025), increased procrastination and self-reported memory loss among university students under academic pressure (Abbas et al., 2024), diminished student agency when AI assistance replaces rather than supplements self-regulated effort (Darvishi et al., 2024), and shallower reasoning when language models substitute for effortful inquiry (Stadler et al., 2024).

At the same time, other studies document gains in programming self-efficacy and motivation (Yilmaz & Karaoglan Yilmaz, 2023), improved creative problem-solving performance and task confidence (Urban et al., 2024), reductions in the anxiety associated with help-seeking and academic writing (Baidoo-Anu & Owusu Ansah, 2023; Chan & Hu, 2023; Sallam, 2023), and meaningful loneliness relief among student users of conversational agents (Maples et al., 2024). The literature is therefore marked by an unresolved tension: GenAI appears simultaneously to support and to erode the psychological foundations of successful university study.

Three gaps motivate the present review. First, existing syntheses of GenAI in higher education are dominated by educational technology and assessment perspectives (Crompton & Burke, 2023; Lo, 2023; Zawacki-Richter et al., 2019), with psychological constructs treated peripherally. Second, reviews that do address cognition or wellbeing tend to examine single constructs, such as critical thinking (Zhai et al., 2024) or acceptance intentions (Strzelecki, 2024), rather than offering an integrated psychological account.

Third, the moderating conditions that determine whether GenAI use is beneficial or harmful for a given student remain undertheorised, despite their obvious importance for policy and counselling practice. Understanding these conditions matters particularly in contexts such as Malaysia and the wider Asian region, where universities are simultaneously promoting digital transformation and confronting rising concern about student mental health and resilience (Mohamed Ibrahim et al., 2025; Jailani et al., 2025).

Accordingly, this critical narrative review addresses three questions. First, what does the current literature reveal about the effects of GenAI use on university students' cognitive functioning, motivation, emotional wellbeing, and academic identity? Second, through which psychological mechanisms do these effects appear to operate? Third, which individual and institutional factors moderate whether GenAI functions as a psychological resource or a psychological risk?

The review deliberately looks beyond ChatGPT as a single product to the broader class of generative systems, because students increasingly move across multiple tools, including text generators, code assistants, image generators, and companion chatbots, each of which engages distinct psychological processes.

The remainder of the article describes the review approach, synthesises the literature across four thematic domains, integrates the findings into a dual-pathway conceptual model together with its theoretical and practical implications and the limitations of the evidence base, and concludes with an agenda for future research.

METHODOLOGY

Research Design

This article adopts a critical narrative review methodology. Unlike systematic reviews, which aim for

exhaustive and protocol-driven coverage of a narrowly defined question, critical narrative reviews are suited to emerging, conceptually heterogeneous fields in which the priority is interpretation, integration, and theory building. Given that the psychological literature on GenAI spans educational psychology, human-computer interaction, information systems, counselling, and cognitive science, and that constructs are measured inconsistently across these fields, a narrative synthesis was judged more appropriate than a meta-analytic aggregation.

Search Strategy and Sources

Literature was identified through searches of Scopus, Web of Science, ERIC, PsycINFO, and Google Scholar using combinations of terms such as "generative AI", "ChatGPT", "large language model", "university students", "higher education", "wellbeing", "anxiety", "self-efficacy", "motivation", "critical thinking", "cognitive offloading", "dependence", and "academic integrity".

Reference lists of key reviews (Crompton & Burke, 2023; Lo, 2023; Zhai et al., 2024) were snowballed for additional sources. Priority was given to peer-reviewed empirical studies and influential conceptual papers published between 2021 and 2026, reflecting the period in which modern GenAI systems became publicly accessible, although foundational theoretical works in psychology were retained where they anchor the interpretation of newer findings.

Inclusion Criteria and Analytical Approach

Studies were included if they examined university or tertiary students (or, for a small number of mechanism-focused studies, comparable adult populations) and reported outcomes with clear psychological relevance, including cognition, emotion, motivation, identity, mental health, or social functioning. Purely technical evaluations of model performance, studies limited to school-age children, and opinion pieces without analytical contribution were excluded.

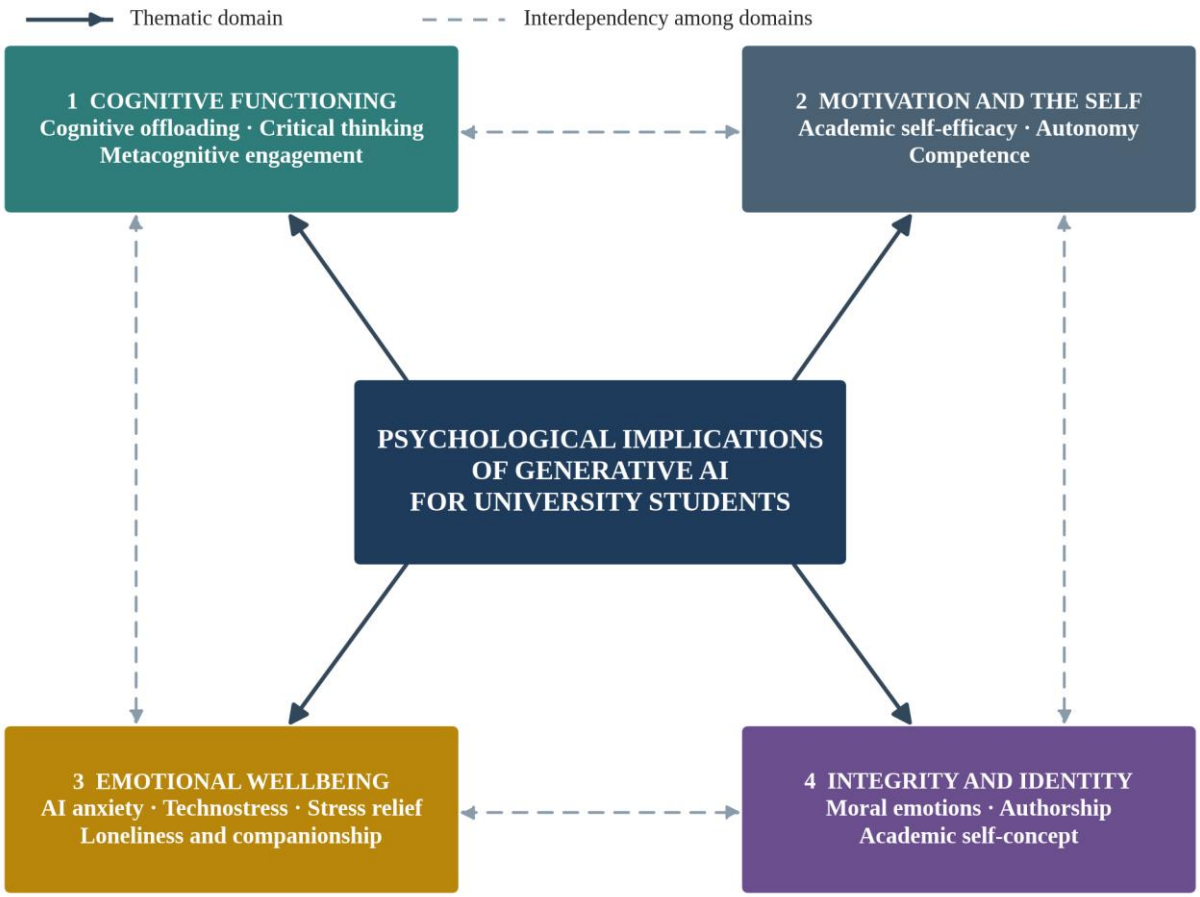
The synthesis that follows is organised thematically rather than chronologically, and a critical stance is maintained throughout: methodological weaknesses, contradictory findings, and interpretive limits of the evidence are highlighted rather than smoothed over.

RESULTS

Four thematic domains were derived inductively from the reviewed literature: cognitive functioning; motivation and the self; emotional wellbeing; and academic integrity, moral emotions, and academic identity. Figure 1 presents an overview of these domains, and Table 1 summarises the key empirical studies that anchor the synthesis.

Although discussed separately for clarity, the domains are deeply interconnected. A student who offloads thinking to a chatbot may experience short-term stress relief but longer-term erosion of self-efficacy; a student anxious about AI-related job displacement may respond with either avoidance or compulsive use. These interdependencies are taken up in the Discussion.

Figure 1. Thematic map of the psychological implications of generative AI for university students.



Note. Solid arrows indicate the four thematic domains derived from the literature; dashed arrows indicate the interdependencies among domains discussed in the text.

Table 1. Summary of key empirical studies on the psychological implications of generative AI for university students

Study	Design and sample	Primary domain	Key psychological findings
Gerlich (2025)	Mixed-methods survey and interviews; 666 participants including university-age adults	Cognitive functioning	Frequent AI use negatively correlated with critical thinking, mediated by cognitive offloading; association strongest among younger users
Lee et al. (2025)	Survey; 319 knowledge workers reporting 936 real tasks	Cognitive functioning	Higher confidence in GenAI predicted less critical thinking and effort; higher self-confidence predicted more critical engagement
Stadler et al. (2024)	Experiment; 91 university students (ChatGPT vs search engine)	Cognitive functioning	ChatGPT markedly lowered cognitive load but produced weaker reasoning and shallower justifications
Bastani et al. (2025)	Field experiment (RCT); ≈ 1,000 secondary mathematics students	Learning	Unguarded GPT-4 tutor raised practice performance but reduced unassisted exam performance by 17%; pedagogical guardrails eliminated the harm
Kosmyna et al.	EEG experiment; essay writing	Neurocognitive	LLM condition showed weakest fronto-parietal

(2025)	with LLM, search engine, or unaided thought		connectivity, poorer recall of own text, and reduced sense of ownership (“cognitive debt”)
Deng et al. (2025)	Systematic review and meta-analysis; 69 experimental studies (2022–2024)	Learning and motivation	ChatGPT improved academic performance and higher-order thinking propensities and reduced mental effort, but produced no gain in self-efficacy
Darvishi et al. (2024)	Randomised study; more than 1,000 students	Self-regulation	AI assistance improved peer-feedback quality while available; gains were not internalised without self-monitoring scaffolds
Yilmaz & Karaoglan Yilmaz (2023)	Quasi-experiment; undergraduate programming students	Motivation and the self	GenAI coding assistant raised programming self-efficacy, computational thinking, and motivation relative to controls
Urban et al. (2024)	Preregistered experiment; 145 university students	Motivation and the self	ChatGPT increased task self-efficacy and solution quality, but students miscalibrated their self-evaluations
Abbas et al. (2024)	Two-wave survey; Pakistani university students	Motivation and wellbeing	Academic workload predicted heavier ChatGPT use, which predicted procrastination, self-reported memory loss, and lower grades
Maples et al. (2024)	Survey; 1,006 student users of a companion chatbot	Emotional wellbeing	Lonely users perceived strong social support from the agent; 30 participants reported that it halted suicidal ideation
Laestadius et al. (2024)	Grounded theory; 582 Reddit posts on the chatbot Replika	Emotional wellbeing	Emotional dependence, distress after model changes, and harms following inappropriate responses to disclosures
Crawford et al. (2024)	Survey; university students	Social wellbeing	Reliance on ChatGPT for social interaction was linked to lower perceived human support; loneliness predicted greater reliance
Cavazos et al. (2025)	Survey; United States college students	Integrity and identity	Students distinguished legitimate assistance from misconduct and held nuanced perceptions of AI-related cheating

Note. GenAI = generative artificial intelligence; RCT = randomised controlled trial; EEG = electroencephalography; LLM = large language model.

Cognitive Functioning: Offloading, Critical Thinking, and Metacognition

The most extensively researched psychological concern is that GenAI encourages cognitive offloading, the delegation of internal cognitive work to external tools (Risko & Gilbert, 2016). Offloading is not inherently harmful; calculators, calendars, and search engines have long extended human cognition. Earlier research on the so-called Google effect demonstrated that people remember where information can be found rather than the information itself (Sparrow et al., 2011), and that the mere presence of a smartphone can tax available cognitive capacity (Ward et al., 2017). GenAI, however, differs in kind rather than merely in degree, because it offloads not only memory and retrieval but also generation, synthesis, argumentation, and evaluation, the very operations that university education is designed to cultivate.

Emerging empirical evidence supports this concern. Gerlich (2025), in a mixed-methods study of 666 participants, found a significant negative correlation between frequent AI tool use and critical thinking performance, mediated by cognitive offloading, with the association strongest among younger participants of typical university age. Lee et al. (2025), surveying 319 knowledge workers about 936 real tasks, reported that higher confidence in GenAI was associated with less self-reported critical thinking and reduced cognitive

effort, whereas higher confidence in one's own abilities was associated with more critical engagement. Although conducted with workers rather than students, the mechanism, calibration of trust between self and machine, translates directly to academic contexts. Experimental evidence with university students points in the same direction. Stadler et al. (2024) randomly assigned 91 university students to research a socio-scientific issue using either ChatGPT or a conventional search engine and found that, although the language model markedly reduced extraneous, intrinsic, and germane cognitive load, students who used it produced weaker reasoning and shallower justifications for their conclusions. The ease that GenAI provides, in other words, may come at the cost of precisely the germane effort through which understanding is constructed. Within higher education more broadly, Zhai et al. (2024) synthesised evidence that overreliance on AI dialogue systems is associated with weakened decision making, analytical reasoning, and critical evaluation among students, particularly when systems are used to obtain answers rather than explanations.

Experimental and neurocognitive studies add causal and mechanistic weight. Bastani et al. (2025), in a field experiment with approximately one thousand secondary mathematics students, found that unrestricted access to a GPT-4 tutor improved practice performance substantially but harmed subsequent unassisted exam performance by 17 percent relative to controls, whereas a scaffolded version with pedagogical guardrails eliminated the harm without eliminating the benefit. Kosmyna et al. (2025) used electroencephalography to compare essay writing with a large language model, a search engine, or unaided thought, and reported that the language model condition showed the weakest fronto-parietal connectivity, poorer recall of one's own text, and a diminished sense of ownership, a pattern the authors describe as accumulating cognitive debt. At a theoretical level, León-Domínguez (2024) argues that habitual outsourcing of reasoning to chatbots risks under-stimulating the prefrontal executive functions, including working memory, inhibition, and cognitive flexibility, that continue to mature during the traditional undergraduate years.

Nevertheless, the cognitive story is not uniformly negative, and critical caution is warranted in three respects. First, several of the most cited studies rely on self-reported thinking rather than performance measures, and cross-sectional designs cannot exclude the possibility that students with weaker critical thinking simply gravitate toward heavier AI use. Second, meta-analytic evidence complicates a purely pessimistic reading: synthesising 69 experimental studies published between 2022 and 2024, Deng et al. (2025) found that ChatGPT interventions improved academic performance and higher-order thinking propensities while reducing mental effort, although they produced no significant gain in self-efficacy, indicating that outcomes depend heavily on how the tool is embedded in instruction. Third, studies of guided use suggest that GenAI can function as a metacognitive mirror: Stojanov (2023) describes using ChatGPT as a more knowledgeable other in the Vygotskian sense, prompting self-explanation and hypothesis testing. Darvishi et al. (2024), in a randomised study of more than one thousand students, found that AI assistance improved the quality of peer feedback while it was available, but that students did not internalise the improvement once assistance was withdrawn unless self-monitoring scaffolds were provided. The consistent pattern across this literature is that the cognitive consequences of GenAI depend less on exposure than on the mode of engagement: answer-seeking use predicts offloading and skill stagnation, whereas explanation-seeking, iterative, and self-monitored use can support learning. As the following section shows, the same mode-of-engagement principle governs the motivational consequences of GenAI.

Motivation and the Self: Self-Efficacy, Autonomy, and Competence

A second stream of research examines how GenAI reshapes the motivational architecture of studying. Self-determination theory holds that intrinsic motivation flourishes when the needs for autonomy, competence, and relatedness are satisfied (Ryan & Deci, 2000). GenAI has an ambivalent relationship with each of these needs. On the autonomy side, students consistently report valuing the freedom that GenAI affords: the ability to study at any hour, to ask so-called stupid questions without embarrassment, and to receive immediate, personalised feedback rather than waiting for overburdened staff (Chan & Hu, 2023; Ngo, 2023). Such affordances can be experienced as autonomy-supportive, particularly by students who find traditional help-seeking channels intimidating. Related motivational frameworks that emphasise existence, relatedness, and growth needs among learners similarly suggest that flexible, low-threat learning resources can strengthen engagement when growth needs are activated (Hambali et al., 2025).

Competence perceptions show similarly mixed patterns. Yilmaz and Karaoglan Yilmaz (2023) found in a quasi-experimental study that students who used a GenAI coding assistant reported significantly higher programming self-efficacy, computational thinking, and motivation than controls. Convergent experimental evidence comes from Urban et al. (2024), whose preregistered experiment with 145 university students showed that working with ChatGPT significantly increased self-efficacy for a complex creative problem-solving task and improved the quality, elaboration, and originality of solutions. Qualitative accounts echo this scaffolding effect for academic writing, especially among students working in a second language, for whom GenAI reduces the fear of grammatical error that otherwise suppresses participation (Chan & Hu, 2023; Sallam, 2023). Against this, a competing body of evidence suggests that competence gains can be illusory or borrowed. In the same experiment by Urban et al. (2024), students struggled to calibrate their self-evaluations when using the tool, and perceived usefulness of ChatGPT was associated with overestimation of the quality and originality of answers. In the field experiment by Bastani et al. (2025), students with AI access likewise believed they had learned more than they had. Abbas et al. (2024), in a two-wave study of Pakistani university students, found that academic workload and time pressure predicted heavier ChatGPT use, which in turn predicted greater procrastination, self-reported memory loss, and lower grade point averages. When the source of performance is externalised, attributions of success shift away from the self, and self-efficacy built on AI-assisted output may collapse precisely in evaluative situations, such as closed-book examinations or job interviews, where the assistant is absent (Bandura, 1997).

Acceptance research adds a further motivational nuance. Studies applying technology acceptance frameworks find that performance expectancy and habit are among the strongest predictors of students' intention to use ChatGPT (Strzelecki, 2024; Habibi et al., 2023). The prominence of habit is psychologically significant: it suggests that for many students GenAI use rapidly becomes automatic rather than deliberate, which is precisely the condition under which offloading occurs without metacognitive oversight. Taken together, the motivational literature suggests that GenAI can genuinely nourish competence and autonomy when it is positioned as a coach, but that it can hollow out both needs when it becomes an habitual substitute for effortful practice, a distinction that current usage patterns among time-pressured students do not favour (Abbas et al., 2024; von Garrel & Mayer, 2023). How students experience these motivational dynamics emotionally is the subject of the next section.

Emotional Wellbeing: Anxiety, Technostress, Stress Relief, and Companionship

The emotional consequences of GenAI for students operate along at least three distinct channels. The first is anxiety about artificial intelligence itself. AI anxiety, conceptualised as apprehension about learning, using, and being displaced by intelligent systems, predates ChatGPT (Wang & Wang, 2022) but has intensified in the generative era. Students in numerous surveys express concern that the skills they are acquiring may be devalued by the time they graduate, and that professions they aspire to may be automated (Chan & Hu, 2023; Cavazos et al., 2025; Kajiita & Murote, 2025). This anticipatory career anxiety is not irrational, and it interacts with academic motivation in complex ways. Within control-value theory, achievement emotions arise from appraisals of control and value (Pekrun, 2006); when GenAI simultaneously reduces perceived control ("a machine can already do this better") and destabilises perceived value ("why master a skill that will be automated?"), the predicted emotional outcome is a mixture of anxiety, boredom, and hopelessness, which qualitative studies indeed report among subsets of students.

The second channel is technostress in daily academic use. GenAI relieves certain stressors while introducing others. On the relief side, students describe GenAI as reducing the overload of information searching, softening writer's block, and providing reassurance before submissions (Chan & Hu, 2023; Ngo, 2023). On the burden side, classic technostress dimensions such as techno-overload, techno-complexity, and techno-uncertainty (Tarafdar et al., 2007) reappear in new forms: pressure to keep up with rapidly changing tools, uncertainty about which uses are institutionally permitted, and fatigue from verifying unreliable output. The unreliability point deserves emphasis. Because large language models produce confident hallucinations, conscientious students must engage in continuous vigilance, and several studies note that verification labour partially offsets the time savings that motivate use in the first place (Farrokhnia et al., 2024; Lo, 2023). For

students with perfectionistic tendencies, ambiguity about whether AI assistance constitutes misconduct is itself a source of chronic low-grade anxiety (Cotton et al., 2024; Perkins, 2023).

The third channel concerns loneliness, companionship, and emotional support. University students report high levels of loneliness, and conversational agents are increasingly used as accessible listeners. Maples et al. (2024), studying 1,006 student users of a companion chatbot, found that participants were lonelier than typical student norms yet perceived strong social support from the agent, and thirty participants spontaneously reported that the chatbot had halted their suicidal ideation. Such findings indicate genuine palliative potential, particularly for students facing barriers to formal counselling, a persistent concern in many Asian higher education systems where counselling needs frequently outstrip provision (Jailani et al., 2025). However, the same literature documents serious risks. Laestadius et al. (2024), analysing user communities of the chatbot Replika, identified patterns of emotional dependence, distress following unexpected model changes, and harm when the agent responded inappropriately to disclosures of self-harm. Attachment-theoretic analyses suggest that individuals with anxious attachment styles may be especially prone to forming dependent bonds with responsive, ever-available agents (Xie & Pentina, 2022). In educational settings, Crawford et al. (2024) found that students who relied on ChatGPT for social interaction tended to report lower perceived social support from friends and family, and loneliness predicted greater reliance on the chatbot, raising the possibility of a substitution cycle in which artificial companionship crowds out the human connection that most robustly protects student wellbeing. This concern is sharpened by evidence that human social support remains one of the strongest buffers of academic stress and builders of resilience among university students (Mohamed Ibrahim et al., 2025).

Academic Integrity, Moral Emotions, and Academic Identity

Although academic integrity is usually framed as an institutional problem, it is experienced by students as a psychological one, involving moral emotions, self-concept, and identity. Surveys consistently show that students hold nuanced views: most can distinguish legitimate assistance from misconduct and disapprove of wholesale outsourcing, yet substantial minorities admit to uses they themselves consider questionable (Cavazos et al., 2025; von Garrel & Mayer, 2023). This gap between moral judgement and behaviour is fertile ground for cognitive dissonance, rationalisation, and guilt. Qualitative studies report students describing unease about whether AI-polished work is really theirs, and anxiety about false accusations from unreliable AI detectors, which adds a distinct stressor: even honest students now fear being unable to prove their honesty (Cotton et al., 2024; Sullivan et al., 2023).

Deeper than rule compliance lies the question of academic identity and authorship. Producing original work under one's own name is central to how students construct themselves as emerging scholars and professionals. When GenAI co-produces that work, the sense of ownership weakens, a phenomenon observed even at the neurocognitive level in reduced memory for, and identification with, AI-assisted text (Kosmyna et al., 2025). Rudolph et al. (2023) argue that the deeper threat of GenAI is not cheating but the erosion of the formative struggle through which disciplinary identity develops. In professional programmes, this identity question extends to future practice: students in fields such as social work, education, and healthcare must reconcile human-centred professional values with an AI-saturated future workplace, a negotiation that shapes both their ethics and their occupational self-concept (Kajiita & Murote, 2025; Sallam, 2023). Institutional responses matter here. Policy frameworks that engage students as partners in defining acceptable use, rather than treating them as suspects, appear more likely to preserve both integrity and healthy academic identity (Chan, 2023; Perkins, 2023), whereas surveillance-heavy approaches risk normalising mutual distrust between students and institutions.

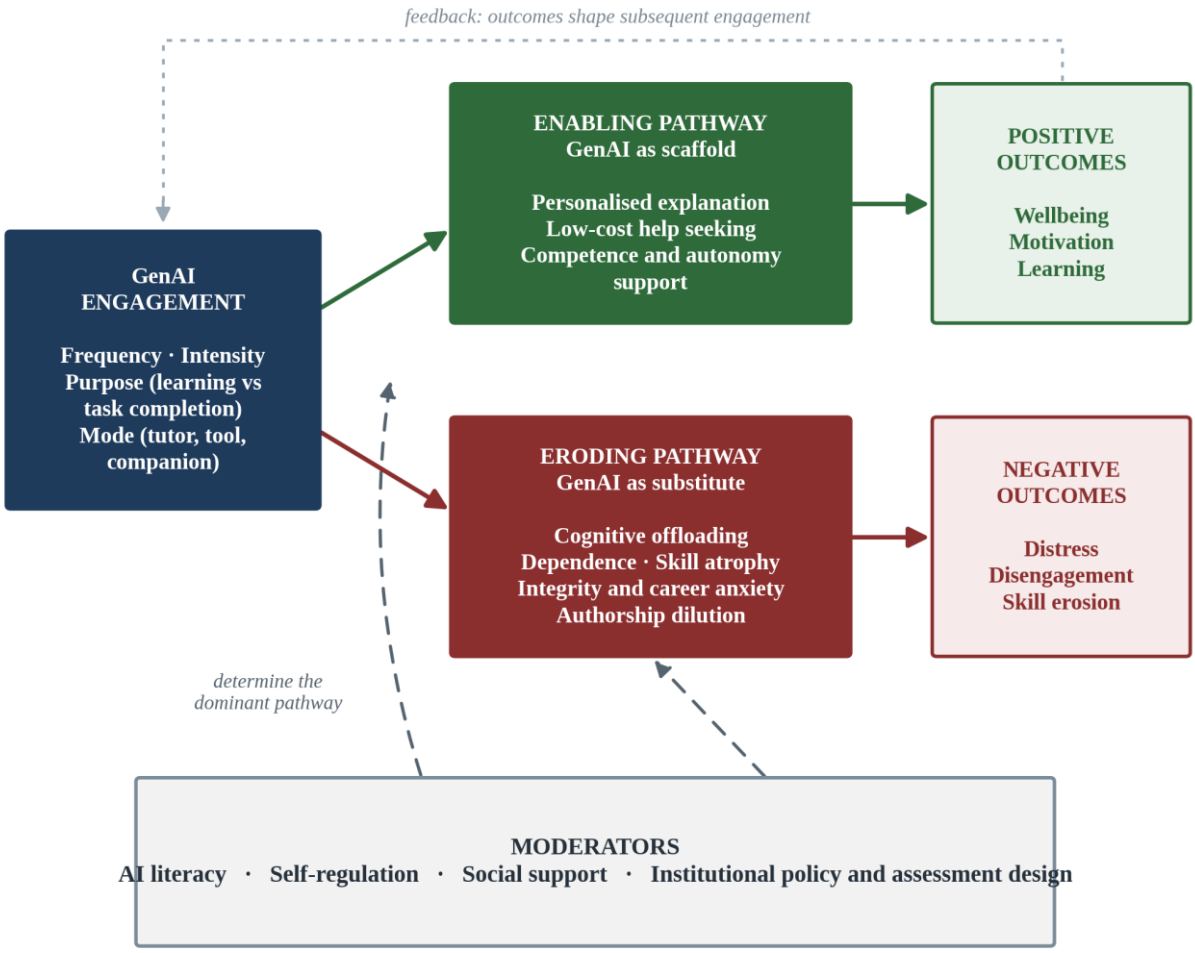
DISCUSSION

An Integrated Dual-Pathway Model

Read as a whole, the literature resists any simple verdict that GenAI is good or bad for students' psychological functioning. The same tool that raises one student's programming self-efficacy (Yilmaz & Karaoglan Yilmaz,

2023) deepens another student's procrastination and memory complaints (Abbas et al., 2024); the same conversational capacity that interrupts suicidal ideation in one user (Maples et al., 2024) fosters harmful dependence in another (Laestadius et al., 2024). To organise this heterogeneity, Figure 2 proposes a dual-pathway model of GenAI's psychological implications.

Figure 2. A dual-pathway conceptual model of the psychological implications of generative AI use among university students.



Note. GenAI engagement, characterised by frequency, purpose, and mode, can follow an enabling trajectory (GenAI as scaffold) or an eroding trajectory (GenAI as substitute), with the dominant pathway determined by four moderators: AI literacy, self-regulation, social support, and institutional policy and assessment design.

In the model, GenAI engagement is characterised not only by frequency and intensity but, crucially, by purpose (learning-oriented versus task-completion-oriented use) and by mode (tutor, tool, or companion). Engagement can then travel down two pathways. The enabling pathway operates when GenAI functions as a scaffold: it supplies personalised explanation and feedback, lowers the social cost of help seeking, and supports the experience of competence and autonomy, feeding positive outcomes in wellbeing, motivation, and learning (Chan & Hu, 2023; Stojanov, 2023; Deng et al., 2025). The eroding pathway operates when GenAI functions as a substitute: cognitive work is offloaded, effortful practice is displaced, dependence and skill atrophy develop, anxiety about surveillance, integrity, and future employability accumulates, and the sense of authorship weakens (Gerlich, 2025; Kosmyna et al., 2025; Stadler et al., 2024; Zhai et al., 2024). Both pathways are usually available to the same student at the same time; which one dominates is determined by a set of moderators.

Four moderators emerge from the evidence with reasonable consistency. The first is AI literacy, understood not merely as prompting skill but as calibrated understanding of what language models can and cannot do (Ng et al., 2021). Students who understand hallucination, bias, and the statistical nature of generation are better positioned to verify output and to reserve trust appropriately, the calibration process that Lee et al. (2025) identify as decisive for critical engagement. The second is self-regulation. Experimental work shows that the harms of AI assistance largely disappear when use is scaffolded with self-monitoring prompts, guardrails, or delayed assistance (Bastani et al., 2025; Darvishi et al., 2024), implying that the operative variable is not access but the preservation of the learner's own regulatory loop. The third is social support. Students embedded in supportive peer, family, and institutional networks appear less likely to drift into companionship-substitution and better able to convert academic stress into resilient coping (Crawford et al., 2024; Mohamed Ibrahim et al., 2025). The fourth is institutional policy and assessment design. Clear, participatory policies reduce integrity anxiety and moral ambiguity (Chan, 2023; Perkins, 2023), while assessment formats that reward process, oral defence, and in-person performance re-anchor competence in the student rather than the tool (Rudolph et al., 2023; Cotton et al., 2024).

Theoretical Implications

The findings carry implications for several psychological theories. For theories of distributed and extended cognition, GenAI represents a qualitatively new coupling. Classic offloading research concerned storage and retrieval (Risko & Gilbert, 2016; Sparrow et al., 2011); generative systems offload constructive cognition, which means that the boundary of the cognitive system now runs through the very processes that educational assessment attempts to measure and that educational psychology attempts to develop. Theories of learning built on desirable difficulty and germane cognitive load face a similar challenge: GenAI is exceptionally efficient at removing difficulty, but some of the difficulty it removes is precisely the load through which schema construction occurs (Stadler et al., 2024; Sweller et al., 2019). A mature theory of AI-augmented learning will need to distinguish, more precisely than current frameworks do, between extraneous load that tools should absorb and germane load that learners must retain.

For self-determination theory, the evidence suggests that the same artefact can be autonomy-supportive and autonomy-corrosive depending on the mode of engagement, which invites refinement of how need support is conceptualised for non-human agents (Ryan & Deci, 2000). The relatedness need raises the sharpest questions. Companion chatbot research indicates that perceived relatedness can be partially satisfied by artificial agents (Maples et al., 2024; Xie & Pentina, 2022), yet substitution evidence suggests that such satisfaction may not confer the protective benefits of human connection and may even undermine them (Crawford et al., 2024). Whether machine-provided relatedness is psychologically real, merely palliative, or actively displacing is arguably the most consequential open theoretical question in this field. Finally, for control-value theory (Pekrun, 2006), GenAI introduces a novel appraisal object: students now appraise not only their control over academic tasks but their control relative to machines, and not only the value of achievement but the durability of that value in an automating labour market. Achievement emotion research has yet to incorporate this comparative and anticipatory dimension.

Practical Implications for Universities

Several practical implications follow for institutions such as UNITAR International University and the wider higher education sector. First, AI literacy should be treated as a core psychological intervention, not merely a technical skill. Curricula should explicitly teach the failure modes of GenAI, train verification habits, and cultivate calibrated self-confidence, since confidence in one's own ability, rather than in the tool, predicts sustained critical thinking (Lee et al., 2025; Ng et al., 2021). Second, learning designers should build guardrailed engagement rather than prohibition. The experimental literature is clear that scaffolded AI tutors can preserve benefits while preventing harm (Bastani et al., 2025; Darvishi et al., 2024); blanket bans, by contrast, push use underground, where it is most likely to take the unreflective, answer-seeking form associated with the eroding pathway, while also amplifying integrity anxiety (Cotton et al., 2024; Sullivan et al., 2023).

Third, counselling and student affairs services should update their practice for the GenAI era. Counsellors should routinely ask about AI companionship and dependence when assessing lonely or anxious students, should be prepared to work with career anxiety framed around automation, and should recognise that some students will arrive having first disclosed their distress to a chatbot (Maples et al., 2024; Laestadius et al., 2024). Given the documented shortfall between counselling needs and provision in many systems (Jailani et al., 2025), carefully governed AI-supported triage may have a role, but it must be positioned as a bridge to human care rather than a replacement for it. Fourth, institutions should actively strengthen the human social fabric of study. Because social support buffers academic stress and builds resilience (Mohamed Ibrahim et al., 2025), and because reliance on chatbots for social interaction is associated with weaker human support networks (Crawford et al., 2024), investment in collaborative pedagogy, peer mentoring, and campus community is itself a form of AI risk mitigation. Fifth, assessment reform should be pursued with psychological, not only security, objectives: formats that make students' own thinking visible, such as oral defences, staged drafts, and reflective process documentation, protect integrity while re-anchoring self-efficacy and authorship in the student (Rudolph et al., 2023; Chan, 2023).

Critical Appraisal and Limitations of the Evidence Base

A critical review must also assess the quality of the evidence it synthesises, and here substantial caution is required. First, the field is dominated by cross-sectional surveys and convenience samples, which cannot establish causal direction. It remains plausible, for example, that anxious, procrastinating, or less confident students select into heavier GenAI use, rather than heavy use producing these states; the two-wave design of Abbas et al. (2024) mitigates but does not eliminate this concern. Second, measurement is immature. Many studies rely on single-institution instruments, self-reported critical thinking, or usage measures that conflate radically different behaviours, such as asking for explanations versus generating entire assignments. Third, publication and novelty dynamics likely inflate both alarm and enthusiasm: dramatic findings about cognitive decline or suicide mitigation attract attention, while null results are less visible. The volatility of this literature is underscored by the fact that at least one widely cited meta-analysis of ChatGPT's learning effects has subsequently been retracted, a reminder that individual headline findings in this fast-moving area should be weighted cautiously until they are independently replicated. Fourth, the evidence base is unevenly distributed geographically, with limited longitudinal work in the Global South despite rapid adoption there, and the pace of model development means findings about one system generation may not generalise to the next (Farrokhnia et al., 2024; Lo, 2023). Finally, almost no studies track students across the full arc from enrolment to employment, so claims about long-term skill atrophy or durable wellbeing effects remain, at present, plausible extrapolations rather than demonstrated facts. These limitations do not license complacency, but they do counsel against both moral panic and uncritical techno-optimism.

Directions for Future Research

Five directions appear most urgent. First, longitudinal cohort studies should follow students across semesters and into early careers, measuring GenAI usage modes alongside validated indices of critical thinking, self-efficacy, wellbeing, and performance, in order to disentangle selection from influence. Second, experimental and design-based research should systematically compare engagement modes, testing which scaffolds, delays, and metacognitive prompts shift use from the eroding to the enabling pathway across disciplines and proficiency levels (Bastani et al., 2025; Darvishi et al., 2024). Third, research on AI companionship among students needs both epidemiological and clinical attention: prevalence, attachment-related risk profiles, effects on human relationships, and safe-use guidelines for counselling services (Laestadius et al., 2024; Maples et al., 2024; Xie & Pentina, 2022).

Fourth, cross-cultural research is needed, since constructs such as help-seeking stigma, face concerns, family academic pressure, and collectivist support norms plausibly moderate every pathway in the model, and regional journals are well placed to build this evidence base for Asian contexts (Hambali et al., 2025; Mohamed Ibrahim et al., 2025). Fifth, measurement development should be prioritised: the field needs psychometrically robust instruments that distinguish learning-oriented from substitution-oriented GenAI use, and that capture emerging constructs such as authorship dilution, verification fatigue, and automation-related

career anxiety (Wang & Wang, 2022). Progress on these fronts would allow the next generation of reviews to move from mapping possibilities to quantifying conditional effects.

CONCLUSION

Generative artificial intelligence has moved, in a remarkably short time, from novelty to infrastructure in the lives of university students. This review has argued that its significance is as psychological as pedagogical. Across literature from 2021 to 2026, GenAI emerges as a double-edged psychological technology: capable of scaffolding competence, easing anxiety, and extending support to students whose traditional structures fail to reach, yet equally capable of hollowing out the effortful cognition, self-belief, and human connection on which durable learning and wellbeing depend. The proposed dual-pathway model locates the difference not in the technology itself but in the mode of engagement and in four moderating conditions: AI literacy, self-regulation, social support, and institutional design. The task facing universities is therefore not to decide whether students will live and learn with generative AI, because that question has already been answered, but to shape the conditions under which that cohabitation strengthens rather than diminishes the students themselves. Beyond ChatGPT lies not a particular product but a permanent feature of the cognitive and emotional environment of higher education, and psychology must be at the centre of how that environment is governed.

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Declaration of Interest

The authors declare no conflict of interest.

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