

The psychological impact of generative AI on L2 graduate students' research writing: a mixed-methods investigation

Lei Li

Comillas Pontifical University, Madrid, Spain

avantalee@gmail.com

Abstract. This article introduces a mixed-methods study examining the psychological effects of Generative Artificial Intelligence (GenAI) tools on the research writing processes of English as a Second Language (L2) graduate students. While previous research has highlighted GenAI's benefits for language accuracy and efficiency, its influence on procrastination and anxiety remains underexplored. This proposed study will employ a Randomised Controlled Trial (RCT) combined with qualitative phenomenology to investigate how GenAI tools reshape self-regulation strategies and emotional states during academic writing. Focusing on 120 Chinese graduate students, the research will compare three experimental conditions: GenAI use with AI (Artificial Intelligence) detection protocols, GenAI use without detection, and a non-AI control group. Quantitative data from validated procrastination and anxiety scales will be integrated with reflective journals and semi-structured interviews. The study seeks to enhance theoretical frameworks concerning technology-mediated writing anxiety and guide ethical AI integration policies.

Keywords: GenAI, academic procrastination, L2 writing anxiety, self-regulated learning, experimental design

1. Introduction

Procrastination and anxiety present significant challenges in academic writing, particularly for Second Language (L2) learners navigating linguistic, cultural, and cognitive complexities [1]. Moreover, the emergence of Generative Artificial Intelligence (GenAI) tools, such as ChatGPT, has introduced new dynamics for these L2 learners. While these systems offer the potential to alleviate language-related stress [2], their capacity to exacerbate or reshape procrastination behaviours remains uncertain. This gap is crucial, as procrastination in L2 contexts often originates from perfectionism, evaluation anxiety, and task aversion [3] - factors that GenAI may inadvertently amplify through over-reliance or illusory productivity.

This article outlines a robust methodological framework designed to address the following research questions:

1. How do GenAI tools influence passive, active, and productive procrastination in L2 research writing?
2. What individual (e.g., language proficiency) and contextual (e.g., AI literacy) factors moderate these effects?
3. To what extent does procrastination mediate the relationship between GenAI use and writing anxiety?

2. Theoretical background

2.1. Procrastination in academic writing

Procrastination in academic writing is a multifaceted phenomenon. Passive procrastination refers to delaying the initiation of a writing task due to fear, whereas active procrastination involves a deliberate decision to postpone writing, based on the belief that future conditions will be more conducive to high-quality work [4]. GenAI tools, by automating tasks such as outline development, may initially seem beneficial for passive procrastinators, aligning with self-regulation theory [5]. However, this assistance could impede students who thrive under time constraints. Active procrastination, which can enhance performance through time pressure, contrasts with passive procrastination, which is associated with diminished performance and heightened stress [6]. Recent meta-analytic findings indicate that GenAI reduces the effectiveness of active procrastination on academic performance, decreasing effect sizes from $d = 0.38$ to $d = 0.21$ [7]. This suggests that the potential for stress-inspired creativity is diminished with GenAI. Language anxiety, combined with perfectionism, further complicates the challenges faced by L2 learners [8].

2.2. Anxiety in research writing

Key factors contributing to writing-related anxiety in researchers include the fear of failure, the complexity of the task, and L2 linguistic insecurity [9]. Anxiety and procrastination often create a reinforcing cycle, with anxiety leading to delays and procrastination becoming more pronounced as deadlines approach [10]. GenAI may mitigate anxiety by providing language assistance and generating drafts [11]. However, excessive reliance on these tools can impede skill development and contribute to procrastination [5].

Cognitive-affective models [12] differentiate between two types of anxiety related to writing: surface-level anxiety, concerning technical errors such as punctuation or spelling, and deep-level anxiety, related to the flow of ideas and logical coherence. AI tools can reduce surface-level anxiety by eliminating grammatical and stylistic errors (e.g., a 40% decrease in linguistic errors in drafts written by EFL students). However, while GenAI can enhance the monitoring process, it also presents potential drawbacks, including over-reliance on AI-generated content. Biologically, procrastination often results from anxiety as deadlines approach. Studies suggest that GenAI is likely to lower anxiety among off-campus learners by providing linguistic information and correction. However, these findings also correlate with higher utilisation rates of GenAI ($\alpha = 0.42, p < 0.01$), which is associated with academic suspension.

2.3. Generative AI in research writing

GenAI tools are valuable in second language writing, simplifying content generation, ensuring language precision, and reducing cognitive load [5]. Furthermore, GenAI can enhance authors' self-confidence and reduce apprehension when speaking in public [13]. However, over-dependence on GenAI, rather than fostering original thought, can hinder comprehension, as seen in EFL learners who prioritise fluency over coherence when using GenAI [14]. For example, GenAI provides numerous ideas simultaneously, potentially shortening the preparation period and reducing time for broad, critical thinking [15]. Human-AI collaboration models [3] suggest that 'augmented writing,' or human-led reviewing, outperforms algorithms in terms of quality ("OR" = 2.17, 95% CI = 1.89–2.49) [16].

A significant gap in the literature is the absence of randomised controlled trials demonstrating the causal effects of mutual AI. Furthermore, personal characteristics (e.g. AI literacy) and contextual factors (e.g. academic discipline) likely influence these effects, necessitating further investigation [17].

3. Methodology

3.1. Design overview

This study employs a sequential mixed-methods design, integrating a randomised controlled trial (RCT) with a qualitative phenomenological approach. The RCT will involve 120 Chinese postgraduate students enrolled in an English for Research Publication course, randomly assigned to three experimental conditions:

1. Group 1 (AI with Detection): Participants will use GenAI tools (e.g., ChatGPT) to draft and refine the Introduction section of an empirical research paper required for the course, with AI detection protocols (e.g., Turnitin AI detection) activated to monitor AI-generated content.
2. Group 2 (AI without Detection): Participants will use GenAI tools without AI detection, simulating a 'low-stakes' environment for drafting the same section.
3. Group 3 (Non-AI Control): Participants will draft the Introduction section using traditional tools (e.g., Grammarly for grammar checks, without Generative AI).

3.2. Procedure

Pre-intervention Phase: All participants will complete baseline assessments, including the Academic Procrastination Scale (APS) and the Second Language Writing Anxiety Inventory (SLWAI). Demographic data (e.g., English proficiency scores, and prior AI experience) will also be collected.

Intervention Phase: Over 12 weeks, participants will iteratively develop the Introduction section of their empirical research paper, guided by structured milestones:

- Weeks 1–3: Literature review synthesis and drafting of initial arguments.
- Weeks 4–6: Refinement of research gaps and hypothesis formulation.
- Weeks 7–9: Structural coherence and language polishing.
- Weeks 10–12: Final revisions based on peer/instructor feedback.

Groups 1 and 2 will attend a 90-minute workshop on ethical GenAI use (e.g., avoiding plagiarism, and critical evaluation of AI outputs), while Group 3 will receive equivalent training on traditional academic writing strategies.

3.3. Analytical plan

Quantitative Analysis:

1. ANOVA: To determine differences in posttest procrastination and anxiety scores among groups.
2. Multiple Regression: To incorporate moderators such as language proficiency and AI literacy.
3. Mediation Analysis (PROCESS v4.2): To examine the mediating role of AI-related procrastination in anxiety pathways.

Qualitative Analysis:

1. Thematic Coding (NVivo 14): To identify themes such as “AI as a crutch” and “illusory progress” in journals and interviews.
2. Triangulation: To corroborate quantitative trends with qualitative narratives.

3.4. Benefits of the design

The design offers several benefits:

Task Authenticity: By focusing on a single, high-stakes academic task (the Introduction section), the design mirrors real-world second language (L2) writing demands, enhancing its validity.

Process-Oriented Insights: Tracking iterative drafting phases allows for granular analysis of how Generative AI (GenAI) tools influence procrastination and anxiety at different writing stages.

Balanced Rigour: Combining AI detection protocols (Group 1) with unrestricted use (Group 2) provides nuanced insights into ethical and practical trade-offs.

3.5. Ethical considerations

Data will be anonymised, and participants can withdraw consent at any time. Privacy concerns will be addressed.

AI detection results from Group 1 will be used solely for research purposes and will not impact academic standing.

4. Anticipated contributions

4.1. Theoretical implications

1. AI-driven Procrastination Typology Expansion: Identify new manifestations of procrastination resulting from AI, such as “algorithmic busywork.”

2. Dynamics of Anxiety: Distinguish anxiety arising from language-specific issues from meta-cognitive apprehension in AI-assisted writing.

4.2. Practical applications

1. AI Application Guidelines: Develop strategies for balancing efficiency and skill development based on synthesised evidence.

2. Pedagogical Tools: Design AI literacy courses for integration into educational curricula to mitigate over-reliance.

4.3. Methodological innovation

RCT-Embedded Mixed Design: Improve causal inferences using a methodologically rigorous approach.

Triangulation Framework: Consolidate diverse data (journals, interviews, usage analytics) to indicate behavioural changes.

5. Potential limitations

1. Narrow Focus: The essay’s limited scope, focusing only on the introduction section, may not fully capture the impact of GenAI on other stages of research writing, such as the Methodology or Discussion sections.

2. Contextual Limitations: The study represents students from a single discipline and course, potentially limiting generalisability. Different fields, such as STEM and the humanities, may encounter distinct challenges.

3. Intervention of Feedback: Feedback from peers and instructors may obscure the specific impact of GenAI.

4. Potential for Bias: The adoption of reflective journals introduces the risk of social desirability bias, as participants may consciously understate their reliance on AI to align with assumed ethical norms.

5. Temporal Constraints: The study’s 12-week duration limits the ability to assess the long-term effects of AI use, potentially overlooking future outcomes such as declines in critical thinking skills.

6. Conclusion

This paper addresses the role of GenAI tools in the learning processes of L2 students, focusing on the psychological and behavioural changes that occur when these tools are used in academic writing. More particularly, this chapter discusses the role played by GenAI in composing the Introduction section of a scientific article. However, through a real assignment which contains all aspects of this interaction - such as assistance from AI, procrastination tendencies, and the triggering of anxiety - it becomes easier to comprehend these dynamics. The key contributions of this study are:

Stage-Based Knowledge: Recognising the differences in the tasks when using GenAI at various stages of writing (e.g., the beginning versus the end) and its impact on the different types of procrastination (active versus passive).

Ethical Dimensions: Academia often highlights the tension between AI tools that assist in detecting copied material and the promotion of self-authorship in educational contexts where originality is encouraged.

Concrete Plans: Strategies that can be put in place for bringing GenAI into L2 writing instruction, including phased AI use (e.g., a complete ban on AI for proofreading) to prevent over-reliance.

Quantitatively, the mixed methods incorporated in the Randomised Controlled Trial (RCT) strengthen causal inference in educational technology research. Thus, by examining a single composed task in depth, a more thorough analysis can be conducted. Future research will particularly focus on the long-term effects, cross-disciplinary comparisons, and the adaptation of AI tools to the metacognitive needs of L2 learners. Finally, this study highlights the unavoidable fact that pedagogical goals must be considered alongside efficiency if AI-driven interaction is to lead to success in higher education.

References

- [1] Steel, P., & Klingsieck, K. B. (2016). Academic procrastination: Psychological antecedents revisited. *Aust. Psychol.*, 51(1), 36–46. <https://doi.org/10.1111/ap.12173>
- [2] Yan, D. (2023). Impact of ChatGPT on learners in a L2 writing practicum: An exploratory investigation. *Educ. Inf. Technol.*, 28(11), 13943–13967. <https://doi.org/10.1007/s10639-023-11742-4>
- [3] Nguyen, A., Hong, Y., Dang, B., & Huang, X. (2024). Human-AI collaboration patterns in AI-assisted academic writing. *Stud. High. Educ.*, 49(5), 847–864. <https://doi.org/10.1080/03075079.2024.2323593>
- [4] Chu, A. H. C., & Choi, J. N. (2005). Rethinking procrastination: Positive effects of “Active” procrastination behavior on attitudes and performance. *J. Soc. Psychol.*, 145(3), 245–264. <https://doi.org/10.3200/socp.145.3.245-264>
- [5] Kitsantas, A., & Zimmerman, B. J. (2008). College students’ homework and academic achievement: The mediating role of self-regulatory beliefs. *Metacogn. Learn.*, 4(2), 97–110. <https://doi.org/10.1007/s11409-008-9028-y>
- [6] Ferrari, J. R., Johnson, J., & McCown, W. G. (1995). *Procrastination and Task Avoidance: Theory, Research, and Treatment*. <http://ci.nii.ac.jp/ncid/BA27097459>
- [7] Kooren, N. S., Van Nooijen, C., & Paas, F. (2024). The influence of active and passive procrastination on Academic Performance: A Meta-Analysis. *Educ. Sci.*, 14(3), 323. <https://doi.org/10.3390/educsci14030323>
- [8] Saplavskaya, J., & Jerkunkova, A. (2018). Academic procrastination and anxiety among students. *Eng. Rural Dev.* <https://doi.org/10.22616/erdev2018.17.n357>
- [9] Tahmouresi, S., & Papi, M. (2021). Future selves, enjoyment and anxiety as predictors of L2 writing achievement. *J. Second Lang. Writ.*, 53, 100837. <https://doi.org/10.1016/j.jslw.2021.100837>
- [10] Rothblum, E. D., Solomon, L. J., & Murakami, J. (1986). Affective, cognitive, and behavioral differences between high and low procrastinators. *J. Couns. Psychol.*, 33(4), 387–394. <https://doi.org/10.1037/0022-0167.33.4.387>
- [11] Escalante, J., Pack, A., & Barrett, A. (2023). AI-generated feedback on writing: insights into efficacy and ENL student preference. *Int. J. Educ. Technol. High. Educ.*, 20(1). <https://doi.org/10.1186/s41239-023-00425-2>
- [12] Cassady, J. C., & Johnson, R. E. (2002). Cognitive test anxiety and academic performance. *Contemp. Educ. Psychol.*, 27(2), 270–295. <https://doi.org/10.1006/ceps.2001.1094>
- [13] Tram, N. H. M., Nguyen, T. T., & Tran, C. D. (2024). ChatGPT as a tool for self-learning English among EFL learners: A multi-methods study. *System*, 127, 103528. <https://doi.org/10.1016/j.system.2024.103528>
- [14] Polakova, P., & Ivenz, P. (2024). The impact of ChatGPT feedback on the development of EFL students’ writing skills. *Cogent Educ.*, 11(1). <https://doi.org/10.1080/2331186x.2024.2410101>
- [15] Joo, S. H. (2024). Generative AI as Writing or Speaking Partners in L2 Learning: Implications for Learning-Oriented Assessments. *Stud. Appl. Linguist. TESOL*, 24(1). <https://doi.org/10.52214/salt.v24i1.12865>
- [16] Chambers, L., & Owen, W. J. (2024). The efficacy of GenAI tools in postsecondary education. *Brock Educ. J.*, 33(3). <https://doi.org/10.26522/brocked.v33i3.1178>
- [17] Güvendir, E., & Uzun, K. (2023). L2 writing anxiety, working memory, and task complexity in L2 written performance. *J. Second Lang. Writ.*, 60, 101016. <https://doi.org/10.1016/j.jslw.2023.101016>