The Study of the Correlation between AI-Assisted EFL Writing Frequency and Writing Anxiety among Chinese University Students

Ziqian Yu[1,a,*]

[1]School of Foreign Languages, Minzu University of China, Beijing, China
[a]yuziqian0324@163.com
[*]Corresponding author

Abstract: The integration of artificial intelligence (AI) in educational contexts has introduced new dynamics in second language acquisition, particularly concerning writing anxiety among Chinese university students. This study examines the correlation between AI-assisted English as a Foreign Language (EFL) writing frequency and writing anxiety. A comprehensive questionnaire survey, utilizing Cheng's Second Language Writing Anxiety Inventory (SLWAI), was conducted among 115 students. Descriptive statistics, correlation, and regression analyses were performed using SPSS to evaluate cognitive anxiety, avoidance behavior, somatic anxiety, and the frequency of AI-assisted writing. The results indicate a significant positive correlation between the frequency of AI-assisted writing and all forms of writing anxiety, highlighting that frequent AI use corresponds with increased anxiety levels. These findings suggest that while AI tools can aid in completing writing tasks, they may also foster dependency and hinder the development of independent writing skills. It is crucial for educators to support students in building confidence and reducing AI reliance, ultimately enhancing their academic performance and adaptability in future professional environments.

Keywords: Writing anxiety, Second language acquisition, AI-assisted writing, EFL teachers

1. Introduction

1.1 Research Background

The intelligent era has ushered in a significant shift in second language acquisition and teaching. Writing anxiety, a prevalent issue among Chinese university students, has garnered considerable attention from scholars worldwide. However, despite extensive studies on writing anxiety, research exploring the correlation between writing anxiety and the frequency of AI-assisted second language writing remains sparse. The increasing integration of artificial intelligence in educational contexts presents a new perspective for investigating how AI impact students' emotional and academic experiences in language acquisition.

1.2 Research Objectives

This study aims to analyze the relationship between English writing anxiety and the frequency of AI-assisted second language writing among Chinese university students through a comprehensive questionnaire survey. The data will be analyzed using correlation and regression analysis methods available in the SPSS statistical software. The primary objectives of this study are as follows:

(1) To explore the relationship between English writing anxiety and the frequency of AI-assisted second language writing among Chinese university students.

(2) To provide insights and recommendations for English writing instruction and learning in the new intelligent era based on the current state of writing anxiety. These insights aim to enhance English writing instruction and learning, thereby improving students' writing efficiency and performance.

1.3 Research Significance

(1) Theoretical Significance: While numerous researchers have studied writing anxiety, the

correlation between writing anxiety and the frequency of AI-assisted second language writing remains underexplored in the context of the emerging intelligent era. This study contributes to the existing body of research on writing anxiety by examining its relationship with AI-assisted writing, thereby enriching the theoretical framework of writing anxiety research.

(2) Practical Significance: This study aims to elevate the awareness of English teachers and Chinese students regarding English writing anxiety. By understanding the deficiencies in their current practices, educators and students can leverage AI-assisted second language writing tools to mitigate anxiety. Consequently, this can lead to improved English writing performance and a reduction in writing anxiety, fostering a more effective and supportive learning environment.

2. Literature review

Daly and Miller (1975) define English writing anxiety as a state of anxious behavior exhibited by learners during the writing process, manifesting in actions such as avoiding writing tasks and worrying about others' evaluations of their written work. Krashen (1981) posits that learners tend to experience higher levels of anxiety when writing in L2 compared to writing in their L1.

Researchers have struggled to establish a clear relationship between anxiety and foreign language achievement, with mixed results in quantifying the effects of anxiety on language learning. While research has not definitively proven the direct effect of anxiety on language learning, there is a recognized need to further explore the relationship between foreign language anxiety and proficiency. (Horwitz et al., 1986: 125). Research by MacIntyre and Gardner demonstrates a negative correlation between language anxiety and memory recall, suggesting that anxiety can impact various aspects of language learning. They argue that affective variables, like language anxiety, are not merely side effects but can play a causal role in individual differences in language achievement, challenging the linguistic coding deficit hypothesis proposed by Sparks and Ganschow (Macintyre, 1995: 90). A study by Tran Thi Thu Trang, Richard B. Baldauf and Karen Moni (2012) found that approximately two-thirds of the students suffered from Foreign Language Anxiety (FLA) to some degree, while the teachers did not attribute adequate importance to it. Factors contributing to FLA included students feeling anxious about their English language studies, with some students associating anxiety with concerns about their academic progress. FLA significantly affects the majority of students and underscores the importance of addressing it in language teaching practices (Tran et al., 2012: 238). In early research on the impact of anxiety in L2 writing, the Foreign Classroom Language Anxiety Scale (FLCAS) were used to measure L2 anxiety. The results showed that L2 writing anxiety is different from L2 speaking anxiety, measured using FLCAS (Horwitz et al., 1986: 129). Besides, L2 writing anxiety negatively predicted the students' grade in both speaking and writing courses. Later, Cheng (2004, 2017) created the Second Language Writing Anxiety Inventory (SLWAI), which has become the most commonly utilized tool in L2 writing anxiety studies.

In the new intelligent era of rapid development of artificial intelligence, some researchers have also explored the issue that AI chatbot-based instruction reduces students' anxiety about learning English writing (Hawanti & Zubaydulloevna, 2023: 182). Besides, EFL instructors at universities are enthusiastic about using ChatGPT in writing lessons (Nguyen, 2023: 1). However, there is no quantitative study on the relationship between the frequency of using AI-assisted L2 writing and writing anxiety. This study aims to analyze the correlation between the two using Chinese college students as an example.

3. Methodology

This study investigates the correlation between the use of AI-assisted English writing and English writing anxiety among Chinese university students through a comprehensive questionnaire survey. The data analysis was conducted using descriptive statistics, correlation, and regression analysis in SPSS 24.0.

3.1 SPSS statistic analysis

Firstly, the study employed descriptive statistics to analyze the overall situation of English writing anxiety among university students using AI-assisted writing. The analysis focused on four primary indicators: cognitive anxiety, avoidance behavior, somatic anxiety, and the frequency of AI-assisted

writing use. The sample size, minimum and maximum values, mean, standard deviation, and median were analyzed to gain a deeper understanding of students' performance and trends in these areas.

Secondly, Pearson correlation analysis was conducted on the four indicators: frequency of AI-assisted writing use, cognitive anxiety, avoidance behavior, and somatic anxiety.

3.2 The questionnaire based on SLWAI

The English writing anxiety measurement was based on Cheng's (2004) Chinese version of the Second Language Writing Anxiety Inventory (SLWAI), which has been widely used by domestic scholars and has demonstrated good reliability and validity. The questionnaire consists of 22 items, addressing anxiety resulting from somatic, cognitive, and avoidance behaviors. Specifically, there are seven items on somatic anxiety, eight on cognitive anxiety, and seven on avoidance behavior anxiety.

To incorporate the variable "frequency of AI-assisted English writing use," an additional item was included in the questionnaire. The original phrasing of "writing English essays" was modified to "using AI to assist in writing English essays" to better fit the context of this study. The questionnaire items were rated on a five-point Likert scale: strongly disagree, disagree, neutral, agree, and strongly agree, scored from 1 to 5, respectively. Higher scores indicated higher levels of English writing anxiety, and vice versa. The reliability coefficient of the questionnaire was 0.843, indicating good reliability and validity.

4. Results and discussion

4.1 Descriptive Analysis of Variables

Table 1: Frequency Analysis Results

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Usage Frequency	6.09	9.57	16.52	46.09	21.74
2.When I do not use AI assistance to write English essays within a limited time, my thoughts become disorganized.	10.43	14.78	22.61	31.3	20.87
3.When I do not use AI assistance to write English essays within a limited time, I often feel panic.	12.17	11.3	23.48	34.78	18.26
4.When I do not use AI assistance to write English essays within a limited time, I become so nervous that I tremble or sweat.	16.52	26.09	13.04	31.3	13.04
5.When I do not use AI assistance to write English essays within a limited time, my heart beats rapidly.	19.13	20.87	15.65	25.22	19.13
6.When I do not use AI assistance to write English essays, I feel stiff	20.87	24.35	13.91	27.83	13.04

and tense all over.					
7.If I am suddenly required to write an English essay without AI assistance, my mind goes blank.	18.26	20	12.17	32.17	17.39
8.When I write in English without AI assistance, my mind often goes blank.	18.26	14.78	14.78	32.17	20
9.If I am required to write an English essay without AI assistance, I will find excuses not to write.	20	24.35	15.65	23.48	16.52
10.Whenever possible, I try not to use AI assistance to write English essays.	17.39	25.22	18.26	26.96	12.17
11.I often seek any opportunity outside of class to practice writing English essays without AI assistance.	21.74	30.43	23.48	20.87	3.48
12.I often independently write my thoughts in English.	19.13	31.3	20	22.61	6.96
13.Without AI assistance, I usually avoid writing in English as much as possible.	7.83	25.22	20.87	33.04	13.04
14.Unless there is no other choice, I will not write English essays independently.	10.43	16.52	23.48	33.04	16.52
15.I will avoid situations where I have to write English essays without AI assistance as much as possible.	4.35	16.52	26.09	42.61	10.43
16.I am not at all concerned about how others will evaluate my English essays.	22.61	35.65	14.78	22.61	4.35
17.I am not at all worried about receiving a low score.	29.57	33.91	16.52	13.91	6.09

18.I am not worried that my independently written English essays will be much worse than others'.	26.09	21.74	15.65	29.57	6.96
19.I am very worried that other students will laugh at my English essays written without AI assistance.	18.26	23.48	18.26	26.09	13.91
20.I am very afraid that my English essay written without AI assistance will be selected as a class discussion example.	20	17.39	15.65	29.57	17.39
21.I do not feel nervous when using AI assistance to write English essays.	3.48	10.43	28.7	38.26	19.13
22.If I know my essay will be reviewed by the teacher, I am very worried that my English essay written without AI assistance will get a bad grade.	6.96	20.87	19.13	33.91	19.13
23.If I know my essay written without AI assistance will be reviewed by the teacher, I feel worried and uneasy.	12.17	22.61	22.61	23.48	19.13

This survey analyzed students' feelings and behavioral responses when writing English essays with and without AI assistance within a limited time. Table 1 shows the results of the questionnaire survey. Frequency analysis of multiple indicators provides the following conclusions:

(1) Usage Frequency: Data shows that 46.09% of students frequently use AI assistance for writing English essays, and 21.74% strongly agree with frequent usage. Only 6.09% strongly disagree with using AI assistance. This indicates that the majority of students have a positive attitude towards using AI assistance and often rely on this tool.

(2) Feelings Without AI Assistance: When writing without AI assistance, 31.3% of students report their thoughts become disorganized, 34.78% feel panic, 31.3% tremble or sweat with nervousness, and 27.83% feel stiff and tense all over. Additionally, 32.17% say their minds go blank, indicating many students feel very anxious and nervous without AI assistance.

(3) Psychological Reactions: Without AI assistance, 25.22% of students experience rapid heartbeats, and 32.17% say their minds stop working. Furthermore, 33.04% avoid writing in English whenever possible, indicating high levels of anxiety. 23.48% make excuses not to write, reflecting an avoidance mentality when faced with writing tasks.

(4) Dependence on AI Assistance: Data shows that 42.61% of students try to avoid situations where they have to write without AI assistance, and 30.43% do not practice independent writing outside of class, indicating high dependence on AI assistance. Additionally, 33.04% say they will not write

independently unless there is no other choice, reflecting a lack of confidence in independent writing.

(5) Concern About Evaluation: Many students worry about others' evaluations of their independent writing. 33.91% fear getting a bad grade without AI assistance, 26.09% worry about being laughed at by classmates, and 29.57% fear their essays being selected for class discussion. These data indicate a lack of confidence in their writing ability and fear of negative evaluation.

(6) Feelings With AI Assistance: Compared to the anxiety without AI assistance, 38.26% of students do not feel nervous when using AI assistance, and 19.13% strongly agree with this. This indicates that AI assistance alleviates students' nervousness and boosts their writing confidence to some extent.

Overall, students exhibit a high dependence and trust in AI assistance for writing. Many students feel nervous, disorganized, and panicky when writing without AI assistance within a limited time, showing significant psychological stress and anxiety. Students lack confidence in independent writing, worry about receiving poor evaluations and grades, and tend to rely on AI tools to complete writing tasks. These results suggest that English writing instruction should focus on addressing students' psychological stress and building confidence, helping them gradually reduce dependence on AI assistance and enhance their independent writing skills and confidence. Educators can guide students to complete writing tasks independently, provide positive feedback and support, and help them overcome writing anxiety and build confidence. This will help students better apply and demonstrate their English writing skills in academic and professional development.

Table 2: Basic Indicators

Item	Sample Size	Min	Max	Mean	SD	Median
Cognitive Anxiety	115	1.000	4.125	2.957	0.649	3.000
Avoidance Behavior	115	1.714	4.286	2.985	0.595	3.000
Somatic Anxiety	115	1.000	5.000	3.135	1.185	3.286
Usage Frequency	115	1.000	5.000	3.678	1.105	4.000

In table 2, we analyzed the basic data of four basic indicators: cognitive anxiety, avoidance behavior, somatic anxiety, and AI-assisted writing usage frequency. By analyzing statistical indicators such as sample size, minimum value, maximum value, mean, standard deviation, and median, we can gain an in-depth understanding of the level and distribution of these indicators.

The cognitive anxiety score ranges from 1.000 to 4.125, with an average of 2.957, indicating a medium level of cognitive anxiety. The standard deviation is 0.649, suggesting moderate variability. The median is 3.000, consistent with the mean, indicating that students' cognitive anxiety levels are generally consistent with the average.

The avoidance behavior score ranges from 1.714 to 4.286, with an average of 2.985, indicating a medium level of avoidance behavior. The standard deviation is 0.595, suggesting moderate variability. The median is 3.000, consistent with the mean, indicating that students' avoidance behavior levels are generally consistent with the average.

The somatic anxiety score ranges from 1.000 to 5.000, with an average of 3.135, indicating a relatively high level of somatic anxiety. The standard deviation is 1.185, suggesting higher variability. The median is 3.286, slightly higher than the mean, indicating that students' somatic anxiety levels are generally higher than the average.

The usage frequency score ranges from 1.000 to 5.000, with an average of 3.678, indicating a high usage frequency. The standard deviation is 1.105, suggesting higher variability. The median is 4.000, slightly higher than the mean, indicating that students' usage frequency is generally higher than the average.

Overall, these statistical indicators provide a comprehensive understanding of the levels and distribution of cognitive anxiety, avoidance behavior, somatic anxiety, and usage frequency. These

findings suggest that many students experience significant cognitive and somatic anxiety and engage in avoidance behavior when writing without AI assistance. However, they frequently use AI assistance to alleviate these anxieties. These insights can guide educators in addressing students' psychological stress and building their confidence in independent writing.

4.2 Correlation Analysis

Table 3: Pearson Correlation

	Usage Frequency	Cognitive Anxiety	Avoidance Behavior	Somatic Anxiety
Usage Frequency	1			
Cognitive Anxiety	0.201*	1		
Avoidance Behavior	0.265**	0.546**	1	
Somatic Anxiety	0.644**	0.555**	0.508**	1
* $p<0.05$ ** $p<0.01$				

In this survey of students, it conducted a Pearson correlation analysis on four variables: frequency of using AI-assisted writing tools, cognitive anxiety, avoidance behavior, and somatic anxiety. Table 3 is the result of Pearson correlation analysis. The primary findings from this analysis elucidate the strength and direction of relationships among these psychological and behavioral indicators, providing essential insights into students' mental states and behavioral responses during the English writing process.

4.2.1 Relationship Between Usage Frequency and Other Variables

The frequency of using AI-assisted writing tools shows a significant positive correlation with all three other variables, with the strongest correlation being with somatic anxiety (0.644**). This suggests that students who frequently use AI-assisted writing tools tend to experience higher levels of somatic anxiety during the writing process. This heightened anxiety may stem from a lack of confidence in their writing abilities, prompting a greater reliance on AI tools to alleviate their stress. Additionally, the correlation with avoidance behavior (0.265**) and cognitive anxiety (0.201*) indicates that students who frequently use AI-assisted writing tools are also more likely to exhibit avoidance behavior and cognitive anxiety.

4.2.2 Relationship Between Cognitive Anxiety and Other Variables

Cognitive anxiety is strongly correlated with both avoidance behavior (0.546**) and somatic anxiety (0.555**), indicating that cognitive anxiety is closely linked to students' avoidance behaviors and somatic anxiety. Students with high cognitive anxiety are more likely to exhibit avoidance behaviors and experience higher levels of somatic anxiety during the writing process. This underscores the importance of addressing cognitive anxiety in educational and psychological interventions.

4.2.3 Relationship Between Avoidance Behavior and Other Variables

The correlation between avoidance behavior and somatic anxiety is 0.508**, suggesting that students who tend to avoid writing tasks are also more likely to experience somatic anxiety symptoms such as increased heart rate and sweating. This positive correlation indicates that avoidance behavior is not just a psychological response but is also accompanied by noticeable physiological reactions. Additionally, the correlation between avoidance behavior and cognitive anxiety (0.546**) reveals a significant mutual influence, with high levels of avoidance behavior typically associated with high levels of cognitive anxiety.

4.2.4 Relationship Between Somatic Anxiety and Other Variables

Somatic anxiety is significantly positively correlated with usage frequency (0.644**), cognitive anxiety (0.555**), and avoidance behavior (0.508**). This demonstrates that somatic anxiety plays a crucial role in the writing process and is closely related to students' cognitive and behavioral responses.

Students with high somatic anxiety are more likely to frequently use AI-assisted writing tools to mitigate their writing stress, and they also display higher levels of cognitive anxiety and avoidance behavior.

In conclusion, the frequent use of AI-assisted writing tools during the English writing process is significantly positively correlated with cognitive anxiety, avoidance behavior, and somatic anxiety. The strong correlation between somatic anxiety and usage frequency indicates that students experiencing higher levels of somatic anxiety are more inclined to rely on AI tools. These findings suggest that educators should pay close attention to students' emotional and psychological responses, offering appropriate support and guidance to help reduce anxiety and enhance independent writing skills. Moreover, by providing psychological counseling and training, educators can help lower students' cognitive anxiety and avoidance behaviors, boosting their confidence in writing. Ultimately, these measures will not only improve students' academic performance but also equip them with better adaptability and confidence for their future careers and personal development.

4.3 Analysis of Variances

Table 4: Results of Variance Analysis

	Usage Frequency					*F*	*p*
	Never	Rarely	Occasionally	Usually	Frequently		
Cognitive Anxiety	2.88±0.71	2.65±0.52	2.55±0.71	3.18±0.59	2.96±0.57	4.597	0.002**
Avoidance Behavior	2.59±0.42	2.61±0.65	2.77±0.53	3.20±0.52	2.96±0.65	4.794	0.001**
Somatic Anxiety	1.47±0.48	2.06±0.72	2.17±0.78	3.57±1.00	3.90±0.82	23.800	0.000**
* *p*<0.05 ** *p*<0.01							

Table 4 shows the results of variance analysis. The analysis of variance (ANOVA) conducted to explore the relationship between the frequency of using AI-assisted writing tools and students' cognitive anxiety, avoidance behavior, and somatic anxiety revealed significant differences across different usage frequency groups ($p < 0.01$). The detailed findings are as follows:

(1) Cognitive Anxiety: The mean cognitive anxiety levels varied with the frequency of AI-assisted writing tool usage. The mean values were 2.88 ± 0.71 for the 'never use' group, 2.65 ± 0.52 for the "rarely use" group, 2.55 ± 0.71 for the 'occasionally use' group, 3.18 ± 0.59 for the "usually use" group, and 2.96 ± 0.57 for the "frequently use" group. The ANOVA results indicated a significant difference in cognitive anxiety across these groups (F = 4.597, p = 0.002). Students who usually used AI-assisted writing tools exhibited the highest cognitive anxiety, which might be attributed to their reliance on these tools and the anxiety experienced during independent writing.

(2) Avoidance Behavior: Similarly, the mean values for avoidance behavior increased with the frequency of tool usage. The "never use" group had a mean value of 2.59 ± 0.42, the "rarely use" group 2.61 ± 0.65, the "occasionally use" group 2.77 ± 0.53, the "usually use" group 3.20 ± 0.52, and the "frequently use" group 2.96 ± 0.65. The ANOVA results revealed a significant difference in avoidance behavior among the groups (F = 4.794, p = 0.001). Students who usually used AI-assisted writing tools showed the highest levels of avoidance behavior, indicating a tendency to evade writing tasks or over-rely on AI tools.

(3) Somatic Anxiety: The difference in somatic anxiety across usage frequency groups was particularly pronounced. The mean values were 1.47 ± 0.48 for the 'never use' group, 2.06 ± 0.72 for the 'rarely use' group, 2.17 ± 0.78 for the 'occasionally use' group, 3.57 ± 1.00 for the "usually use" group, and 3.90 ± 0.82 for the "frequently use" group. The ANOVA results indicated an extremely significant difference in somatic anxiety among the groups (F = 23.800, p = 0.000). Students who

frequently used AI-assisted writing tools experienced the highest levels of somatic anxiety, possibly due to their heightened nervousness and unease when writing without AI assistance.

The results of the ANOVA indicate a significant relationship between the frequency of using AI-assisted writing tools and levels of cognitive anxiety, avoidance behavior, and somatic anxiety among students. Those who usually and frequently used AI-assisted writing tools demonstrated higher levels of cognitive anxiety, avoidance behavior, and somatic anxiety. These findings suggest that while AI tools can aid in completing writing tasks, they may also lead to increased dependence and decreased confidence in independent writing. Educators should be mindful of students' psychological states and work to reduce their dependence on AI tools, thereby enhancing their confidence and ability in independent writing. Providing appropriate support and guidance is essential for helping students overcome writing anxiety and fostering their independent thinking and writing skills, which are crucial for improving overall writing proficiency and academic performance.

5. Conclusion

In conclusion, this study reveals a significant correlation between the frequency of AI-assisted English writing and writing anxiety among Chinese university students. The findings indicate that students who frequently use AI tools for writing experience higher levels of cognitive anxiety, avoidance behavior, and somatic anxiety. This reliance on AI assistance underscores a lack of confidence in independent writing abilities, leading to increased psychological stress when AI tools are unavailable. Consequently, it is imperative for educators to address these anxieties by fostering students' independent writing skills and confidence. By providing psychological support and encouraging gradual reduction in AI dependency, educators can help students achieve better academic performance and prepare them for future professional challenges.

References

[1] Cheng, Y. S. (2004). A measure of second language writing anxiety: Scale development and preliminary validation. Journal of Second Language Writing, 13(4), 313–335.

[2] Cheng, Y. S. (2017). Development and preliminary validation of four brief measures of L2 language-skill-specific anxiety. System, 68, 15–25.

[3] Daly, J. A., & Miller, M. D. (1975). The Empirical Development of an Instrument to Measure Writing Apprehension. Research in the Teaching of English, 9(3), 242–249.

[4] Hawanti, S., & Zubaydulloevna, K. M. (2023). AI chatbot-based learning: alleviating students' anxiety in English writing classroom. Bulletin of Social Informatics Theory and Application, 7(2), 182–192.

[5] Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign Language Classroom Anxiety. The Modern Language Journal, 70(2), 125–132.

[6] Krashen, S. (1981). Second language acquisition. Second Language Learning, 3(7), 19-39.

[7] Macintyre, P. D. (1995). How Does Anxiety Affect Second Language Learning? A Reply to Sparks and Ganschow. The Modern Language Journal, 79(1), 90–99.

[8] Nguyen, T. T. H. (2023). EFL Teachers' Perspectives toward the Use of ChatGPT in Writing Classes: A Case Study at Van Lang University. International Journal of Language Instruction, 2(3), 1–47.

[9] Tahmouresi, S., & Papi, M. (2021). Future selves, enjoyment and anxiety as predictors of L2 writing achievement. Journal of Second Language Writing, 53, 100837.

[10] Tran, T. T. T., Baldauf, R. B., & Moni, K. (2012). Foreign Language Anxiety: Understanding Its Status and Insiders' Awareness and Attitudes. TESOL Quarterly, 47(2), 216–243.