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A Meta-analysis of the Relationship Between Foreign Language Anxiety and Academic Achievement

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Abstract— *For nearly 40 years, research on foreign language anxiety (FLA) has received consistent attention from the academic community. However, the results of studies on the relationship between FLA and L2 academic achievement have been inconsistent, and previous meta-analysis results have also been divergent. Therefore, this study uses a meta-analysis method to integrate 79 independent effect sizes from 39 relevant studies, involving a total of 15,447 L2 learners. The aim is to discuss the relationship between FLA and L2 academic achievement, and to examine the overall effect size and the moderating effects of relevant influencing factors. The study finds that there is a moderately negative correlation between FLA and L2 academic achievement ($r = -0.34$). The results of the moderator variable analysis show that educational level, anxiety types, test types, learning environment have moderating effects of different degrees on the relationship between FLA and L2 academic achievement. However, assessment form, target language, gender, and year of learning do not have moderating effects. The research results can provide a reference for research on FLA and FL teaching practice.*

Keywords— ***Foreign language anxiety, L2 academic achievement, meta-analysis***

I. INTRODUCTION

Foreign language anxiety (FLA) is a crucial factor significantly influencing L2 learning and its outcomes. Since the publication of the groundbreaking paper on FLA research by Horwitz et al. (1986), this field has witnessed rapid development in both theoretical and empirical research. Many scholars have carried out extensive research on the relationship between FLA and L2 academic achievement, and a continuous stream of relevant research results have emerged (Khajavy et al, 2024; Li, 2015; Papa, 2010; Teimouri, 2017; Wei et al., 2024).

In recent years, with the increasing richness of empirical research (Khajavy et al, 2018; Teimouri, 2021), scholars have successively published a number of meta-analyses on the relationship between FLA and L2academic performance (Botes et al., 2020; Dong, 2021; Teimouri et al., 2019; Zhang, 2019). However, despite these numerous studies, research conclusions regarding the relationship between the two still diverge. On one hand, as time progresses, new scientific empirical research is emerging continuously, and its conclusions urgently need to be incorporated into a comprehensive analysis. On the other hand, the moderating variables that affect the relationship between FLA and L2 academic achievement have not been fully explored and still require further refinement and in-depth research.

In view of this, this study employs the meta-analysis method to delve deeper into the relationship between FLA and L2 academic achievement. By integrating the latest research findings, this study aims to elucidate the relationship from a more novel and comprehensive perspective, thus providing a more accurate and thorough understanding of this field. Meanwhile, it is hoped that this study can offer more targeted guidance for FL teaching practice.

II. LITERATURE REVIEW

Research on FLA and its relationship to FL academic achievement has been extensive, yet with inconsistent findings. This section delves into two aspects: the relationship between FLA and FL academic achievement in individual studies, and relevant meta-analyses. By examining these, this study aim to understand the current research status and identify areas for further exploration.

2.1 FLA and FL academic performance

FLA was proposed by Horwitz et al. (1986). They believed that FLA is different from general anxiety. It is related to classroom language learning and stems from the uniqueness of the language learning process. FLA is a unique complex set of self-perceptions, beliefs, emotions, and behaviors (Horwitz et al., 1986). Horwitz et al. (1986) developed the Foreign Language Classroom Anxiety Scale (FLCAS). Based on this scale, a large number of theoretical and empirical studies on FLA have been carried out in the academic community.

Many studies on the relationship between FLA and L2 academic achievement have found a certain degree of negative correlation between the two. However, regarding the degree of negative correlation, the academic community has not reached a consensus. Some researchers have found a low-degree negative correlation between FLA and academic performance (Li, 2020), some have found a moderate-degree negative correlation (Li, 2021), and some scholars have found a high-degree negative correlation (Alrabai, 2025).

At the same time, research on FLA has become more refined. Scholars have developed scales for anxiety related to specific language skills, such as the Foreign Language Reading Anxiety Scale (FLRAS), the Foreign Language Writing Anxiety Scale (FLWAS), the Foreign Language Listening Anxiety Scale (FLLAS), and the Foreign Language Speaking Anxiety Scale (FLSAS). Studies on the relationship between anxiety related to specific language skills and corresponding academic performance have been continuously carried out. Jee (2016) found a moderate-degree negative correlation (r = - 0.44) between FLRA and foreign language reading performance, while Zhao et al. (2013) found a low-degree negative correlation (r = - 0.02). Jee (2016) also found a moderate-degree negative correlation (r = - 0.34) between FLWA and foreign language writing performance, while Susanna et al. (2023) found a low-degree negative correlation (r = - 0.16). Moreover, a low-degree negative correlation (r = - 0.28) and a moderate-degree negative correlation (r = - 0.48) between FLA and foreign language listening performance were also found. Pyun et al. (2014) found a moderate-degree negative correlation (r = - 0.48) between FLSA and foreign language speaking performance.

In summary, the academic community has basically reached a consensus on the relationship between overall FLA and foreign language academic performance, as well as the relationship between anxiety related to specific foreign language skills and their corresponding foreign language academic performance, both showing a negative correlation. However, regarding the degree of negative correlation, there is still no definite conclusion. Therefore, this study uses a meta-analysis method to integrate the results of empirical studies in the past ten years, hoping to clarify the relationship between FLA and foreign language academic performance.

2.2 Meta-analyses on the relationship between FLA and FL performance

Teimouri et al. (2019) used the meta-analysis method to explore the relationship between FLA and L2 academic achievement. Teimouri et al. (2019) integrated a total of 105 independent samples from 97 English studies published between 1994 and 2016. The study found a moderate negative correlation (r = -0.36) between FLA and academic performance. The moderator variable analysis showed that the method of performance evaluation, educational stage, target language, and type of anxiety had different degrees of moderating effects on the relationship between FLA and L2 performance.

Zhang (2019) studied the correlation between FLA and academic performance (i.e., course grades and language tests). This study included 46 studies from 1986 to 2017. The results showed a moderate negative correlation (r = -0.34) between FLA and academic performance. Compared with the study by Teimouri et al. (2019), this study included non-continuous variables such as language proficiency and language distance, as well as non-continuous variables such as age and the publication year of the article as new moderator variables. In addition, this study also paid attention to anxiety related to specific language skills, but was limited to listening anxiety and reading anxiety.

Botes et al. (2020) used the meta-analysis method to study the relationship between FL enjoyment, FLA, and academic performance. Regarding the study of FLA, Botes et al. (2020) integrated 59 articles. The anxiety levels in all 59 articles were measured based on the Second Language Classroom Anxiety Scale developed by Horwitz et al. (1986). The research results showed a moderate negative correlation (r = -0.39) between FL classroom anxiety and academic performance.

Dong (2021) used the meta-analysis method to explore the relationship between FLA and academic performance of Chinese English learners. This study integrated 66 independent effect sizes from 43 relevant domestic and foreign studies between 1999 and 2020, involving a total of 24,596 participants. The results showed a moderate negative correlation (r = -0.33) between FLA and their English academic performance. In addition, the results of the moderator variable analysis showed that the method of performance evaluation, educational stage, and age all had certain moderating effects on the “anxiety-performance” relationship of Chinese English learners. In addition, this study explored

the relationship between anxiety related to specific language skills including listening, speaking, reading, and writing and FL performance. However, the number of independent samples involved was small, and the focus was still on the field of listening anxiety.

In summary, there are inconsistent results regarding the relationship between FLA and FL performance. Previous meta-analyses have not cover the results of empirical studies from 2020 to 2024. The academic community still has no definite conclusion on the role of some moderator variables in the relationship between FLA and FL academic achievement. The existing research on moderator variables urgently needs to be refined (the classification of assessment forms for FL academic achievement is not detailed enough, and there is little attention paid to anxiety related to specific language skills) and enriched (other moderator variables should be appropriately included). Therefore, this study combines the latest research progress in this field to explore the relationship between FLA and FL performance from a more specific and multi-dimensional perspective.

III. RESEARCH DESIGN

3.1 Research questions

This study mainly addresses the following two questions:

RQ1: What is the relationship between FLA and FL academic achievement?

RQ2: What factors moderate the relationship between FLA and FL academic achievement ?

3.2 Literature search

Literature search mainly includes the following three steps. First, determine keywords. Based on the author's preliminary reading of literature on the relationship between FLA and FL academic achievement, the search keywords for this study were determined. The literature search keywords are combinations of "emotion", "anxiety", "foreign language anxiety", "second language anxiety", "writing anxiety", "speaking anxiety", "reading anxiety", "listening anxiety", " achievement", "proficiency", and "performance".

Second, conduct literature search. To ensure that there is no publication bias in the included literature, this study comprehensively searched both Chinese and English literature databases. The scope of Chinese literature search includes CNKI and Wanfang Database. The scope of English literature search includes Web of science, Google Scholar, LLBA, ProQuest, etc.

Third, manual search. To avoid omissions, the study conducted a manual search again on the official websites of SSCI journals that mainly publish research results in this field. The relevant Chinese journals searched include *Foreign Language Teaching and Research*, *Foreign Language World, and Modern Foreign Languages* etc. The relevant English journals include *System, Language Teaching Research, Annual Review of Applied Linguistics*, etc.

3.3 Inclusion criteria

The study must report the correlation coefficient between the overall anxiety of FL learners or anxiety specific to certain FL skills (such as listening anxiety, speaking anxiety, writing anxiety, reading anxiety) and their FL academic achievement, or other indicators convertible to corresponding effect sizes.

First, both FLA and FL academic achievement involved in the study should have certain measurement methods. For example, FLA should be measured based on a certain FL anxiety scale, and FL performance should be quantified based on language tests, examination scores.

Second, journal articles must be from peer-reviewed journals (such as SSCI, CSSCI), and dissertations must be doctoral dissertations.

Third, the study must provide the sample size and basic sample data (such as age, gender, etc.) involved.

Fourth, if a single study contains multiple independent sub-studies, each sub-study is included in the meta- analysis as an independent sample and participates in the calculation of the final effect size.

Fifth, based on the above criteria, the author conducted an initial screening, a re-screening, and a final confirmation of the literature. A total of 39 pieces of literature finally entered the literature coding process, including 8 pieces of Chinese literature and 31 pieces of English literature including doctoral dissertations, with publication years ranging from 2013 to 2024.

3.4 Coding procedure

The author coded the following information from the 39 included pieces of literature: basic literature information (author, publication date, publication type, etc.), participant information (age, gender, target language, educational level, etc.), measurement methods (anxiety types, assessment forms, test types, etc.), and effect sizes (sample size, correlation coefficient, direction of effect). In principle, each piece of literature corresponds to one effect size. However, if a study reports the effect sizes of multiple independent samples simultaneously, each independent sample should be regarded as a single independent research sample, and its corresponding effect size should be reported one by one. In addition, if a literature reports multiple sets of effect sizes for the same sample, the average of these multiple sets of effect sizes is

taken for data analysis. After coding, a total of 79 independent effect sizes were obtained from the 39 pieces of literature, involving 15,447 research subjects (3,589 from Chinese literature and 11,888 from English literature).

3.5 Data analysis

This study used the Comprehensive Meta-Analysis 3.3 software for meta-analysis. First, the author entered all the coded data into the software and conducted a heterogeneity test. The test results showed that a random-effects model should be used in this study to report the effect size. Since this study was based on correlation coefficients, the author first converted the correlation coefficient r into Fisher's z-value. Then, a funnel plot and fail-safe N were used to test for publication bias in the included literature. Based on the above tests, this study conducted a main-effect analysis on the relationship between FLA and FL academic achievement, as well as an analysis of moderator variables.

3.5.1 Heterogeneity test

Borenstein (2021) proposed that the choice of the effect-size calculation model in meta-analysis should be based on two criteria: the sample size and the results of the heterogeneity test. If the independent sample size is less than 5, a fixed-effects model should be used; otherwise, a random-effects model should be adopted. The sample size included in this study met the requirements for using a random-effects model. To further determine which effect model should be used to calculate the effect size, the study conducted a heterogeneity test on the included literature. The results of the heterogeneity test are as follows.

First, the Q-value reached a significant level ($Q = 834.166$, $p < 0.001$), indicating that the effect values involved in the literature included in this study were significantly heterogeneous.

Second, $I^2 = 90.649\% > 75\%$, suggesting that the literature included in this study had high heterogeneity.

Considering the sample size and the results of the heterogeneity test, this study adopted a random-effects model for subsequent meta-analysis research.

3.5.2 Publication bias

To avoid publication bias, this study used a funnel plot and the Fail-safe N test to determine whether there was a publication bias problem.

As shown in Fig. 1, most of the effect sizes were concentrated in the upper-middle part of the funnel plot, and the effect sizes on both sides were nearly symmetrically distributed. In addition, almost no effect sizes appeared at the bottom of the funnel plot. Therefore, it can be considered that there is no publication bias in the literature included in this study.

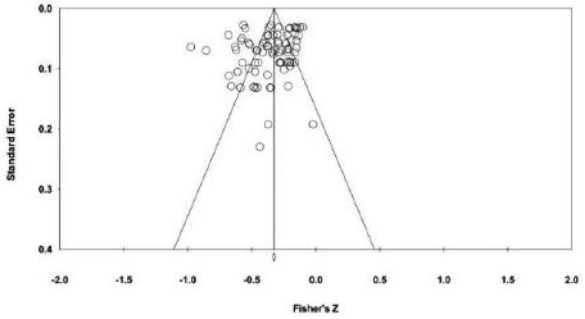

Fig.1: Funnel Plot

In addition, the result of the Fail-safe N test was 52237 ($p < 0.001$). That is to say, if there was a publication bias problem in the literature included in this study, at least 52237 more pieces of literature would be needed to correct the bias. Obviously, it is unreasonable and unrealistic to include 52237 more pieces of literature. Therefore, the Fail-safe N test once again proves that the literature included in this study is representative and there is no publication bias problem.

IV. RESULTS AND DISCUSSION

4.1 Main effects

The results of the meta-analysis show that there is a moderately negative correlation between FLA and FL academic achievement ($r = - 0.34$, $p < 0.001$). This result is generally consistent with the findings of Teimouri et al. (2019), Zhang (2019), Botes et al. (2020), and Dong (2021). Therefore, this study can be regarded as a re-verification of previous research.

Compared with the results of Teimouri et al. (2019), the results of this meta-analysis are closer to the effect-sizes reported by Zhang (2019) and Dong (2021). The three meta-analyses reported effect sizes of - 0.34, - 0.34, and - 0.33 respectively. This may be because these three meta-analyses all considered the relationship between anxiety related to specific FL skills and the corresponding FL academic achievement. In addition, both this study and Dong (2021) newly included Chinese literature, which may also be the reason why the main effect results of the two meta-analyses are close.

4.1 Potential moderators

The results of the meta-analysis indicate that the effect value of the correlation between FL anxiety and FL performance is at a medium level. To further explore the specific variables that interfere with the correlation between FLA and FL academic achievement, this study conducted an analysis of potential moderator variables. The results of the moderator variable analysis are shown in Table 1.

4.1.1 Non-continuous moderators

According to the analysis results of potential moderator variables, educational level, anxiety types, test types, and learning environment are all potential moderator variables affecting the relationship between FLA and FL academic performance, while the assessment form and second language are not.

Table 1 Moderators

Moderators		k	r	95%CI		Q
				Lower Limit	Upper Limit	
Assessment Form	Self-assessment	10	-0.375***	-0.448	-0.297	0.725
	Others-assessment	69	-0.337***	-0.376	-0.297	
Educational Level	Primary School	9	-0.451***	-0.595	-0.278	45.834***
	University	39	-0.361***	-0.408	-0.312	
	Senior High School	11	-0.350***	-0.432	-0.262	
	Postgraduate	5	-0.210***	-0.284	-0.135	
	Junior High School	8	-0.184***	0.234	-0.133	
Anxiety Types	Listening	7	-0.419***	-0.508	-0.320	29.281***
	Reading	7	-0.379***	-0.437	-0.318	
	Speaking	5	-0.374***	-0.492	-0.243	
	Overall	45	-0.348***	-0.398	-0.297	
	Writing	9	-0.198***	-0.253	-0.142	
Test Types	Experiment	2	-0.517***	-0.649	-0.354	79.705***
	Mid/Final-term	22	-0.409***	-0.506	-0.300	
	CET-4	10	-0.324***	-0.393	-0.251	
	IELTS/TOEFL	12	-0.282***	-0.366	-0.193	
	Classroom Quiz	5	-0.237***	-0.318	-0.153	
	Cambridge	3	-0.143***	-0.184	-0.184	
Learning Environment	SL	3	-0.512***	-0.569	-0.450	40.062***
	HL	5	-0.418***	-0.509	-0.319	
	FL	65	-0.339***	-0.379	-0.298	
Second Language	Non-English	11	-0.385	-0.437	-0.330	1.986
	English	67	-0.337	-0.376	-0.296	

As shown in Table 1, the assessment form is not a moderator variable affecting the relationship between FLA and FL academic performance (Q = 0.725). This result is inconsistent with the findings of Zhang (2019) and Dong (2021). Both Zhang (2019) and Dong (2021) believe that when evaluating students' performance based on self-evaluation, students often underestimated their FL academic achievement. However, this study found no significant difference between the two assessment forms, which means that students have a relatively rational and reasonable expectation of their own learning outcomes. Currently, there are still relatively few studies in the academic community that use self-evaluated scores as the assessment form, and researchers are still cautious about using self-evaluation methods. Since this study included only 10 studies based on self-evaluation, follow-up research can further investigate and re-verify this issue.

The educational level is a significant moderator affecting the relationship between FLA and FL academic performance (Q = 45.834, $p < 0.001$). The research results show that, overall, the anxiety level of learners tends to decline as the educational level progresses. However, specifically, it presents a trend of "first decreasing, then increasing, and then decreasing again". This provides data support for the view of Teimouri (2019). Teimouri (2019) argues that the age of learners and the inherent characteristics of the educational level jointly influence the learners' FLA level. In terms of this study, as students get older, their cognitive abilities and FL learning experience continue to increase. Correspondingly, their FLA level will decrease to some extent, which is also the reason why the overall anxiety level of FL learners shows a downward trend. However, students at different educational levels face different examination requirements pressure of further education. Therefore, the anxiety levels of learners at different educational levels also have their uniqueness. Most of the participants in the literature included in this meta-analysis are from Asian countries (including China, South Korea, etc.). High school students in Asian countries usually face the highly competitive college entrance examination, and English, as a major subject, accounts for a relatively high proportion in the total score. Therefore, learners at this educational stage tend to be more anxious about FL learning. This study covers learners from primary school to postgraduate and doctoral levels, which supplements the research of Teimouri (2019) and Dong (2021) in this dimension.

The anxiety type is another significant moderator affecting the relationship between learners' FLA and FL academic achievement (Q = 29.281, $p < 0.001$). Regarding the relationship between anxiety related to specific FL skills and the corresponding FL academic performance, the results show that the correlation between listening anxiety and the corresponding FL academic performance is the highest (r = - 0.419), followed by reading anxiety (r = - 0.379), speaking anxiety (r = - 0.374), and writing anxiety (r = - 0.198). Regarding listening and speaking, on the one hand, this result reflects problems such as unreasonable investment and allocation of time in FL learning among most FL learners and even schools. Most students and even schools pay less attention to the communicative function of foreign languages, and instead focus more on the examination-oriented nature of languages. Improving oral and listening skills is difficult and time-consuming, which leads to less attention being paid to these two aspects of language ability. On the other hand, listening and speaking tests require learners to complete language input and output within a short period, imposing higher demands on learners' foreign language abilities and causing greater stress. Regarding reading, the reading materials that learners encounter increasingly show trends of "constantly growing in length, expanding in scope, and increasing in the number of new words". Therefore, this results in a relatively high level of reading anxiety among FL learners. In contrast, learners have relatively sufficient time for written production when facing writing tests and tasks, and they can re-check and revise their output. As a result, the correlation between writing anxiety and the corresponding FL academic performance is the lowest.

Test type (Q = 79.705, p < 0.001) also significantly affects the relationship between learners' FLA and FL academic performance.

Learning environment, as another significant moderator variable (Q = 40.062***, p < 0.001), influences the relationship between FLA and FL academic performance. Teimouri (2019) found that the second-language environment and the FL environment had no significant impact on the relationship between FLA and FL academic performance. In contrast, this study discovered that, compared with the FL environment, learners in the second-language environment are completely separated from their mother-tongue context. They need to use the target language in their daily study and life, which places extremely high demands on their target-language skills. Additionally, learners have to adapt to a new environment and culture. For these reasons, the second-language environment poses a greater challenge to learners than the FL environment.

The target language is not a moderator variable affecting the relationship between FLA and FL academic performance (Q = 4.396). Teimouri (2019) believes that, as an international lingua franca, English is the focus of academic and even global language attention. With the development of globalization, English has become the most widely used language in the world. Therefore, compared with learning other languages, learners have a lower negative correlation between "FLA and FL performance" when learning English. Although the conclusion of this study is consistent with the result of Teimouri (2019), the target language is not a significant moderator variable in this study. The reason for this result may be that the sample size of non-English target languages involved in this study is small. In addition, the sample size of Chinese EFL learners included in this study is large.

4.1.2 Continuous moderators

The author conducted a meta-regression analysis on three continuous variables: the year of learning, and gender.The results of the meta-regression indicate that the above two variables are all not moderator variables affecting the relationship between FLA and FL academic performance.

As shown in Fig. 2, as the year of learning increases, the Fisher's Z value for the association between FLA and FL academic achievement does not exhibit a clear linear trend. The effect sizes corresponding to different learning durations fluctuate widely (with Z-values ranging from -4 to 4) and do not form a consistent pattern related to learning duration. This result indicates that, regardless of whether learners have short or long English learning experience, the strength of the association between their FLA and academic achievement does not show a stable trend of strengthening or weakening.

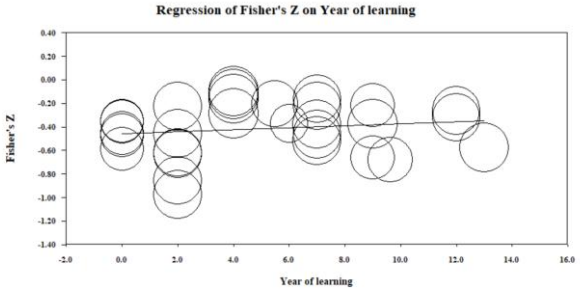

Fig.2: Meta-regression of year of learning

As shown in Fig. 3, as the proportion of females in the sample changes, the Fisher's Z value for the association between FLA and academic achievement does not exhibit a clear linear trend. The effect sizes corresponding to different gender compositions are highly overlapping and scattered, with no consistent pattern related to the proportion of females. This result indicates that, regardless of the proportion of females in the sample group, the strength of the association between FLA and academic achievement does not show a stable trend of strengthening or weakening as the gender composition changes.

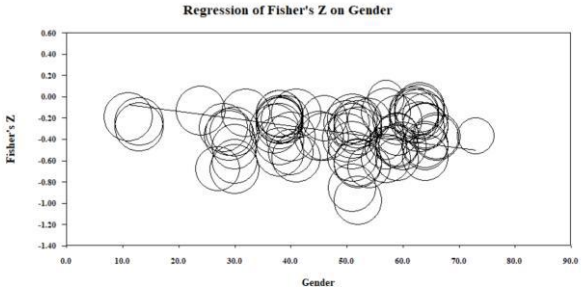

Fig.3: Meta-regression of gender

V. CONCLUSION

This study employed the meta-analysis to explore the relationship between FLA and their FL academic performance, as well as the moderator variables affecting this relationship. The findings regarding the main effect are largely consistent with previous studies. Regarding the research on moderator variables, this study incorporated additional variables and more extensive empirical data, and obtained some new insights. However, due to the limited number of included studies, the research results may have certain limitations. Future research can consider including more recent empirical literature to further explore this relationship. In addition, researchers can examine the relationships between other emotions (e.g., enjoyment, boredom) and academic performance, thereby

enriching the academic community's understanding of the factors affecting FL academic performance and providing reference for relevant FL teaching practices.

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