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Effect of self-efficacy sources and attitude on pronunciation learning strategies among EFL learners in China

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Article Info

ABSTRACT

Pronunciation learning is a crucial yet often neglected aspect of second language acquisition, particularly for English as a foreign language (EFL) learner. However, the factors influencing effective pronunciation learning strategies (PLS) remain underexplored. This study aims to address this gap by investigating the effects of self-efficacy sources (mastery experiences, vicarious experiences, social persuasion, and physiological/emotional states) and attitude (cognitive, conative, and affective components) on the adoption of PLS among EFL learners in China. To explore these relationships, a quantitative approach was employed, using structural equation modeling to analyze data from 320 EFL students. The results reveal that self-efficacy sources, namely, mastery experiences and vicarious experiences, have a positive and significant effect on PLS, while verbal persuasion and psychological state have an insignificant impact on PLS. Moreover, findings indicate that cognitive and conative attitudes were found to have a positive and significant impact on PLS, whereas affective attitudes had no significant effect on PLS. This study contributes to the growing body of research on pronunciation learning by providing insights into how psychological factors can shape EFL learners' strategy use, offering implications for language educators to support students in improving their pronunciation skills.

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1. INTRODUCTION

Learning English as a foreign language (EFL) enhances students' language abilities across multiple domains, such as listening, speaking, reading, writing, pronunciation, grammar, and vocabulary [1], [2]. While all these language components are essential, pronunciation serves as the foundational element. Pronunciation plays a critical role in communication, as spoken language relies on sound to convey grammar and vocabulary. Without sound, the full expression and dynamism of a language are diminished [3]. Prior scholars argue that EFL learners experience substantial challenges in vocabulary and English learning strategies, eventually preventing them from developing English language proficiency [4]–[6].

In most regions of China, students take English classes starting from the third grade in primary schools [7]. English courses in universities are also compulsory; most EFL learners take at least two years of English courses. Non-English major undergraduates at most state-run institutions are required to enroll in a college English (CE) program and get a passing score on the college English test-band 4 (CET-4) before they are eligible to apply to the bachelor of arts degree [8]. Postgraduate students must take English test as a prerequisite [9]. EFL learners in China must be fluent in speaking English language, particularly when they reach the university level; however, their English language level skills still needs to be improved [7].

EFL learners in China have a diversity of difficulties with English pronunciation learning [10], which can substantially influence their overall language competency and ability to communicate effectively. The listening and speaking levels of Chinese learners are deficient and lacking in pronunciation learning strategies (PLS) to achieve the best results in pronunciation performance [11]. Several factors contribute to the difficulty in pronunciation of EFL learners. Mispronunciations establishing an accurate English pronunciation might occur due to the tonal character of Chinese, the absence of some English sounds in the Chinese language, and the effect of native phonetic patterns [12]. Because hundreds of different dialects are spoken in China, the English pronunciations of EFL learners are often influenced by regional Chinese languages.

Furthermore, EFL learners in China need more access to reliable English PLS [13]. The majority of English language instructors in China are not native speakers of English, and the education system in China frequently fails to provide adequate instruction in phonology for teachers of EFL [10]. Due to the absence of specialized training in this area, Chinese teachers may need more time to be ready to handle the learner pronunciation needs of their students, which can lead to ongoing problems with pronunciation [14]. Therefore, it is possible that learner pronunciation needs to accurately reflect the myriad of accents and differences that are experienced in China [6].

However, written English makes up most of the numerous types of school tests administered to students in China [15]. On the other hand, oral English is found to be the component of learning a foreign language that received the least attention [16]. Because of the academic pressure and the intense rivalry, Chinese students tend to focus more on their written test performance rather than their oral communication skills; as a result, they need to pay more attention to English pronunciation. Due to the minimal emphasis placed on pronunciation teaching, students are at risk of not receiving the attention necessary to improve their pronunciation abilities adequately. Consequently, learners could need help with the correct articulation, emphasis, rhythm, and intonation when speaking English [17], [18].

Previous scholars recognized the importance of English PLS [19], [20]. Earlier research has shown that PLS are critical in improving EFL learners' performance [21]. Although pronunciation strategies play a crucial role, they have yet to be given prominence in the English curriculum of Chinese universities [16]. Additionally, researchers examined the relationship between PLS and English performance for EFL learners [20], [22]. However, these studies did not examine the underlying mechanisms of how these learning strategies influence EFL PLS through self-efficacy sources and attitudes.

This study contributes to the literature in the following aspects. First, this research identifies the role of self-efficacy sources and attitudes on PLS among EFL learners in China. Several studies have investigated the correlation between attitude and PLS. There is sufficient research examined in the existing literature into the association between self-efficacy and language proficiency [23]; however, the assessment of self-efficacy and attitudes could assist learners to adopt PLS require further investigation. Second, prior research on EFL learners' self-efficacy and attitudes is significantly linked with language learning outcomes [24], [25]. Numerous studies have observed the different aspects in relationship to EFL pronunciation learning with an emphasis on student's attitudes toward the language, students' affective responses to the speech, or the influence of students' self-efficacy beliefs on the choice of PLS and instructional strategies [26], [27]. Although earlier studies' findings have been helpful, more research is required to determine whether learners' attitudes and self-efficacy affect PLS [8], [28].

Third, previous studies used a combination of quantitative and qualitative research methodologies to understand better-related self-efficacy, attitude, and PLS in different contexts [23], [28], [29]. Most studies have used simple regression and correlation analysis to test self-efficacy, attitudes and PLS models [27], [30], this research addresses the methodological gap using partial least squares-structural equation modeling technique by employing a quantitative research design to add more contributions to existing research. Based on the research inputs, this research aims to address these research gaps in the conceptualization of self-efficacy sources, attitudes and PLS. Hence, within the developed research model the study addresses the following research questions:

i) Do the self-efficacy sources (mastery experience, vicarious experience, verbal persuasion, physiological state) have effect on PLS among EFL learners in China? (RQ1)
ii) Does attitude (cognitive, affective and conative attitudes) have effect on PLS among EFL learners in China? (RQ2)

2. COMPREHENSIVE THEORETICAL BASIS

This research builds a conceptual model with the support of social cognitive theory. This theory is widely adopted by prior researchers in the arts and social sciences [31], [32]. Social cognitive theory was introduced by Bandura [33]. Self-efficacy refers to an individual's belief in their abilities to achieve a

particular goal or engage in a specific behavior [34]. Individuals' self-perception of their abilities can be reliable indicators of their subsequent behavior. The potential sources of self-efficacy knowledge include four primary categories: i) mastery or enactive experience; ii) vicarious experience; iii) social persuasion; and iv) physiological states. Over the past decade, research has focused on self-efficacy beliefs in English pronunciation [35].

2.1. Self-efficacy and PLS

Self-efficacy defines to an individual's belief in their ability to organize and carry out necessary actions to gain desired results [36]. Previous research has noted that self-efficacy is a most significant predictor of student's performance in language strategies [8], [31]. It has been found to have a positive connection with learner's foreign language abilities and learning strategies [37].

Numerous studies have highlighted the positive connection between self-efficacy and PLS in various leaning contexts [23], [24]. Existing research [38] examined the impact of self-efficacy on different language learning strategies. The results indicate that learners with higher level of self-efficacy are more inclined to use metacognitive strategies in pronunciation learning, such as planning, monitoring progress, and adjusting their leaning methods. In contrast, those with lower level of self-efficacy tend to replay on more passive strategies like repetition and imitation. These results suggest that self-efficacy plays a significant role in shaping learners' choices and use of PLS.

Furthermore, former research by Yang [39] validated the link between self-efficacy and PLS in their study context of French learners. They discovered that learners with strong self-efficacy not only excelled in phonological capabilities but also favored more advanced learning strategies, such as actively correcting their pronunciation and utilizing technology to improve it. In contrast, learners with low self-efficacy are more likely to avoid addressing pronunciation challenges, hindering their overall learning progress.

Prior research by Sakurai [40] examined the influence of self-efficacy on English learners' pronunciation strategies and found that learners with high level of self-efficacy are more inclined to use self-directed strategies, such as practicing with language applications or actively seeking feedback. On the other hand, learners with low level self-efficacy tended to depend more on teacher guidance, showing less autonomy in pronunciation learning. However, given the limited research on how the sources of self-efficacy affect PLS, particularly among EFL learners in China, further investigation is needed.

2.2. Attitude and PLS

Previous study by Almusharraf [41] explored a relationship between learners' attitudes toward pronunciation learning and their proficiency in pronunciation abilities. The research demonstrated that learners with positive attitudes are more likely to employ metacognitive strategies, such as self-correction and using recording tools to listen to their pronunciation repeatedly for enhancement. Previous research by Sardegna [42] investigated the link between attitude in pronunciation leaning, concluding that positive attitudes foster greater attitude and motivate learners to adopt more advanced strategies. Additionally, Sardegna *et al.* [28] highlighted that learners' attitudes are tied to psychological factors, reflecting their evaluative beliefs about the purpose of learning.

A prior study by Jang [43] suggested that learners with stronger beliefs in the importance of pronunciation are more likely to prioritize its learning. Also, recent researchers have shown a significant relationship between learners' attitudes and the adoption of effective learning strategies [29], [41]. Although there are so many researches in this field, studies on learners' attitudes and PLS should be explored further.

2.3. Hypotheses development
2.3.1. Self-efficacy sources and PLS

According to Bandura [33], self-efficacy comes from the mastery of experiences, vicarious experience, social persuasion, and physiological states. Based on social cognitive theory, self-efficacy promotes cognitive development in a specific filed by means of cognitive, motivational, affective, and selection processes. It is also applicable in the field of entrepreneurship, in which entrepreneurial self-efficacy contributes to career development and performance. Prior researchers stated that self-efficacy is the most influential and significant predictor of a learner's performance [24], [34].

Prior research by Capa-Aydin *et al.* [44] pointed out that learner self-efficacy is shaped based on the four sources of information: mastery experience, vicarious experience, verbal persuasion, and physiological states. Mastery experience discusses the individual's experience and achievements. In contrast, vicarious experience refers to peers' ability to perform a task to get a higher evaluation of their own skills for promoting self-efficacy. Verbal persuasion highlights the evaluation of teachers and peers to provide learners with good feedback and give positive stimulus to work harder for their self-efficacy beliefs to assess the learners [45]. Physiological states influencing learner's evaluation of their stress in doing a specific

job-oriented task. Individuals having higher levels of stress and anxiety may affect their self-efficacy and hinder their effort in performing a task [46].

However, very few studies examined the sources of self-efficacy regarding PLS [47]–[49] discovered a positive correlation between self-efficacy sources and foreign learning languages. Existing research [50] found that sources of self-efficacy influence Chinese learners' English learning, including their experience, social persuasion, and interests. Earlier study Zarei and Naghdi [51] argued that there is a correlation between learners' self-efficacy and the classroom environment, peer interaction, and interaction between teachers and learners. Based on these previous researches, the following hypotheses are posited:

− H1: Mastery experience positively and significantly influences students' PLS.
− H2: Vicarious experience positively and significantly impacts students' PLS.
− H3: Verbal persuasion positively and significantly impacts students' PLS.
− H4: Physiological state positively and significantly influences students' PLS.

2.3.2. Attitude and PLS

Research on PLS and attitudes has been examined in the existing literature [28]. Prior study by Indrayadi et al. [52] posited that attitudes positively correlate with language learning strategies. Some of the authors argued that learners' attitudes regarding pronunciation help learners achieve comprehensive learning outcomes [41], [43]. Following the social psychological attitudinal model, attitudes are divided into three aspects: i) cognitive attitude; ii) affective affect; and iii) conative attitude. Cognitive attitude refers to learners' personal and evaluative beliefs about performing intellectual and practical linguistics-related tasks. Affective consists of positive feelings and emotions of learners to do a specific task where negative feelings have a debilitative influence. A conative attitude describes a learner's willingness and behavioral intention to perform a task [53].

Prior studies have been focused on the domain of English pronunciation on learner's attitudes and feelings reactions towards native and non-native pronunciations while focusing on cognitive, affective, and conative learner attitudes [8], [22]. Previous study by Peng et al. [54] argued that learners' pronunciation is positively associated with achievement emotional state. Attitudes positively affect learners' pronunciation skills and their behavioral intentions. Therefore, learners with greater levels of affective and conative attitudes are more likely to attain good pronunciation efficiency. Thus, the following hypotheses are suggested, and the proposed conceptual model is presented in Figure 1.

− H5: Cognitive attitude positively and significantly influences students' PLS.
− H6: Affective attitude has a positive and significant impact on student's PLS.
− H7: Conative attitude has a positive and significant effect on student's PLS.
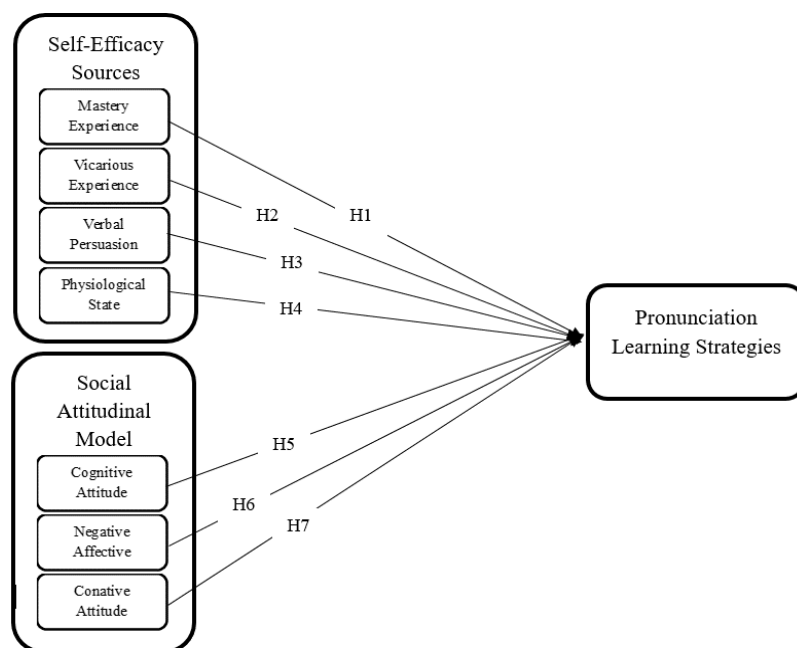

Figure 1. Conceptual model

3. METHOD

3.1. Study context and sampling method

The data was collected from Huanghuai University, China. All students have been learning English for at least six years before enrolling in university. All non-English major students in this university take college English courses, and all English major students take intensive English courses and related reading, writing, speaking, and translating courses; all those compulsory courses include pronunciation instruction and drilling inside and outside the classroom. This research adopted non-probability convenience sampling technique for data collection. To collect reliable data, we approached the university administration office and requested that they allow us to collect data from students. We ensured the university administration regarding the confidentiality of the students' responses. After getting approval, we generated an e-questionnaire link using Wenjuanxing survey QR code and forwarded that survey link to students' WeChat accounts. We sent a 400-survey link among students with the help of other university students, who assisted in timely data collection. Finally, we got 320 questionnaires that the students accurately answered. In some of the responses, 80 questionnaires were incompletely filled by the students. Therefore, we discarded those questionnaires in further analysis. The demographical profile of the participants is male students 46.9% and female students 53.1%. The ages of the students fall between 17-20 years, 78.1%, and 21-24 years, 21.9%.

3.2. Measurement scales

3.2.1. Self-efficacy sources

We used 24 measurement items to assess the self-efficacy sources: mastery experience, vicarious experience, verbal persuasion, and physiological state [47]. In this scale, there are six items measure for mastery experience, six items for vicarious experience, six items for verbal persuasion and six item for psychological state. All responses were captured using a five-point Likert scale, which spans from 1 (indicating strongly disagree) to 5 (indicating strongly agree). The Cronbach's alpha for the mastery experience (0.928), vicarious experience (0.912), verbal persuasion (0.962), and physiological state was (0.935).

3.2.2. Attitude

We used three dimensions with 15 items, including cognitive attitude, affective attitude, and conative attitude, to assess students' attitudes toward PLS. We adapted this scale from the study by Sardegna *et al.* [53], self-efficacy dimension was removed because we took pronunciation self-efficacy sources scale [47]. The CA for cognitive attitude (0.927), affective attitude (0.767), and conative attitude was (0.752).

3.2.3. PLS

To evaluate PLS, we adapted PLS scales developed by Scholarsarchive and Eckstein [55]. The instrument has 28 items in total, the original scale's 6-point scale was designed to accurately measure the frequency of subjects' use of PLS, but for non-native speakers, such precision frequency descriptions may make comprehension and selection more difficult. Therefore, the present study simplified the scale to a 5-point scale, using broader and more intuitive terms such as 'never' to 'always' so that it would be easier for subjects to make choices, which in turn would improve the validity and consistency of the measurement.

Since the study subjects were Chinese students, some of the time frequencies in the original scale, such as 'about once a day' and 'about once a month', might not exactly match with their actual study habits. By changing to a 5-point scale, we use terms that are more in line with the actual situation of Chinese students, such as 'sometimes' and 'often', thus improving the cultural adaptability and accuracy of the scale. The 5-point scale is widely used in educational psychology research and has a high degree of comparability and interpretability. By adapting the original scale to a 5-point scale, this study not only simplified the response process of the subjects, but also ensured the comparability of the data with the results of other studies, thus improving the generalizability and external validity of the findings. The Cronbach's for PLS was (0.931).

3.3. Measurement model

The present study employed a separate measurement approach utilizing Smart-PLS 4 for data analysis. This technique is widely used by prior researchers nowadays in social sciences research [56], [57]. Initially, we evaluated the measurement model to check the validity and reliability of the instruments employed, adhering to the threshold established by Shmueli *et al.* [58]. Subsequently, we executed the structural model to examine the formulated hypotheses. For this purpose, we evaluated the construct reliability and convergent validity, including Cronbach's alpha, composite reliability (CR), and the average variance extracted (AVE). According to Hair *et al.* [59], factor loadings above the threshold value of 0.70 and above 0.60 in exploratory research are considered sufficient indicator reliability. In this study we eliminated ME3, PLS1, PLS2, PLS5, PLS8, PLS11, PLS12, PLS18, PLS20 and PLS21 items because of lower loading <0.60. We retained all the items those are above the 0.60. According to prior researchers, a value higher than 0.60 is considered an acceptable value in terms of reliability, as seen in Figure 2 [57], [58].

Moreover, the adequacy of AVE as all the values accepted the cutoff value of 0.50 to prove the appropriate convergent validity, as posited by Hair *et al.* [56]. Table 1 displays the results of these assessments, confirming the convergent validity where all results were sufficient. In step 2, we evaluated the discriminant validity employing the heterotrait-monotrait (HTMT) criterion proposed by Henseler *et al.* [60]. The HTMT values should be ≤0.85 according to the stricter criterion, while the more lenient criterion permits values ≤0.90. Table 2 indicates that all HTMT values were below the stringent threshold of <0.85, allowing us to conclude that the respondents recognized the distinctiveness of the nine constructs. As a whole, both validity tests have demonstrated that the measurement items are valid and reliable.
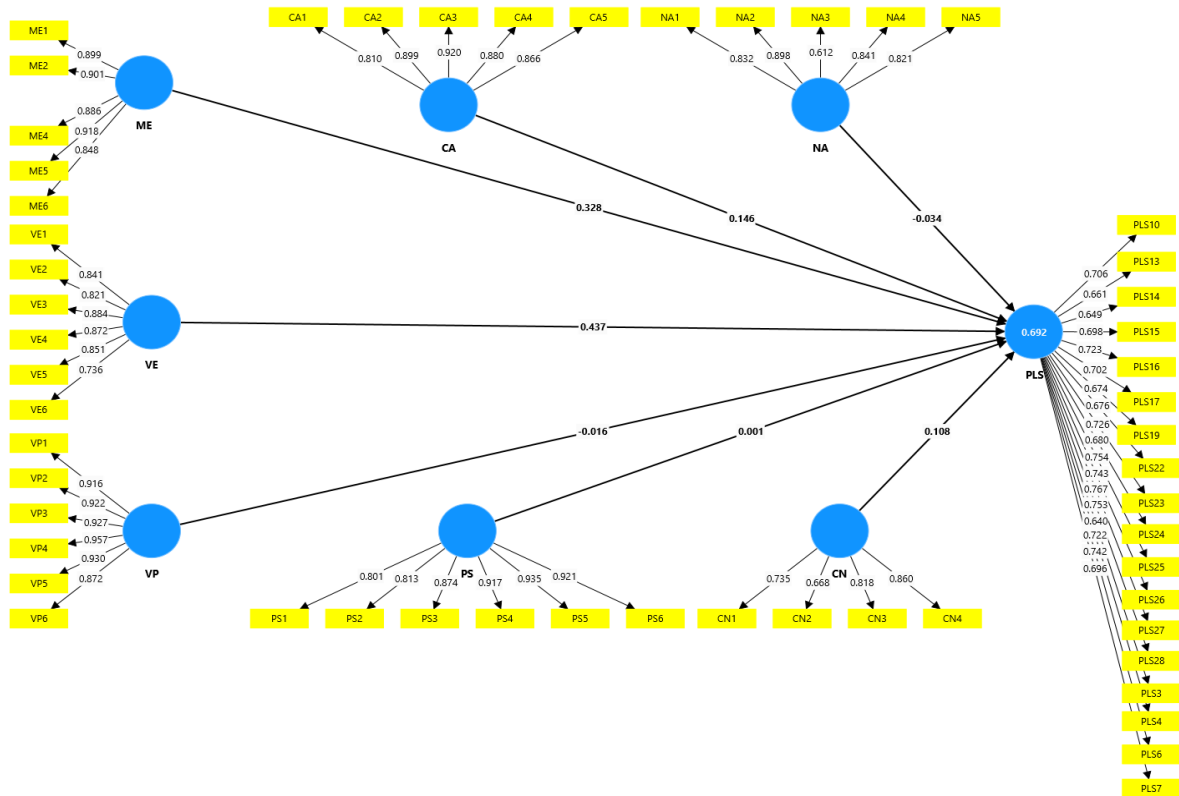

Figure 2. Measurement model

Table 1. Reliability and validity analysis

Constructs	CA	CR	AVE
Mastery experience	0.935	0.950	0.793
Vicarious experience	0.913	0.933	0.698
Verbal persuasion	0.964	0.971	0.848
Physiological state	0.944	0.953	0.772
Cognitive attitude	0.923	0.943	0.767
Negative affective	0.905	0.910	0.651
Conative attitude	0.780	0.855	0.599
PLS	0.941	0.947	0.500

Table 2. HTMT

Constructs	CA	CN	ME	NA	PLS	PS	VE	VP
CA								
CN	0.470							
ME	0.302	0.468						
NA	0.371	0.368	0.116					
PLS	0.595	0.606	0.722	0.138				
PS	0.089	0.247	0.252	0.755	0.138			
VE	0.719	0.662	0.683	0.188	0.846	0.123		
VP	0.222	0.408	0.784	0.190	0.604	0.274	0.594	

Note: CA=cognitive attitude, CN=conative attitude, ME=mastery experience, NA=negative affective, PS=physiological state, VE=vicarious experience, VP=verbal persuasion

4.   RESULTS AND DISCUSSION

4.1. Structural model

The hypotheses results were evaluated through 5,000 bootstrapping methods using Smart-PLS software 4.0. The significance of the results was displayed in Table 3 and Figure 3 with path coefficient, p-value, and t-statistics. Moreover, structural model explains R^2=69% variance in PLS. As Hair *et al.* [61] recommended, the value for a desired R^2 should be more than zero or 0.10. Thus, this study achieved the desired outcomes for structural model fitness.

Table 3. Hypotheses testing

Hypotheses	Relationships	Original sample (O)	T statistics (|O/STDEV|)	P values
H1	ME->PLS	0.328	5.126	0.000
H2	VE->PLS	0.437	6.803	0.000
H3	VP->PLS	-0.016	0.238	0.812
H4	PS->PLS	0.001	0.013	0.989
H5	CA->PLS	0.146	2.663	0.008
H6	NA->PLS	-0.034	0.641	0.522
H7	CN->PLS	0.108	2.359	0.018

Note: ME=mastery experience, VE=vicarious experience, VP=verbal persuasion, PS=physiological state, CA=cognitive attitude, NA=negative affective, CN=conative attitude
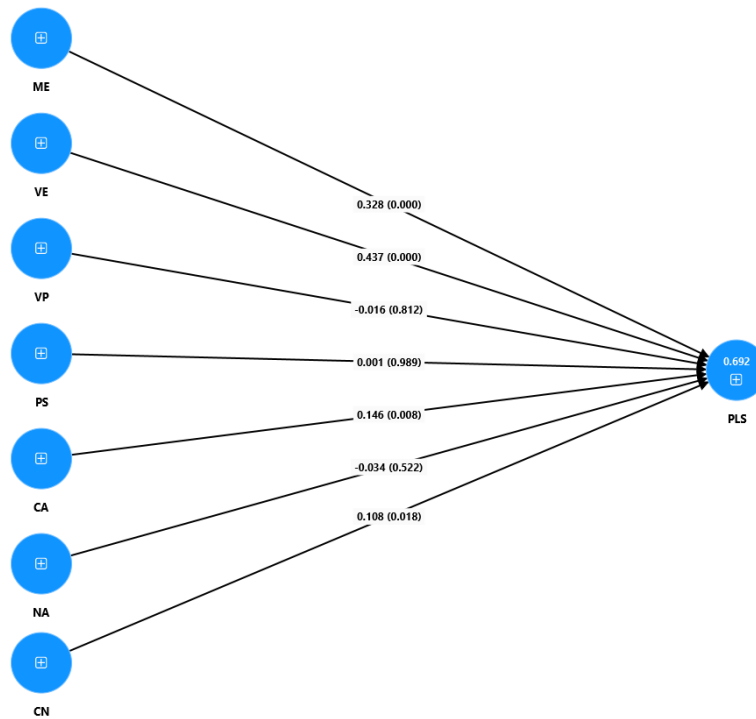

Figure 3. Structural model

4.2. Hypotheses testing

The results of the hypotheses are presented in Table 3. Results indicated that mastery experience positively affects PLS (β=0.328, t=5.126, p=0.000). Therefore, H1 was accepted. Moreover, H2 findings showed that vicarious experience positively and significantly influences PLS (β=0.437, t=6.803, p=0.000). Consequently, H2 was supported. H3 results revealed that verbal persuasion has an insignificant impact on PLS (β=-0.016, t=0.238, p=0.812). So, H3 was not accepted. Additionally, H4 findings showed that physiological state has an insignificant effect on PLS (β=0.001, t=0.013, p=0.989). Therefore, H4 was not accepted. H5 results revealed that cognitive attitude significantly affects PLS (β=0.146, t=2.663, p=0.008). Thus, H5 was supported. Furthermore, H6 findings illustrated that affective attitude insignificantly affects PLS (β=-0.034, t=0.641, p=0.522). Hence, H6 was not accepted. Lastly, H7 results showed that conative attitude positively and significantly influences PLS (β=0.108, t=2.359, p=0.018). Thus, H7 was also accepted.

4.3. Discussion

This study hypothesized model based on self-efficacy sources and attitudes with regard to PLS among EFL learners in China. H1 and H2 results, mastery, and vicarious experiences significantly influence learners' pronunciation strategies. These results are in line with prior researchers, who stated that mastery and vicarious experiences provide an authentic and influential source of information to the learners for achieving maximum outcomes in PLS [24], [48], [51]. Learners with higher mastery levels and vicarious experiences are more likely to select effective tactics and develop a sense of ease and self-assurance in learning strategies. Learners more confident in their chosen strategies have achieved optimum performance in English language skills. Teachers can improve learners' skills by making significant efforts through fruitful discussions and portfolios. Thus, it is essential to highlight the teacher's role in supporting and fostering learner's self-confidence and learning by providing continuous feedback and encouragement. This is particularly crucial when learners have limited chances to engage with native speakers of the language they are learning.

Concerning H3 and H4 findings, verbal persuasion and physiological state have an insignificant effect on PLS. These results are not consistent with previous research [31], [44], [50]. This study's results contended that teachers do not encourage learners' responses to verbal persuasion and physiological state to seek interest in PLS at the university level. Learners are not getting self-assurance experience in their pronunciation abilities and are experiencing anxiety. Therefore, teachers could assist learners in enhancing their verbal perception and developing personal abilities, giving positive feedback on progress and guiding developing oral skills. Such responses develop more confidence among learners to independently work on improving their pronunciation learning skills. Teachers may reduce anxiety by conducting future learning activities to enhance self-efficacy beliefs among learners. Learners improve their self-efficacy beliefs through commitment and productive efforts to attain significant results in English PLS.

Furthermore, H5 and H7 findings showed that social attitudinal models such as cognitive, and conative attitudes significantly impact PLS among EFL learners in China, while H6 results insignificantly related to PLS. H5 and H7 results were consistent with existing scholars [41], [52], [53], who argued that learners' cognitive and conative attitudes toward good pronunciation significantly predicted learner's pronunciation strategies. Learner positive attitudes towards English learning pronunciation strategies helps them in oral communication at different levels of education institutions and organizations. Learners who are less confident in speaking English are more prone to experiencing fear when required to talk in English without prior speech practice. Learners who acknowledged the significance of proficient pronunciation should have exerted endeavors when confronted with situations that exposed their inadequate pronunciation abilities.

Lastly, our research highlights the importance of self-efficacy and attitude in shaping PLS. This suggests that language instructors should focus on enhancing students' confidence (via mastery experiences, vicarious experiences, social persuasion, and physiological/emotional states) to positively impact their pronunciation learning. Attitude, especially in its cognitive, affective, and behavioral dimensions, plays a crucial role in language acquisition. Recognizing and fostering positive attitudes in learners can lead to improved learning outcomes. The findings may influence the design of pronunciation-focused curricula. By embedding activities that strengthen learners' self-efficacy, educators could help students become more adept in their use of PLS. The results can also be incorporated in teacher training programs to include modules on how to foster self-efficacy and positive attitudes as these are shown to enhance learner engagement, motivation, and resilience in learning environment. Teachers should be trained to recognize low self-efficacy in learners and apply strategies to boost their self-efficacy, such as giving feedback that emphasizes effort and progress. Our findings could contribute to broader research on language learning motivation, specifically by identifying how self-efficacy and attitude influence strategic behaviors in learning pronunciation. Future research could explore similar relationships in other language skills such as listening writing and reading.

5. CONCLUSION

This research highlights the importance of psychological factors, particularly self-efficacy sources and attitudes, in influencing PLS among EFL learners in China. The findings show that mastery and vicarious experiences are crucial in promoting effective strategy use, while the verbal persuasion and emotional state appear to be less significant. Additionally, the positive impact of cognitive and conative attitudes emphasizes the need for a structured approach that fosters learner motivation and active engagement in pronunciation practice. These insights offer valuable implications for educators and curriculum designers, suggesting the need to create learning environments that foster learners' self-efficacy and encourage positive attitudes toward pronunciation learning. The findings suggest that educators should design learning environments that foster confidence in pronunciation learning. Incorporating more opportunities for successful practice, peer

learning, and supportive feedback could improve learners' self-efficacy and, in turn, their pronunciation strategies. Moreover, results show that pronunciation instruction should not only focus on linguistic features but also on building learners' self-efficacy and positive attitudes. Curriculum developers can integrate self-efficacy-building activities and attitude-shaping elements into pronunciation courses, which may lead to more effective learning strategies for pronunciation training and learning.

The present study results also offer some implications for pedagogy and theory enhancement. Firstly, personalized learning approaches, based on the study's findings, language-learning technologies and applications can develop personalized learning paths that consider an individual's self-efficacy and attitude. For example, adaptive learning systems could offer customized tasks based on a student's confidence levels or provide motivational prompts to improve attitudes toward learning pronunciation. Secondly, intervention programs for low self-efficacy leaners, the study lays the groundwork for developing intervention programs aimed at improving learners' self-efficacy and attitudes. Such interventions could be piloted in schools or language centers and measured for their effectiveness in enhancing PLS. Thirdly, further research on mediating factors, future research could expand by investigating whether other variables, such as cultural background and language anxiety, mediate the relationship between self-efficacy, attitude, and PLS. This could provide a more nuanced understanding of how learners' psychological factors interact with language learning. Fourthly, policymakers in education could use these insights to promote educational reforms that emphasize the development of positive self-efficacy beliefs and attitudes among EFL learners. Schools might implement more holistic language teaching policies that focus not only on linguistic competence but also on psychological support systems. In summary, the study findings provide a foundation for more effective language teaching strategies and open up avenues for future research on the psychological factors influencing language learning. These insights can be used to design more learner-centered approaches that address both cognitive and emotional aspects of pronunciation learning.

The current research has some limitations that need to be considered. The nature of this study is cross-sectional, and data was gathered from one university in China. Future research could be conducted on the longitudinal data using a vast sample size from different regions at local and international levels. This study uses quantitative data, collecting responses from learners through a questionnaire survey. While survey-based measures are frequently used in behavioral science, it is essential to acknowledge that participants may have been motivated to provide socially desired responses, misidentify techniques, or have difficulty accurately recalling their conduct. Future researchers may collect data using qualitative methods by conducting interviews with learners to check their pronunciation level and strategies. Finally, our model does not incorporate a metric for assessing the metrics of pronunciation performance thus it is hoped that future studies can expand the scope of this study and examine the relationship between self-efficacy beliefs and pronunciation accuracy metrics.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization	I : **I**nvestigation	Vi : **Vi**sualization
M : **M**ethodology	R : **R**esources	Su : **Su**pervision
So : **So**ftware	D : **D**ata Curation	P : **P**roject administration
Va : **Va**lidation	O : Writing - **O**riginal Draft	Fu : **Fu**nding acquisition
Fo : **Fo**rmal analysis	E : Writing - Review & **E**diting	

CONFLICT OF INTEREST STATEMENT

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ETHICAL APPROVAL

The studies involving human participants were reviewed and approved by School of Education of Universiti Utara Malaysia and Huanghuai University in China. The patients/participants provided their written informed consent to participate in this study.

DATA AVAILABILITY

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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