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Psychological constructs of AI speaking app adoption among Chinese tertiary learners: a mixed-methods investigation through the Technology Acceptance Model

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Abstract: The prevalent ownership of mobile devices and increasing use of AI learning tools among college English as Foreign Language (EFL) learners has triggered wide discussions on the application of AI learning tools in developing English skills. This mixed-method cross-sectional study tries to understand how language-learning-related psychological factors, including Willingness to Communicate (WTC), Self-perceived Communication Competence (SPCC), and Speaking Anxiety (SA), are related to learners' acceptance and adoption of AI speaking apps based on the Technology Acceptance Model. In this study, 280 Chinese students from 6 different universities, including both undergraduate and postgraduate levels, participated in the questionnaire, with 8 of them further taking part in semi-structured interviews. Binary Logistic Regression analysis revealed that WTC is positively correlated with the behavioral intention to use the apps and perceived usefulness, while SPCC is negatively correlated with perceived usefulness. SA, however, showed no significant correlation with learners' acceptance of the apps. The interviews provided additional insights, with participants highlighting the motivational mechanisms, the utility during fragmented time and the emotional relief provided by the apps as the key factors driving their use. The findings underscore the potential of mobile AI speaking apps in enhancing English speaking practice while also revealing certain limitations.

Keywords: willingness to communicate; self-perceived communication competence; speaking anxiety; AI-assisted language learning; mobile learning apps

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1 Introduction

With the rapid advancements in artificial intelligence (AI), an increasing number of learners are utilizing AI tools to enhance their English learning, particularly in speaking practice. Current applications of AI in oral English learning are largely powered by the development of Automatic Speech Recognition (ASR) technology (e.g., Duolingo) and generative AI chatbots (e.g., GPT-4) (Tai and Chen 2024; Zou et al. 2023b). ASR provides scoring and feedback on learners' pronunciation and fluency, and generative AI chatbots offer personalized, interactive experiences that are more stress-free and simulate real-life conversations (Li and Chan 2024; Zou et al. 2023c). These AI-powered tools assist English as Foreign Language (EFL) learners in improving their speaking abilities and enriching their learning experiences across both formal and informal learning settings. More importantly, serving as conversation partners, AI tools can provide EFL learners with additional opportunities for speaking practice – an advantage particularly beneficial for Chinese tertiary students, who often face limited peer interaction and collaboration in the English learning process (Wu 2018) and restricted speaking opportunities in traditional English classes (Zou et al. 2023c).

Investigating the relationship between psychological factors and learners' acceptance of AI speaking apps is critical, as learners' successful use depends on the extent to which they accept these apps. Several psychological constructs, including Speaking Anxiety (SA), Willingness to Communicate (WTC), and Self-Perceived Communication Competence (SPCC), emerge to be crucial in examining learners' acceptance of AI speaking apps, as they are linked to learners' engagement and effectiveness in language learning, especially in speaking practice. Specifically, research has demonstrated that higher WTC is positively correlated with more engagement in second language (L2) communication and active participation in speaking activities (Deng and Peng 2023; Ha 2011; MacIntyre et al. 1998). Similarly, SPCC has been shown to be positively related to communicative behaviors, with learners who perceive themselves as competent more likely to engage in oral communication (Teven et al. 2010; Yashima 2002). In contrast, high levels of speaking anxiety might hinder learners' participation and performance, often resulting in silence in class and unsatisfactory performance in oral assessments (Hewitt and Stephenson 2012; Liu and Jackson 2008).

Despite the valuable investigations in formal learning settings, little is known, however, about the extent to which these psychological factors can be related to the acceptance of speaking apps in the informal, mobile, AI-powered language learning environment. In this line of research, Huang and Zou (2024) found a positive association between WTC and the intention to use AI tools among Chinese EFL university

students, reporting that those with a higher WTC with AI tend to report greater perceived usefulness and satisfaction. Yang and Lou (2024) found that self-perceived competence in communicative mobile learning positively predicted students' perceived usefulness and ease of use of apps. In general, research in this area remains limited and warrants further investigation.

Therefore, this cross-sectional study aims to bridge this gap by examining the relationship between Chinese tertiary-level students' psychological factors – namely WTC, SA, and SPCC – and their acceptance of mobile AI speaking applications. Additionally, this study explores students' perceptions of AI speaking applications to better understand the affordances and identify areas for further enhancement. The findings of this study are expected to inform the design of AI speaking applications that can better align with learners' needs, contributing to the acceptance and effectiveness of AI tools in language learning.

2 Literature review

2.1 Psychological factors in relation to AI acceptance

Several psychological factors have been well established as key concepts in foreign and second language learning, among which the constructs that are most studied and relevant to speaking exercises are perhaps WTC and SA. WTC, defined by MacIntyre et al. (1998), refers to learners' readiness to engage in conversations using a foreign language, and its importance in EFL is due to the significance of interaction in language development. MacIntyre et al. (1998) proposed a pyramid model, in which WTC is conceptualized as learners' behavioral intention that serves as a key antecedent of L2 communication behavior. Previous research on EFL learners at the tertiary level has indicated that individuals with higher WTC participate more actively in classroom speaking activities (Deng and Peng 2023; Ha 2011) and are more inclined to speak during tasks (Leeming et al. 2024). Additionally, it was found out by Huang and Zou (2024)'s study that WTC significantly influenced learners' English speaking with AI, in dimensions of their perceived usefulness and satisfaction with AI-based speaking applications, which further affects their intentions to continue using these tools.

SA refers to the fear or anxiety associated with real or anticipated communication with others (McCroskey 1977). Research has demonstrated that SA negatively impacts language performance, particularly in speaking tasks (Hewitt and Stephenson 2012; Peng and Wang 2024). SA is also found to be negatively correlated with other psychological factors, such as intrinsic motivation (Ahmetovic et al. 2020) and WTC (Zarrinabadi et al. 2024), and this leads to learners' decreased chances to

participate in foreign language interactions. Research by Lee and Hsieh (2019) and Pavelescu (2023) found that anxiety hindered WTC in both in-class and out-of-class contexts. However, Lee and Hsieh (2019) noted that in digital settings, anxiety was not significantly related to WTC, explaining that digital environments may provide a less anxiety-provoking atmosphere for EFL students. Likewise, in Bárkányi's (2021) study, the author indicated that learners with higher SA were more inclined to use mobile learning due to the anonymity it offers.

Moreover, a relatively less explored construct in foreign language learning, SPCC, also carries many potential implications for EFL learning. According to McCroskey and McCroskey (1988), SPCC refers to an individual's self-assessment of their ability to effectively engage in communication activities. This concept has been applied to evaluating communication competence across various contexts, including interactions with acquaintances, friends, and strangers, as well as within small groups, public speaking scenarios, and interpersonal communication (Croucher et al. 2024). Research has shown that SPCC is associated with both Communication Apprehension (CA) and WTC; learners who perceive themselves as competent are more likely to engage in communication and experience lower levels of anxiety (Teven et al. 2010; Yashima 2002).

In general, the constructs reviewed above – WTC, SA, and SPCC – play a significant role in influencing EFL learners' behaviors in speaking practice. Previous studies have mostly examined their interrelations (e.g., Liu and Jackson 2008; Nadeem et al. 2023) in formal English learning settings, and their predictions on speaking productions (e.g., Leeming et al. 2024; Peng and Wang 2024). Against the backdrop of increasing use of AI and the availability of mobile language learning resources, there is a need for further investigation into how these psychological constructs that play a role in English speaking practice can be associated with learners' acceptance and use of AI speaking tools.

2.2 Technology Acceptance Model

The Technology Acceptance Model (TAM), originally introduced by Davis et al. (1989), is widely recognized as one of the most influential frameworks for understanding user acceptance of new technologies. The model outlines the factors that influence an individual's behavioral intention, specifically identifying three key determinants: Perceived Usefulness (PU), Perceived Ease of Use (PEU) and Attitude Toward Using the System (ATUS). PU is understood as whether an individual believes that using a particular system would benefit their performance, while PEU indicates whether one believes that using a particular system would be free from efforts (Davis 1989). ATUS

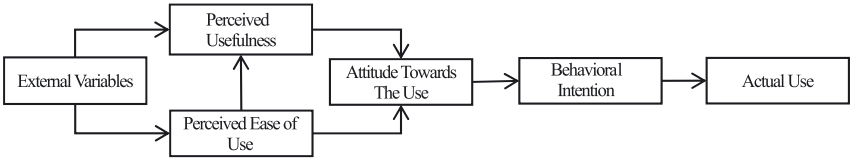


Figure 1: Technology Acceptance Model (Davis 1989).

is conditioned by PU and PEU, exerting a direct influence on behavioral intention (BI). The specific relationship of the three constructs can be seen in Figure 1.

In the context of mobile learning in EFL, previous studies have incorporated TAM into their investigations, integrating psychological factors, such as motivation, self-efficacy, and anxiety caused by novel technologies, into the original TAM to examine AI adoption in the EFL context. For example, Wang et al. (2021) found that Chinese teachers’ self-efficacy of using novel technologies positively affected their PEU and ATUS in higher education. Zou et al. (2023c) revealed a correlation between the intrinsic motivation of Chinese tertiary-level students and their BI and PEU of an AI-based speech evaluation program. There are relatively few studies explicitly concentrating on English-speaking-related psychological factors in association with technological acceptance.

2.3 Learners’ perceptions of AI adoption in the EFL context

Previous studies have explored learners’ perceptions regarding the adoption of AI-driven applications for developing spoken English skills, involving both negative and positive attitudes. A primary concern revolves around the accuracy and reliability of AI-generated feedback, which may stem from limitations in speech recognition technology (Kholis 2021; Zou et al. 2023a, 2023c) and the inherent challenges in evaluating open-ended speaking topics (Litman et al. 2018; Zou et al. 2023c). Additionally, learners have reported that occasional inappropriate or unnatural responses from AI technologies can undermine their trust in these systems and lead to frustration (Kim and Kim 2020; Zou et al. 2023c). Furthermore, the simplistic feedback provided by AI educational tools is criticized for failing to identify specific issues or offer constructive corrections, which may result in confusion (Kim and Kim 2020; Zou et al. 2023a).

On the other hand, several notable benefits are recognized from the adoption of AI applications in education. AI tools offer flexibility, allowing learners to practice at their own pace and time, which is particularly advantageous for adult learners with busy schedules (Zhang and Pérez-Paredes 2021). Moreover, AI speaking apps can create a low-pressure environment for learners to practice speaking without the fear

of making mistakes in front of others (Kim and Kim 2020; Zou et al. 2023c). This aspect can be especially beneficial for learners who experience anxiety or lack confidence when speaking English. Previous research has also corroborated the positive effects of AI technology on learners' psychological factors, such as confidence, WTC, anxiety, and enjoyment (e.g., Fathi et al. 2024; Kim and Su 2024; Shafiee Rad 2024; Zhang et al. 2024), indicating that learners who utilize AI tools report increased willingness to communicate and confidence, as well as reduced anxiety in EFL speaking, attributable to the personalized and supportive nature of these tools.

Taken together, scant attention has been directed toward whether psychological factors predicted learners' acceptance of AI, and few studies extended the TAM by adding psychological constructs (Hsu and Lin 2022). Focusing on AI speaking apps as an emergent technology with great potential to enhance learners' English-speaking practice, we investigated two research questions (RQs) in this study:

- RQ1:** How are the WTC, SA, and SPCC of China's tertiary EFL learners associated with their acceptance of mobile AI speaking apps, indicated by BI, PU and PEU?
- RQ2:** How do EFL students perceive the use of mobile AI speaking apps in practicing their spoken English?

3 Methodology

This study is mixed-method in nature, with quantitative data from an online questionnaire involving scales measuring different constructs, and qualitative data from interviews. The questionnaire was designed to mainly collect data on participants' WTC, SA and SPCC levels, and their acceptance of mobile AI speaking apps. The semi-structured interviews tapped into students' perceptions on the use of mobile AI speaking apps to practice spoken English.

3.1 Participants

In this study, we focused on Chinese tertiary EFL learners, a demographic increasingly engaging in mobile AI English speaking apps in China. An online questionnaire was administrated to students via Wenjuanxing (<https://www.wjx.cn>), an online survey distribution platform in China, generating participation of 337 students and ultimately yielding 280 valid responses. Informed consent was obtained with clarifications of participants' rights. 98.9 % of the participants aged between 18 and 34,

Table 1: Participants’ demographic characteristics (*N* = 280).

Characteristics	Category	Frequency	Percent
Gender	Female	184	65.7
	Male	96	34.3
Age	18–24	249	88.9
	25–34	28	10
	≥35	3	1.1
Academic year	Undergraduate	151	54
	Postgraduate	129	46
English proficiency	CET4	66	23.6
	TEM4	13	4.6
	CET6	164	58.6
	TEM8	37	13.2

with only 1.1 % aged above. All participants were Chinese students who learned English as a second language. Their demographic data are summarized in Table 1. In terms of English language proficiency, all participants had at least passed the CET-4 exam, indicating that their vocabulary was at least 4,000 words and their English proficiency was at least B1-B2 level according to Common European Framework of Reference for Languages (CEFR). Additionally, 13.2 % of the participants had passed the TEM-8 exam, with a vocabulary base between 10,000 and 12,000 words, corresponding to the CEFR C1-C2 level.

3.2 Measures

3.2.1 Questionnaire

The main data-collection instrument was an online questionnaire with closed questions about basic demographic backgrounds and measurement items, totaling 40 items. The questionnaire started with questions about demographic information of participants and two screening questions to investigate whether the participants had used mobile AI speaking apps, and which AI speaking app they had used. Following these, 33 items on a five-point Likert scale were used to measure the three constructs of WTC, SA and SPCC, with each construct assessed in a separate section. Measurement items were carefully adapted from scales used in previous studies, and were reviewed by an expert in the field of mobile learning and EFL. Specifically, 10 items measuring WTC were adapted from Lee and Drajati (2020) and addressed WTC in in-class, out-of-class, and digital settings. 11 items measuring SA were inspired by

Woodrow (2006) and focused on classroom activities and out-of-class conversations. The 12 items measuring SPCC were adapted from McCroskey and McCroskey (1988), covering both formal and informal settings, ranging from conversations with friends to presentations to groups of strangers. When it comes to the items measuring WTC in digital settings, localizations were made to help Chinese participants better understand the questions. For example, the term “Facebook” was replaced with “WeChat” and other social media apps that are more commonly used by Chinese students.

The questionnaire also involved 3 items designed based on the Technology Acceptance Model (TAM) (Davis et al. 1989) to explore the participants’ acceptance of mobile speaking apps, including binary variables of BI (e.g., Are you willing to use AI speaking apps to improve English speaking?), PU (e.g., Do you think using mobile AI speaking apps is effective for enhancing spoken English skills?) and PEU (e.g., Do you think it is easy to learn how to use mobile AI speaking apps?). We coded students’ responses of “Yes” as 1 and “No” as 0.

3.2.2 Semi-structured interviews

To better explore the acceptance of individuals with different levels of WTC, SA, and SPCC of mobile AI speaking apps, we selected 8 interviewees from different majors whose questionnaire responses display different features of WTC, SA, and SPCC. Additionally, their attitudes toward the apps also varied.

In the interviews, we asked about how the participants had used mobile AI speaking apps to practice English speaking, their feelings when they were speaking English on the apps, and how satisfied they were with the usage of AI apps for developing their speaking skills. In addition, participants were asked about their suggestions for further improving mobile speaking apps. The interview questions were employed to gain more details around three main factors: corresponding reasons for their choices in the questionnaire, factors affecting their attitudes towards the apps, and their suggestions for further improvement.

3.3 Analytic approach

Prior to data analysis, 57 questionnaires with response time less than 2 mins or with highly repetitive values were excluded due to the concern that the respondents had not answered the questionnaire seriously. The data screening process resulted in 280 questionnaires that could be used for further analysis. SPSS was employed for data analysis. Exploratory factor analysis (EFA) and reliability test were conducted to examine the construct validity and reliability of the scales.

Then, we used logistic regression models to assess the respective relationship of the psychological constructs – WTC, SA and SPCC – and participants' acceptance of mobile speaking apps indicated by BI, PU and PEU. In the logistic models, the log odds of the binary outcomes (BI, PU and PEU) were modeled as a linear combination of the predictor variables (WTC, SA and SPCC) and control variables of gender, academic year and English proficiency. We checked for multicollinearity using Variance Inflation Factor (VIF) to ensure the validity of the analysis. The Hosmer-Lemeshow test was also conducted to confirm the goodness of fit.

Finally, the interview data were audio-recorded, transcribed to computer by the first author and reviewed by the second author to ensure accuracy. Thematic analysis was used to extract themes emerging from the interview data.

4 Results

Before main analysis, we first executed EFA on the 33 items using principal component analysis (see Table 2), yielding seven factors with a cumulative contribution rate of 67.47 %, denoting effective information extraction. 31 of the 33 items, with the exception of SA10 and SA11, classified into the seven factors with factor loadings exceeding 0.4, supporting the validity of the constructs measured. Given that the factor loading of SA11 was below the 0.3 threshold, it was removed from the analysis, while SA10 was still preserved with its factor loading above 0.3. Moreover, item commonality values surpassed 0.4, indicating strong construct validity through robust correlations. Additionally, results of the reliability test with respective Cronbach's alpha value of 0.84, 0.90, and 0.93, indicate good reliability of the items in measuring respectively WTC, SA and SPCC.

4.1 Associations between students' WTC, SA, and SPCC and their acceptance of mobile AI speaking apps

The descriptive results of the questionnaire response show that participants held a positive attitude towards AI speaking apps. Specifically, 80.4 % of participants expressed a behavioral intention to use mobile AI speaking apps in the future. Furthermore, 96.07 % perceived that using the apps was useful for improving their speaking skills, and 82.5 % found the apps easy to use.

To examine the predictive effects of psychological constructs on technological acceptance, we conducted binary logistic regression analyses with three separate models. Each model tested whether WTC, SA, and SPCC predicted one of the following dependent variables: behavioral intention to use, perceived usefulness, and

Table 2: The descriptive statistics of the measurement constructs ($N = 280$).

Construct	Item	Mean	SD	Factor loadings (EFA)	Cronbach α
Willingness to Communicate	WTC1	3.55	1.036	0.620	0.84
	WTC2	3.24	1.151	0.629	
	WTC3	3.44	1.073	0.563	
	WTC4	3.06	1.15	0.534	
	WTC5	2.95	1.298	0.522	
	WTC6	2.43	1.095	0.539	
	WTC7	3.24	1.126	0.555	
	WTC8	3.05	1.228	0.474	
	WTC9	4.06	0.997	0.508	
	WTC10	4.29	0.902	0.409	
Speaking anxiety	SA1	2.78	1.002	0.443	0.90
	SA2	2.44	1.056	0.421	
	SA3	2.31	1.019	0.412	
	SA4	2.99	1.13	0.423	
	SA5	3.01	1.155	0.442	
	SA6	3.04	1.07	0.482	
	SA7	3.00	1.097	0.436	
	SA8	2.79	1.126	0.432	
	SA9	3.36	1.056	0.430	
	SA10	3.27	1.029	0.359	
	SA11	2.39	1.048	0.280	
Self-perceived Communication competence	SPCC1	2.66	0.997	0.637	0.93
	SPCC2	3.25	0.950	0.760	
	SPCC3	3.06	0.971	0.625	
	SPCC4	2.93	1.005	0.694	
	SPCC5	3.76	0.895	0.648	
	SPCC6	2.99	0.962	0.691	
	SPCC7	3.16	1.001	0.736	
	SPCC8	2.98	1.033	0.609	
	SPCC9	3.04	0.931	0.695	
	SPCC10	2.76	1.011	0.634	
	SPCC11	3.31	0.979	0.648	
	SPCC12	2.88	0.959	0.687	

EFA, exploratory factor analysis.

perceived ease of use, while controlling for gender, academic year, and English proficiency (see Table 3).

The results revealed that WTC was significantly and positively related to behavioral intention ($\beta = 1.22, p < 0.001$), illustrating that for each 1 % increases in learner’s WTC, the log odds of BI increases by 1.22. Examining the odds ratio of this

Table 3: Effects of psychological constructs on technological acceptance.

Variables	BI			PU			PEU		
	B(SE)	Exp (B)	95 % CI for Exp (B)	B(SE)	Exp (B)	95 % CI for Exp (B)	B(SE)	Exp (B)	95 % CI for Exp (B)
WTC	1.22***	3.37	1.85–6.15	1.34*	3.81	1.24–11.64	0.28 (0.30)	1.33	0.74–2.38
SA	0.10 (0.26)	1.10	0.67–1.83	0.82 (0.55)	2.27	0.77–6.66	–0.29 (0.25)	0.75	0.45–1.23
SPCC	–0.16 (0.28)	0.85	0.50–1.46	–1.27* (0.55)	0.28	0.10–0.82	0.13 (0.28)	1.14	0.65–1.98
Academic year	–0.30 (0.17)	0.74	0.53–1.03	0.19 (0.36)	1.21	0.60–2.44	0.17 (0.17)	1.18	0.84–1.66
Gender	–0.34 (0.35)	0.71	0.36–1.41	–0.25 (0.73)	0.78	0.19–3.29	0.67 (0.38)	1.96	0.92–4.15
English proficiency	–0.31 (0.50)	0.74	0.28–1.95	–0.93 (0.86)	0.39	0.07–2.11	0.39 (0.59)	1.47	0.46–4.71
Model summary									
Cox&Snell R ²			0.10			0.04			0.06
Nagelkerke R ²			0.17			0.16			0.07
N									280

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

parameter estimate shows that for each 1 % increase in WTC, the odds of BI increases by a factor of 3.37. The Hosmer and Lemeshow's test suggest that the model provides a good fit to the data.

In addition, Table 3 indicates that WTC is also significantly and positively related to PU ($\beta = 1.34$, $p < 0.05$), and the odds ratio of it shows that it increases the odds of perceiving the app to be useful by a factor of 3.81. Another significant predictor of PU is SPCC, which has a negative association ($\beta = -1.27$, $p < 0.05$) and increasing the odds of PU by a factor of 0.28. SA was not found significantly correlated with any construct of technological acceptance. No psychological construct that we concern in this study show an association with PEU.

4.2 Students' perceptions of mobile AI speaking apps

To further explore participants' perceptions of mobile AI speaking apps, semi-structured interviews were conducted with 8 participants, extracting two main themes revolving around the benefits and limitations of AI speaking apps.

4.2.1 Affordances of AI speaking apps

Three core benefits emerged from participants' accounts of app-enabled oral language practice. Firstly, participants tended to describe AI speaking apps, in general, as "on-demand speaking partners", valuing the apps' ease of use and the ability to transcend the temporal and spatial constraints of traditional speaking practice. This was particularly beneficial for learners with a high WTC yet limited real-life speaking opportunities. S3 noted the difficulty of finding conversation partners and the high cost of hiring language tutors, whereas AI speaking apps provided accessible, cost-free speaking practice. This highlights learners' appreciation for low-stakes speaking opportunities. Increased exposure to speaking practice led to improvements in fluency and communication confidence (S2, S3, S4). As S3 explained:

I only get to speak English in class once or twice a week, but with the app, I can practice whenever I'm bored. Since I'm speaking more and learning words I can actually use in real situations, my confidence has grown, and my fluency has improved.

Secondly, AI speaking apps contribute to participants' non-judgmental oral rehearsal practice, which created psychologically safer spaces than human interactions. Contrasting the "nobody judges you" app environment with classroom anxiety, one participant (S1) emphasized metacognitive benefits from decoupled response time. As S4 explained: "With apps, I can organize thoughts for a while instead of responding immediately", enabling deliberate language processing that reduced cognitive load.

Finally, the reward mechanisms of certain apps usefully sustained learners' engagement. As S3 explained, certain mobile speaking apps incorporate motivational features, such as daily check-ins and level-up systems, which is a useful way to encourage consistent practice. S3 noted:

The apps usually have a level-up feature, similar to a daily check-in system, which motivates me to practice for at least half an hour to an hour each day.

4.2.2 Pedagogical constraints and development potentials

While recognizing app-enabled benefits, participants identified critical gaps requiring technological-pedagogical integration. Participants identified deficiency in feedback quality, limitations in interactive support, and generic content design.

Specifically, participants raised concerns about the quality of feedback supported by ASR technology. One major issue was that feedback often consisted of pure scores without clear or truly constructive explanations, making it difficult for learners to identify specific areas for improvement (S1, S2, S4). Additionally, while some apps could identify grammar and vocabulary errors, they provided little guidance on structuring spoken responses. The feedback remained superficial, focusing on surface-level corrections without addressing speech appropriateness, logical coherence or content development.

Furthermore, participants problematized language-learning chatbots' limited communicative authenticity. While language-learning chatbots could respond to user input, their speech recognition accuracy and dialogue comprehension were often inadequate, making conversations feel unnatural and impersonal (S1, S2, S4, S6, S8). As S4 suggested:

Some gaming apps have virtual AI characters that engage in "language cosplay", adopting distinct personalities. They can hold romantic conversations and give sweet responses rather than just plain information. This makes interactions feel more like conversations with real people. I hope language-learning chatbots can integrate similar features.

5 Discussion

In this study, we examined the relationship between psychological factors – WTC, SPCC and SA – and technological acceptance among Chinese tertiary students. The results indicated that WTC is significantly, positively associated with intention to use AI speaking apps in the future, and higher perceived usefulness, whereas SPCC negatively predicted perceived usefulness of apps. SA was not associated with any constructs of technological acceptance, and no psychological construct has

association with PEU. Qualitative findings revealed learners' perceptions on the affordances and constraints that have an impact on their acceptance and adoption of AI speaking apps. The findings of the study offer insights into the psychological mechanism underlying technological acceptance, particularly in the context of AI-assisted language learning. Below, we interpret these findings with prior studies, discuss practical implications and propose directions for future studies.

5.1 WTC, SPCC, SA and technology acceptance

In the current study, the positive association between WTC and both BI and PU is illuminated by the qualitative account of AI speaking apps as “psychologically safe rehearsal spaces”. High-WTC learners in interviews emphasized how apps allowed them to bypass social judgment (e.g., S1's comment on “nobody judges you”), which aligns with their heightened PU and BI. The results resonate with existing studies emphasizing the role of proactive communication tendencies in positive technology perception (e.g., Huang and Zou 2024) and that learners with higher WTC may view AI speaking apps as platforms to practice without social judgment, thereby amplifying their perceived utility – a pattern observed in gamified language apps (Lee and Drajati 2020). Our study extends the literature by revealing that WTC's influence transcends PU to directly drive BI, a linkage less emphasized in previous work. This suggests that for AI tools requiring active interaction, WTC may serve as a gateway to both cognitive evaluation (PU) and decisional commitment (BI).

Contrary to previous studies (He and Li 2023; Yang and Lou 2024), which suggested that individuals with higher competence exhibit greater continuance intention or higher PU when utilizing mobile learning for English acquisition, we established that SPCC negatively predicted PU. This inverse relationship challenges the conventional “more competence, higher acceptance” assumption in TAM literature. A plausible explanation for this discrepancy lies in that previous studies examined competence in mobile language learning, whereas the present study focused more on the oral, communication-focused dimension. Moreover, learners with high SPCC, who already feel confident in face-to-face communication, may perceive AI apps as redundant or inferior to human interaction, thereby devaluing their usefulness. A “threshold effect” is thus observed here: for communication-focused AI speaking apps, learners with exceeding real-world competence (high SPCC) may perceive them as inadequate substitutes for human interaction, thereby suppressing PU. This aligns with “AI aversion” theories (e.g., Jussupow et al. 2022) but extends them to pedagogical contexts.

In addition, the lack of association between SA and technological acceptance found in the present study diverges from studies linking anxiety to technology

avoidance (e.g., Barrot et al. 2021). This discrepancy may stem from the nature of interactions in the mobile learning setting. Unlike human-centered, face-to-face communication settings where anxiety directly impairs performance (Gregersen and MacIntyre 2014), AI apps may mitigate anxiety by offering non-judgmental, safe “rehearsal space” to learners – a feature highlighted by participants from our interview data. Alternatively, SA’s non-significance might also be due to measurement limitations; our binary acceptance measure (vs. graded scales in prior studies) could have obscured subtle anxiety effects on perceptions of usefulness or ease of use.

5.2 Toward human-AI synergy: pedagogical and technological implications

Our interview data revealed that mobile AI speaking apps could increase speaking practice frequency and reduce anxiety, aligning with previous research highlighting their motivational features, such as daily check-ins, and the advantages of anonymity (e.g., Zhang and Pérez-Paredes 2021). These tools help overcome time and space limitations and provide a non-judgmental space for practice, which has been shown to alleviate anxiety (Bárkányi 2021). However, despite these benefits, some significant challenges were revealed. First, ASR-based apps often deliver “vague feedback”, failing to identify specific errors like pronunciation subtleties, which limits their effectiveness for more advanced learners – a concern raised by Li and Bonk (2023). Second, the scripted nature of chatbot interactions detracts from their conversational authenticity, diminishing their perceived value, despite their interactive features (Zhang and Pérez-Paredes 2021).

Taken together, actionable insights are drawn from the study. EFL educators could consider integrating AI speaking apps into classroom practice, such as using apps for preparatory rehearsal (aligning with “low-stakes practice” comment), then transferring skills for human interactions. In addition, strategically positioning AI tools as complementary to human interaction may reconcile high-SPCC learners’ skepticism. For AI speaking apps’ developers, enhancing conversational authenticity and tiered feedback systems could address diverse learners’ needs, including creating real-world scenarios for interlocutors and giving error diagnosis with higher accuracy.

6 Conclusions

Contextualized in the rapidly evolving landscape of AI-assisted language learning, this study investigated the psychological factors of Chinese EFL learners' acceptance and adoption of mobile AI speaking apps through TAM. Results revealed that learners' WTC significantly predicted both behavioral intentions to use AI apps and their perceived usefulness, that SPCC inversely influenced perceived usefulness, and that SA showed no direct correlation with acceptance. By integrating psychological constructs (WTC, SPCC) into TAM, this study extends the model to emphasize learner disposition as a critical driver of AI tool adoption, and draw pedagogical and technological implications. Also, the mixed-methods design further illuminated how quantitative patterns (e.g., WTC's predictive power) align with learners' qualitative experiences (e.g., apps transcending spatiotemporal constraints for communication and offering motivational feedback for continuous learning).

However, limitations of this study include the homogeneity of the sample, primarily consisting of English-major tertiary students, which may restrict the generalizability of the findings. Additionally, the binary measure of PU and PEU, instead of the use of graded scales, might to some extent obscure the psychological effects on technology acceptance. Additionally, the small sample size of interviewees might limit the breadth of perspectives captured. Future research should incorporate more diverse participants and larger interviewee sample sizes to enhance the representativeness and reliability of the findings.

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