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A latent profile analysis of EFL learners' self-efficacy: Associations with academic emotions and language proficiency

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1. Introduction

In the endeavor to understand human achievement, and academic success in particular, a range of theories postulated the importance of self-concepts in motivating and regulating behaviors, including social cognitive theory (Bandura, 1997), learned helplessness theory (Peterson et al., 1993), attribution theory (Meyer, 1980) and self-determination theory (Deci & Ryan, 1987). Self-efficacy, as one of the most important components of self-concepts, has been extensively studied. Empirically, it has been positively associated with subsequent academic proficiency in a bulk of research, including cross-sectional and longitudinal studies (Caprara et al., 2011; Wang & Bai, 2017) as well as meta-analyses (Honicke & Broadbent, 2016; Richardson et al., 2012; Talsma et al., 2018).

Besides self-efficacy, the importance of affective factors have also been acknowledged by a number of theories following the positive psychology movement, including broaden-and-build theory (Fredrickson, 2001), control-value theory (Pekrun, 2006) and

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complex dynamic systems theory (Toffoli, 2020). Their postulations are simple such that learners are emotional entities who are subjectively responsive to situations, objects and persons surrounding the learning context. Learners could experience full-blown emotions such as pride, enjoyment, shame, boredom, and frustration, to name a few. Influenced by multiple sources and particularly self-efficacy (Zhang & Rahimi, 2014), these emotions could exert substantial impact on learning outcomes. Nonetheless, no study has investigated how they vary as a function of self-efficacy in the domain of second language acquisition.

The abovementioned two constructs (i.e., self-efficacy and academic emotions) are of great relevance for Chinese EFL learners, who are characterized by low levels of self-efficacy (Salili et al., 2001, pp. 221–247; Scholz et al., 2002; Wang et al., 2013) and high levels of negative emotions especially anxiety (Liu, 2006; Shao et al., 2013). Chinese students are the largest EFL group followed by those in India and Europe. Most students start formal English language learning since primary schools. For university students, English learning is usually embedded in a compulsory College English Course. For many Chinese non-English major EFL students, the motivation to learn English has been predominantly driven by external factors such as passing examinations, accumulating academic credits, earning future employment or overseas study opportunities (Chen et al., 2005). According to a survey on Chinese EFL learners, more than one third of them were anxious in English classrooms, fearful of negative evaluation and unwilling to communicate (Liu & Zhang, 2008). Cross-cultural studies also indicated that Asian students (e.g., Singapore, China) were less self-efficacious despite outstanding language achievement (Scholz et al., 2002). In order to facilitate EFL instruction, it would be necessary to gain a holistic view on the levels of students' self-efficacy, and, more importantly, how diverse combinations of it may link to students' emotional experiences and language learning outcomes.

2. Literature review

2.1. Self-efficacy and EFL proficiency

Within the domain of educational psychology, self-efficacy, usually described as academic self-efficacy, was conceptualized as learners' judgement of their capabilities to complete a specific task and attain academic goals (Bandura, 1993). It could, in concert with environmental factors, help determine what learners do with the knowledge and skills they possess and thereby explain the varied degree of academic success among those with similar abilities (Pajares, 1997). Its positive association with academic achievement is consistent across disciplines (e.g., math, first language learning), learning settings (e.g., primary, secondary and university population) and specificity of outcomes (e.g., math, general academic attainment). In a meta-analysis investigating psychological correlates of undergraduates' academic success (Richardson et al., 2012), self-efficacy turned out to be the strongest predictor out of 50 measures, followed by high school GPA, aptitude and intelligence.

With decades of theoretical refining, self-efficacy is now believed to be malleable as a function of tasks, skills and contexts (Woodrow, 2011). Focusing on the EFL setting, although this construct was less researched compared with in other disciplines such as math and science (Wang & Bai, 2017), extant literature yielded significant findings. For example, high efficacious students tended to exhibit lower language learning anxiety (Woodrow, 2011), devote more time to language learning (Woodrow, 2011), adopt internal rather than external attribution style (Hsieh & Kang, 2010), set proficiency-approach rather than proficiency-avoidance goal (Liem et al., 2008), employ more self-regulated learning strategies (Wang & Bai, 2017), demonstrate greater persistence in times of adversity (Pajares, 2009) and, expectedly, achieve higher in English tests (Raoofi et al., 2012).

When it comes to specific language skills, writing self-efficacy was the most frequently studied (e.g., Bruning et al., 2013; Chea & Shumow, 2014; Shen et al., 2020; Woodrow, 2011). Writing self-efficacy in general and also in writing components such as writing ideation, organization, grammar and spelling were positively correlated with writing proficiency among Chinese sophomore students (Sun & Wang, 2020). Nonetheless, contradictory findings also exist. In another study among Chinese undergraduates, Zhang and colleagues found that writing self-efficacy was only correlated with English writing proficiency for freshmen, as opposed to sophomores (Zhang & Guo, 2012). In one cross-sectional study among Malaysian undergraduates, writing self-efficacy was not related to English writing proficiency whatsoever (Jalaluddin, 2013). A quasi-experiment conducted in UK revealed that self-efficacy was not related to writing scores in neither pre- nor post-tests (Wilby, 2020).

A number of moderators might account for the abovementioned inconsistency. For example, an undergoing meta-analysis found that the relationship between self-efficacy and writing proficiency could vary according to cultural contexts, with the effect size larger among Asian students than among Western counterparts (Sun & Wang, in progress). Another potential factor concerns the research method. The majority of previous studies on self-efficacy were variable-centered, inferring correlation or regression coefficients with mean scores, which may be problematic when students do not follow similar patterns of self-efficacy. These observations suggest that the examination of self-efficacy should be extended to a wider range of population with appropriate data analysis methods in order to better capture its nature and outcomes.

2.2. Academic emotions in the EFL context

Emotion refers to a wide spectrum of subjective status involving cognitive, physiological, and affective components (Scherer, 2000). Academic emotions, elsewhere also called achievement emotions, are defined as those that are directly linked to learning process (e.g., enjoyment of vocabulary recitation), classroom activities (e.g., pride of oral output), and learning achievements (e.g., test anxiety) (Pekrun et al., 2002). Based on the two dimensions recommended by Pekrun (2002), namely valence (positive vs negative) and activation (activating vs deactivating), academic emotions may be distinguished into four types: positive activating emotions (e.g., enjoyment, pride), positive deactivating emotions (e.g., relaxation, relief), negative activating emotions (e.g., anxiety, anger), and

negative deactivating emotions (e.g., boredom, hopelessness). According to the broaden-and-build theory (Fredrickson, 2001) with reference to the valence dimension, positive academic emotions could broaden learners' activities, promote their persistence and engagement (Pekrun et al., 2002; Zhang et al., 2020), enable them to face up to challenges (Fredrickson & Joiner, 2018) and ultimately facilitate learning whereas negative academic emotions could limit learners' flexibility (Derakshan et al., 2009), obstruct engagement and hinder proficiency (Zhang et al., 2020).

Given that language acquisition is a process intertwined with emotional and cognitive interactions (Greenspan, 1992), emotions "deserve far greater attention in the language learning domain" (MacIntyre, 2002). The questions of whether to study a foreign language and whether to continue studying it are largely dependent on emotions (Méndez López & Peña Aguilar, 2013). Upon the rise of humanistic approach, academic emotions, including both positive and negative ones, have gained popularity in the field of second language acquisition (see Dewaele & Li, 2020 for a review; Li et al., 2020). Due to the socio-cultural and linguistic demands imposed on learners, literature primarily evolved around foreign language classroom anxiety (Boudreau et al., 2018; Dewaele & Li, 2020; Dewaele & MacIntyre, 2014; Imai, 2010; Liu, 2006; Yu et al., 2015) and to a less extent enjoyment (Piniel & Albert, 2018; Saito et al., 2018; Shirvan & Taherian, 2018) and has laid profound foundations.

Anxiety was found frequently experienced by language learners, who, in the case of conducting oral presentations for example, may find themselves struggling to choose appropriate vocabulary and grammatical structure especially in front of teachers, peers, and native speakers. According to a study among Chinese undergraduates, such emotion was significantly associated with self-rated EFL proficiency among students with different levels of achievement while results with regard to enjoyment was quite the contrary (Li et al., 2020). Alongside with anxiety, emotions such as fear and stress could compromise learners' learning capacity whereas positive emotions such as enjoyment and motivation could greatly facilitate language learning (Shao et al., 2013). However, despite the recent call for a broader range of academic emotions experienced by EFL learners (Dewaele & MacIntyre, 2014), little is known about emotions in addition to anxiety and enjoyment.

2.3. Self-efficacy and academic emotions

Based on the control-value theory (Pekrun, 2006), the primary antecedent of academic emotion is learners' cognitive assessment of perceived control and perceived value. The former refers to learners' perception of the controllability of learning activities and outcomes, shown through the perception of competence (i.e., academic self-efficacy). Less self-efficacious students are more likely to feel dread of learning activities, anticipate failure and appraise challenging tasks as a threat, a result of which would be increased anxiety of upcoming outcomes and a sense of shame (Bandura, 1997; Putwain et al., 2010). In contrast, those who perceive more competence and a sense of control are more likely to face up to challenges, anticipate success, and experience pleasant rather than unpleasant emotions when the learning goals are achieved (Putwain et al., 2013).

The conceptual influence of self-efficacy on academic emotions has been empirically supported among medical and general undergraduates on the whole (Hayat et al., 2020; Mega et al., 2014; Putwain et al., 2013). Self-efficacy in educational skills and behaviors directly and indirectly (through academic proficiency) predicted more pleasant and fewer unpleasant academic emotions both cross-sectionally and prospectively (Putwain et al., 2013). Another study reported the significant mediation effect of academic emotions between self-efficacy and learning engagement (Zhen et al., 2017). Research on discrete academic emotions found that higher levels of self-efficacy were related to lower levels of test anxiety but higher levels of enjoyment of learning (Pekrun et al., 2004).

2.4. Limitations of previous studies

Amongst the preceding studies examining self-efficacy in the EFL context, there are knowledge gaps yet to be addressed. Firstly, they were heavily based on variable-centered approach aiming to understand relationships between self-efficacy as the independent variable and language proficiency as the dependent variable. This approach aims to summarize trends across group-level participants with the assumption that this group level is representative of the larger population (Laursen & Hoff, 2006). Thus, it fails to explain how learners combine self-efficacy in different language skills (e.g., listening) or how they are integrated into self-efficacy profiles. In the case where learners do not follow the same pattern but exhibit distinct sub-patterns, such approach may be problematic. In contrast, person-centered approach could reveal unobserved heterogenous subgroups (Hagenaars & McCutcheon, 2002) by discovering, for example, whether students who are efficacious in listening are also those who are efficacious in writing. To the best of our knowledge, there is only one study which examined EFL learners' self-efficacy profiles using a person-centered approach (Kim et al., 2015). However, its focus was the comparison of self-regulated learning strategies rather than language proficiency as a function of profiles generated. Woodrow's (2006) study, parceling self-efficacy as one component in a multi-dimensional scale pertaining to adaptive language learning, did not tease out the unique pattern of self-efficacy per se. Thus, it remains unknown how students profiled may differ in their language proficiency.

Secondly, antecedents of academic emotions are underexplored among EFL learners. Even though the link between self-efficacy and academic emotions has been established in other domains (cf. 2.3), such relationships are underexamined in English learning contexts. It remains underexplored whether and to what extent self-efficacious EFL learners would experience more pleasant emotions. In order to cultivate positive academic emotions and optimize language teaching, it would be necessary in the first place to explore predictors of a broader spectrum of emotions among EFL learners. Given the importance of affective and cognitive factors in language learning, it would be necessary to find out how individual psychosocial differences, such as self-efficacy beliefs, would trigger emotions.

2.5. The current study

Taken together, no research has investigated how Chinese EFL students evaluate their capabilities in different language skills with a person-centered approach, and how such evaluations would associate with their academic emotions and language proficiency. To fill this gap in research, the current study aimed to address two research questions:

1. Are there any underlying self-efficacy latent profiles composed of four skills of language learning (i.e., listening, speaking, reading and writing)?
2. What are the relationships between self-efficacy latent profiles, academic emotions and language proficiency?

Based on the forgoing literature, it was hypothesized that the level of academic emotions and language proficiency would be differentially associated with each profile in that students with higher levels of self-efficacy would achieve higher language proficiency and experience more positive academic emotions but those with lower self-efficacy levels would achieve lower language proficiency and experience more negative academic emotions.

3. Method

3.1. Participants and procedure

Participants were 300 non-English major undergraduate students (62 males, 238 females) enrolled in College English Course from two universities situated in southern China. College English Course served as a compulsory course for freshmen and sophomores with an aim to improve their comprehensive English proficiency in all four integrated English skills, i.e., listening, speaking, reading, and writing. Participants were on average 20 years old ($M = 20.3$; $SD = 2.1$). Questionnaires were administered via an online platform (*Wenjuanxing*, the equivalent of SurveyMonkey in China). Participants were informed of the purpose of the study, guaranteed the confidentiality of the data to be collected and the right to withdraw from the study at any time without penalty and signed the official consent form. Missing data were less than 5%.

3.2. Measures

3.2.1. Academic self-efficacy

The Questionnaire of English Self-Efficacy scale (QESE; Wang et al., 2013) aims to measure students' self-efficacy beliefs in language learning. It comprises of 32 items on a 7-point Likert scale (from 1 = I cannot do it at all to 7 = I can do it very well). Consistent with the task- and skill-specificity of self-efficacy, items pertain to students' perceived capabilities to complete certain tasks using English in listening, speaking, reading, and writing activities. This scale has been validated among Chinese undergraduates and demonstrated psychometric excellence (test-retest reliability: 0.82; concurrent validity: 0.55; internal consistency: 0.96) (Wang et al., 2013).

3.2.2. Language proficiency

Participants were required to self-report their scores (including a total score, and individual scores for each of the listening, reading, translation and writing sections) in a standardized College English Test-Band 4 (CET-4) which is the most influential English test for non-English majors in China and university students are mandatorily required to take the test by most universities in China, including the two in this study. Chinese college students were required to pass it for the sake of graduation and future job applications (Sun & Wang, 2020). CET-4 is composed of four parts: listening, reading, translation, and writing. Among the four sections, listening and reading comprehension are measured by multiple choice questions and rated by computers while translation and writing parts are rated by College English teachers. The inter-rater and intra-rater reliability were guaranteed by the comprehensive process of training, calibration and monitor of raters (Sun & Wang, 2020). Researchers have widely acknowledged its excellent reliability and validity to represent English proficiency and thus applied it in numerous studies (see Zhang, 2019 for a review).

3.2.3. Academic emotion

The 37-item Academic Emotions Questionnaire (AEQ; Pekrun et al., 2011) was adapted to measure students' academic emotions in language learning with the wordings slightly modified to fit the Chinese university EFL learning context. It consists of three parts pertaining to five types of emotions (enjoyment, pride, anger, anxiety and shame) related to classroom, learning, and exams on a five-point Likert scale (from 1 = strongly disagree to 5 = strongly agree). Among them, enjoyment and pride were grouped into one scale as positive emotions whilst anger, anxiety and shame as negative emotions. This scale has been well validated among Chinese students (Zhen et al., 2017).

3.3. Data analysis

Latent profile analysis (LPA) was carried out to identify student subgroups (profiles) with homogeneous self-efficacy beliefs. This approach is an appealing alternative to other typical analytical approaches using a threshold on a continuous scale or some diagnostic scores since it creates internally homogenous and externally heterogeneous subgroups using maximum likelihood estimation (Wang

Table 1
Descriptive statistics (means, standard deviations, internal consistency) and correlations among the variables in this study.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Academic Self-efficacy																
1.Total	–															
2.Listening	.88[a]	–														
3.Speaking	.91[a]	.74[a]	–													
4.Reading	.92[a]	.77[a]	.74[a]	–												
5.Writing	.91[a]	.69[a]	.80[a]	.81[a]	–											
Academic Emotion																
6.Enjoyment	.46[a]	.42[a]	.38[a]	.41[a]	.46[a]	–										
7.Pride	.48[a]	.42[a]	.43[a]	.41[a]	.45[a]	.76[a]	–									
8.Anxiety	-.34[a]	-.25[a]	-.31[a]	-.32[a]	-.34[a]	-.49[a]	-.39[a]	–								
9.Anger	-.31[a]	-.29[a]	-.23[a]	-.33[a]	-.30[a]	-.37[a]	-.30[a]	.59[a]	–							
10.Shame	-.37[a]	-.27[a]	-.36[a]	-.36[a]	-.35[a]	-.21[a]	-.26[a]	.64[a]	.68[a]	–						
11.Posi	.50[a]	.45[a]	.43[a]	.43[a]	.49[a]	.95[a]	.93[a]	-.47[a]	-.36[a]	-.25[a]	–					
12.Nega	-.39[a]	-.31[a]	-.35[a]	-.39[a]	-.38[a]	-.41[a]	-.37[a]	.86[a]	.86[a]	.89[a]	-.42[a]	–				
Language proficiency																
13.Total	.22[a]	.20[a]	.19[a]	.22[a]	.20[a]	.01	.03	-.16[a]	-.17[a]	-.19[a]	.02	-.20[a]	–			
14.Listening	.20[a]	.24[a]	.16[a]	.18[a]	.15[a]	.07	.10	-.11	-.15[a]	-.13[b]	.09	-.15[a]	.64[a]	–		
15.Reading	.13[b]	.12[b]	0.1	.13[b]	.12[b]	-.01	.03	-.12[b]	-.09	-.13[b]	.01	-.13[b]	.66[a]	.73[a]	–	
16.T&W	.13[b]	.16[a]	.07	.13[b]	.11	.03	.03	-.10	-.06	-.06	.03	-.09	.47[a]	.75[a]	.79[a]	–
M	18.7	4.41	4.91	4.66	4.70	3.21	2.85	2.18	3.00	2.55	6.07	7.72	520	176	185	164
SD	3.38	.91	.97	.91	.94	.65	.55	.73	.64	.68	1.12	1.78	61.9	41.7	38.1	34.7
Cronbach's α	.97	.91	.95	.93	.92	.89	.84	.89	.73	.84	.92	.92	–	–	–	–

Note: Posi: positive emotions; Nega: negative emotions; Total: the total score of CET-4; T & W: Translation & Writing.
[a] $p < 0.01$.
[b] $p < 0.05$.

et al., 2021). Also, LPA is a model-based technique generating model fit statistics and is useful for comparing models for hypothesis testing (Petersen et al., 2019). In addition to the objective model fit indices, the optimal number of profiles is also based on the interpretability of results, which strengthened the reliability and validity of this method. This method assumes that 1) observations are independent of each other, which makes it unsuitable to deal with hierarchical datasets wherein participants were nested within groups (e.g., classes, schools); 2) covariance matrices are equal across profiles (i.e., local independence) which is similar to assumptions in linear discriminant analysis (Asparouhov & Muthén, 2008; Vermunt et al., 2004).

Compared with previous variable-centered approach, LPA has several advantages over the traditional variable-centered approach wherein self-efficacy of four language skills were treated as four distinct continuous variables: (1) it could address unobserved heterogeneity within subsets of population and thus demonstrate distinct patterns of learner self-efficacy and put them into different groups by showing the different combination of this construct in four language skills. Thus, participants with different patterns of the four skills (e.g., relatively low self-efficacy in speaking and writing but high self-efficacy in listening and reading) could be identified. (2) it is a probability- and model-based approach with profiles not simply classified according to means and standard deviations, as was in traditional cut-off score method, but to various model fit indices (e.g., BIC, AIC) via maximum likelihood estimation. With these indices, researchers could evaluate the interpretability and representativeness of the profiles generated. If, for example, four groups were deemed as the optimal choice according to the software, but one of the groups constitutes only 1% of the whole sample, then we would further consider whether to retain this group or not. So, with the combination of objective model fit indices and comprehensive judgement based on the forgoing literature, this method has demonstrated excellent reliability and validity. (3) it could be robustly used for data violating normal distribution assumptions, linear relationships and homogeneity of variance and thus outperforms traditional linear regression (Magidson & Vermunt, 2002).

Based on the literature, there may exist different underlying self-efficacy profiles (Kim et al., 2015), thus we finally adopted this newly developed but well acknowledged method. Model fit indices were compared with varying number of profiles ranging from 2 to 6. The optimal profile solution was determined based on Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), sample size adjusted BIC (aBIC), the *p*-value of the Lo-Mendel-Rubin's Likelihood ratio test (LMR), Bootstrap Likelihood ratio test (BLRT), and entropy. Lower AIC, BIC and aBIC imply better model fit. A significant *p*-value (less than 0.05) in the LMR test suggests that a *k* class model improves the fit over the *k*-1 class model. Higher entropy indicates better classification accuracy with value above 0.70 indicating acceptable delineation of clusters (Jung & Wickrama, 2008). Besides these indices, the interpretation and representativeness of each profile (>5% of the sample) were also considered in the final model selection. After LPA analysis, newly derived profiles of self-efficacy were compared in terms of distal outcomes (language proficiency and academic emotion) with a series of analyses of variance (ANOVA) and post hoc tests. All the analyses were performed on software Mplus 7.0 and SPPS 25.

4. Results

4.1. Basic statistics

Descriptive information (means, standard deviations, Cronbach's α and zero-order correlation) of all constructs and subscales in this study was presented in Table 1. All the scales showed excellent internal consistency (αs $\geq$ 0.73). Aggregated and specific self-efficacy of four language skills were correlated with all the dimensions of academic emotions and the majority of language test scores.

The fit indices and criteria of the optimal number of clusters using the standardized scores of self-efficacy were shown in Table 2. AIC, BIC, aBIC decreased with the additional clusters with the fit improved relatively little from 4-profile onwards. Although the LMR test indicated the 4-profile model fitted the data better than the 3-profile model ($p < 0.05$), proportion of the smallest cluster in the 4-profile model was less than 5%, which indicated that the fourth cluster was not representative. The BLRT test of the 3-profile model was significant ($p < 0.05$) indicating that the 3-profile solution fitted the data better than the 2-profile model in spite of the non-significant LMR test ($p = 0.067$). The BLRT indices were chosen over the LMR because of its consistency in detecting the optimal number of classes (Nylund et al., 2007). Further examination of the 3-profile model plot (Fig. 1) revealed that the three profiles generated were distinctive, representative, and theoretically sensible. Thus, the 3-profile solution was considered optimal.

4.2. Self-efficacy profiles

Fig. 1 presented the breakdown of standardized self-efficacy scores of the three profiles generated which demonstrated comparable levels of self-efficacy in four language skills. The first cluster (labelled "*low self-efficacy profile*"; $M = 3.70$; $SD = 0.52$) consisted of 89 participants (29.7%) who reported the lowest level of self-efficacy for all four dimensions of language learning. The second cluster

Table 2
Fit indices for different models with varying number of latent classes.

Number of profiles	AIC	BIC	aBIC	LMR *p*	BLRT *p*	Entropy	Smallest cluster freq.
2	2964.12	3012.27	2971.05	0.002	<0.0001	0.82	131 (.44)
3	**2768.88**	**2835.55**	**2778.47**	**0.067**	**< 0.0001**	**0.85**	**61(.20)**
4	2569.15	2654.34	2581.40	0.005	<0.0001	0.90	10 (.03)
5	2533.32	2637.03	2548.23	0.047	<0.0001	0.91	6 (.02)
6	2502.27	2624.50	2519.84	0.100	<0.0001	0.9	7 (.02)

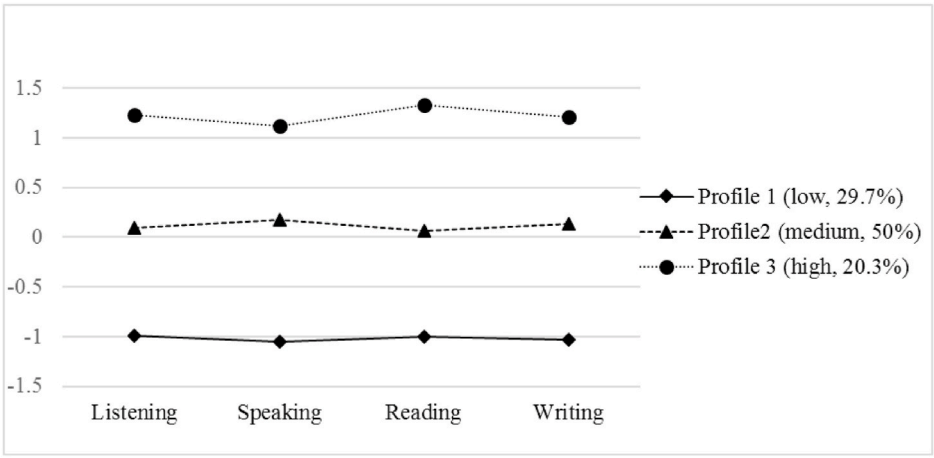

Fig. 1. The three self-efficacy profiles with z-scores identified by latent profile analysis.

("*medium self-efficacy profile*"; $M = 4.78$; $SD = 0.31$), also the largest one, comprised 150 participants (50%) who reported moderate scores on self-efficacy. The last cluster ("*high self-efficacy profile*"; $M = 5.82$; $SD = 0.37$) was composed of 61 participants (20.3%) who were the most self-efficacious on the four language skills. There was no gender ($\chi^2 = 0.44$, *ns*) or age difference ($F = 0.21$, *ns*) with regard to the three clusters. Fig. 2 visualized the group comparison in terms of academic emotions and language proficiency.

4.3. Differences in academic emotions and language proficiency

As shown in Table 3, Post-hoc comparison with Bonferroni adjustment found that there were significant group differences in the majority of outcomes except for translation & writing scores. Specifically, those in the high self-efficacy group reported the highest levels of pleasant academic emotions including enjoyment ($M = 3.69$, $SD = 0.72$), pride ($M = 3.26$, $SD = 0.59$), and aggregated positive emotions ($M = 6.95$, $SD = 1.20$), while the lowest levels of unpleasant academic emotions including anger ($M = 1.77$, $SD = 0.81$), shame ($M = 2.02$, $SD = 0.76$), and aggregated negative emotions ($M = 6.34$, $SD = 1.94$), followed by those in the medium self-efficacy group, and low self-efficacy group. They also performed the best in the overall CET-4 test, and subtests in listening and reading. Students with the medium and low level of self-efficacy, however, differ in neither the overall language proficiency nor specific language skills. There was no group difference whatsoever in terms of translation and writing test scores.

5. Discussion

This study advanced the current literature by (1) classifying students' differences in self-efficacy operationalized as students' confidence in their EFL-related skills with a person-centered approach, and (2) comparing students in distinct self-efficacy profiles on language proficiency and academic emotions. Consistent with the hypotheses, students in different self-efficacy profiles showed significantly different levels of academic outcomes.

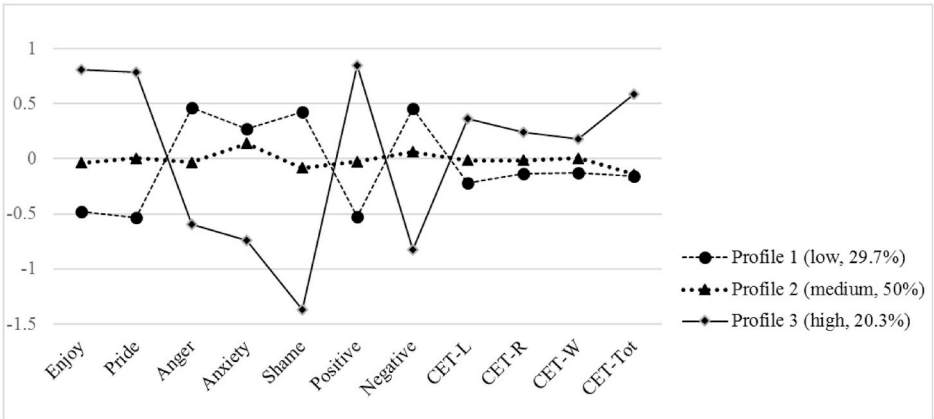

Fig. 2. Differences in student outcome measures (z-score) across the three self-efficacy profiles.

Table 3
ANOVA results examining the differences in student outcomes across the three self-efficacy profiles.

Outcomes	Profile 1 (low, N = 89)		Profile2 (medium, N = 150)		Profile3 (high, N = 61)		Post-hoc	ANOVA	
	Mean	SD	Mean	SD	Mean	SD	Comparison	F (2, 297)	η^2
Positive	5.50	0.88	6.04	0.99	6.95	1.20	1, 2 < 3	36.92[a]	0.20
Negative	8.47	1.43	7.83	1.59	6.34	1.94	3, 2 < 1	31.88[a]	0.18
Enjoyment	2.92	0.52	3.19	0.57	3.69	0.72	1, 2 < 3	31.33[a]	0.17
Pride	2.58	0.45	2.85	0.49	3.26	0.59	1, 2 < 3	33.29[a]	0.18
Anger	2.49	0.61	2.16	0.67	1.77	0.81	3, 2 < 1	19.95[a]	0.12
Anxiety	3.15	0.49	3.06	0.64	2.55	0.66	3 < 1, 2	20.66[a]	0.12
Shame	2.83	0.64	2.60	0.55	2.02	0.76	3, 2 < 1	31.31[a]	0.17
CET-4 tot	510.55	59.32	512.32	56.06	553.66	53.37	1, 2 < 3	11.84[a]	0.07
Listening	167.51	30.69	175.51	50.64	190.3	24.07	1, 2 < 3	5.62[b]	0.04
Reading	179.77	27.37	184.17	46.39	193.25	25.78	1 < 3	2.32	0.02
T & W	160.34	20.94	164.53	44.97	170.30	16.73	*ns*	1.50	0.01

Note: Positive: positive emotions; Negative: negative emotions; CET-4 tot: the total score of CET-4.
T & W: Translation & Writing.
[a] $p < 0.001$.
[b] $p < 0.01$.

5.1. Prevalence and profiles of self-efficacy

Latent profile analysis identified three distinct groups: *low self-efficacy* (prevalence rate: 29.7%), *medium self-efficacy* (50%), and *high self-efficacy* (20.3%). Students in the first group perceived themselves as the least capable in mastering all dimensions of language learning skills (i.e., listening, speaking, reading and writing) whilst those in the last group showed the most confidence and the second group in the middle. The classification results echoed another study conducted among Korean students (Kim et al., 2015) which also reported tripartite profiles.

However, what is different is that Kim and his colleagues' study found that students were evenly distributed (low self-efficacy: prevalence rate 34%; medium self-efficacy: 35%; high self-efficacy: 31%) whilst the current study found disproportionate profiles with *medium self-efficacy* as the dominate group, composed of half of the sample, and with *high self-efficacy* as the smallest one. This may suggest a cultural difference such that high competent Chinese students tended to underestimate their capabilities, as indicated in previous cross-cultural studies comparing Chinese students with European and American counterparts (Scholz et al., 2002; Wang et al., 2013). Presumably, influenced by the Confucian beliefs in humbleness and test-oriented language instruction in China (Wang et al., 2012), there is incongruence between students' actual abilities and their perceived abilities. Nonetheless, whether there is self-efficacy difference among Asian sub-cultures is worthy of future investigation.

Further observation on the three profiles indicated that participants tended to report relatively comparable levels of self-efficacy across the four dimensions. In other words, students who felt competent in one language skill (e.g., speaking) were also those confident in other language skills (e.g., listening). Such finding was indeed unexpected and possibly due to the nature of self-efficacy in the language learning settings. For adult language learners, it is more common that the four skills progress at a comparable speed. In other words, those who excel in speaking are more likely to outperform others in reading and that is why their self-evaluations of the four abilities vary accordingly. Previous studies measuring the multidimensionality of self-efficacy also found that there were high correlational coefficients (above 0.81) across different language skills (e.g., Wang et al., 2013). However, this assumption warrants further exploration comparing students' self-efficacy in different contexts, tasks and skills. It might be also necessary for future questionnaires to tap into the invariance and stability of self-efficacy across different contexts and tasks in addition to skills.

5.2. Associations between self-efficacy profiles, academic emotions and language proficiency

Expectedly, students in different self-efficacy clusters demonstrated different levels of language proficiency. The low and medium self-efficacy groups reported significantly lower scores in the overall language test and the listening subtest than the high self-efficacy group. This finding was in line with the predictive role of self-efficacy on language proficiency in the EFL field (Wang & Bai, 2017; Wang et al., 2013). In terms of reading performance, despite the significant correlation between self-efficacy and reading scores, reading score differences were only present between students at the two extreme self-efficacy levels, i.e., high and low. In other words, no significant differences were yielded between medium and high self-efficacy groups, nor between medium and low self-efficacy groups.

When it comes to translating and writing score, however, though self-efficacy was correlated with it on a bivariate level (cf. Table 1), ANOVA results indicated that students did not differentiate from each other in this regard. The results resonated with previous studies indicating the non-significant relationship between aggregated language-related self-efficacy and essay writing scores (Wilby, 2020). One possible explanation is that translation and writing, as opposed to listening, impose less psychological pressure because they do not require students' spontaneous response and thus "learner-friendly" (Pan, 2016). The actual language proficiency, hence, was not very much influenced by motivational factors such as self-efficacy.

It is also interesting, albeit surprising, to note that students with low and medium self-efficacy showed no differences in any

language scores, which may imply a curvilinear relationship between self-efficacy and proficiency level in the context of EFL despite a general pattern of higher proficiency for higher self-efficacious students (cf. significant correlations in Table 1). Although there is so far little direct evidence pertaining to this, previous studies have found curvilinear relationship between other motivational constructs (e.g., self-regulated learning strategies, outcome expectancy) and academic performance (Bai et al., 2020; Hong-Nam & Leavell, 2006; Shell et al., 1995). Given the curvilinear growth pattern of self-efficacy reported in previous studies (Hornstra et al., 2013), its relationship with language proficiency is hence understandably more complex.

Taken together, these findings may suggest that the relationship between self-efficacy and language proficiency is contingent on (a) the level of self-efficacy and (b) language skills measured. Those moderately self-efficacious could hardly differentiate themselves in proficiency scores compared with the other two groups. As for language skills, writing and translation proficiency was not as susceptible to the influence of students' self-efficacy as listening and reading.

Turning to academic emotions, students in different self-efficacy profiles were highly distinguishable. In other words, the more self-efficacious they were, the more pleasant emotions they could experience, which was consonant with the postulation in the control-value theory (Pekrun, 2006) that self-efficacy, as cognitive appraisal of controllability, serves as a personal antecedent of academic emotions. When students believe in themselves and expect success in task completion, they tend to enjoy the learning process. When they doubt their competence, learning tasks would be viewed as threats and incur unpleasant emotions. Previous empirical studies have evidenced such positive relationship between these two constructs, i.e., self-efficacy and academic emotions (Hayat et al., 2020; Putwain et al., 2013; Zhen et al., 2017), and the results are now extended to the domain of EFL.

Having said that, anxiety followed a distinctive pattern from other emotions, and hence noteworthy. Highly self-efficacious students felt less anxious than their counterparts, which was quite self-explanatory given that the perceived control would result in calmness. However, group differences were not found between students in the other two profiles. Two psychological mechanisms may be at work in parallel. Firstly, this may be explainable by the control-value theory (Pekrun et al., 2002) wherein anxiety was assumed to be triggered in the case of both low control (possible failure expected) and high value (achievement goal valued). For Chinese non-English major undergraduates, English course is more of the school curriculum than of their personal choice, which means it may not be greatly valued by students (Chen et al., 2005). In such a context, students, except for those who are highly confident, may experience similar levels of tension. Another possible explanation may concern limited exposure to English for Chinese students. Despite having multiple English courses, most of the students are not provided with sufficient real-life interaction opportunities with native speakers of English (Chen et al., 2019) and thus tend to show pervasive anxiety no matter whether they are slightly or moderately self-confident of their capabilities.

6. Conclusion, implications and limitations

The current research classified three distinctive self-efficacy styles among Chinese EFL undergraduates and associated the styles with their academic emotions and language proficiency. It is reported students' emotional experience and English language attainment was related to the degree to which they felt confident in mastering language skills. Specifically, the more students felt confident in language learning ability, the more pleasant (e.g., enjoyment) and fewer unpleasant feelings (e.g., shame) they reported. Even though students with low self-efficacy performed worse in most language scores (overall test, listening and reading subtests) than those with high self-efficacy, students with average level of self-efficacy attained similar language results with the other two groups. The findings greatly contributed to the research field by advancing the knowledge of self-efficacy styles in the Chinese EFL learning context and extended the control-value theory to the EFL context.

The findings carried pedagogical implications for Chinese university EFL teaching and English teaching in similar contexts. Firstly, it is essential to initially raise language learners' awareness of the significance of their self-concepts on language learning outcomes and then consciously boost their self-evaluation of language learning abilities. At the same time, front-line EFL teachers should help students build confidence with a range of strategies such as providing appropriate positive feedback (e.g., praise, reward), sufficient background knowledge and scaffolding. Given the little difference in language proficiency between students with average level of self-efficacy and other groups, teachers should pay additional attention to this particular group and foster their confidence to an upper level especially in listening activities, otherwise such students would fare as bad as those lacking confidence.

Secondly, in light of the expected associations between self-efficacy and language proficiency and between self-efficacy and academic emotions, efforts should be devoted to the cultivation of students' understanding of emotions in the learning process and abilities to regulate emotions. Despite a surprising lack of research on L2 emotional regulation, there are some available strategies which were found beneficial including situation selection, situation modification, attentional deployment, cognitive change, and response modulation (Gross, 2014; Mercer, 2015). It is also necessary for teachers to create pleasant emotional atmosphere, provide emotional care and coach students in terms of emotional regulation strategy. Educators in general and curriculum developers in particular are advised to care for students' emotional well-being via programs enhancing their social and emotional learning skill or embedding positive psychology elements (Bai et al., 2021).

There are limitations that should be noted. Firstly, the current study is based on a limited number of students from only two universities in mainland China, which restricted the generalizability of results. Future studies may benefit from the inclusion of students with diverse background. Secondly, the cross-sectional design precluded us from measuring neither the stability of profiles nor their longitudinal associations with student outcomes. It would be interesting that future longitudinal studies could explore (a) if the three profiles are stable across time and (b) if academic emotions mediate self-efficacy and prospective language achievement. There was evidence that self-efficacy influenced academic emotions which in turn associated with students' academic proficiency (Hayat et al., 2020), but such link has not yet been tested among EFL students.

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Data availability

The datasets generated during and/or analyzed during the current study are not publicly available because some results are yet to be published but are available from the corresponding author on reasonable request.

Declarations of interest

None.

Declaration of competing interest

There is no conflict of interest.

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