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Validating the multi-dimensional structure of self-efficacy beliefs in peer feedback for L2 writing: A bifactor-exploratory structural equation modeling approach

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ABSTRACT

The present study aims to validate a new scale, i.e., self-efficacy beliefs in peer feedback (SEBPF), using an advanced method of bifactor ESEM. Informed by sociocognitive theory and self-regulated learning, the SEBPF was designed to measure five distinct factors: self-incentives for peer feedback, perceived use of peer feedback, confidence in peer feedback, managing stress in peer feedback, and setting proximal goals for peer feedback. The items for the SEBPF scale were developed by extracting relevant themes from published studies and conducting interviews with a sample of English as a Foreign Language (EFL) student writers in China. This paper provides a comprehensive account of the developing and validating process of the SEBPF scale. Comparisons of confirmatory factor analysis and exploratory factor analysis support the criterion-related validity of a coherent 5-factor structure comprising 22 items, indicating the reliability and multi-faceted nature of the SEBPF scale. The findings demonstrate the robustness and practical applicability of the SEBPF scale in assessing EFL writers' self-efficacy beliefs associated with peer feedback, as well as its predictive effects on different sub-scores of writing performance. This paper is an empirical application of validating a new scale through bifactor ESEM. Implications were proposed based on the findings.

1. Introduction

Peer feedback is a vital component of the writing process, acting as a crucial link between the solitary act of writing and the collective aspect of communication (Liu & Hansen, 2002). This collaborative method leverages peers' varied perspectives, experiences, and expertise, transforming writing from a solitary endeavor into a dynamic exchange. The significance of peer feedback is manifold. It enhances clarity and readability by providing writers with an external viewpoint on how their text is interpreted, pinpointing areas that may confuse readers, suggesting clear phrasing, or identifying jargon that could alienate specific audiences (Hyland & Hyland,

2006). Additionally, engaging with peer feedback fosters self-efficacy and reflection, challenging writers to reassess their work through the insights of others, which can lead to heightened awareness as a self-regulated student writer (Nicol & Macfarlane-Dick, 2006).

Self-efficacy in peer feedback is a critical yet underexplored area within applied linguistics research. Self-efficacy, a pivotal affective factor, plays a significant role in enhancing learners' academic performance by instilling confidence that leads to improved outcomes (Pajares & Valiante, 2006). In writing, a discipline often characterized by its complexity and dynamic nature (Hayes, 2012), self-efficacy is crucial. Successful writing requires not only the active application of knowledge but also strong self-efficacy, enabling students to effectively utilize their knowledge and regulate their behavior throughout the writing process (Graham, 2007; Teng & Wang, 2023). This is particularly true for peer feedback, a critical component of the writing process that has been somewhat neglected in studies focused on self-efficacy beliefs.

Over the past three decades, considerable attention has been devoted to various aspects of writing research, including writing self-efficacy (Teng, 2024; Teng et al., 2018), writing products (Li & Zhu, 2017), and writing feedback (Chen, 2016; Teng & Ma, 2024). However, the specific influence of individuals' self-efficacy beliefs in their reception and utilization of peer feedback has not been adequately addressed. Given that positive self-efficacy can foster a greater interest in writing, increase effort, and encourage perseverance (Pajares, 2003), understanding its impact on peer feedback is essential.

The shift from traditional teacher-directed, product-focused teaching methods to student-centered learning further underscores the importance of self-efficacy (Kong & Teng, 2023). Implementing the student-centered teaching approach empowers students to actively participate in their own learning processes, especially in the complex realm of writing. Developing awareness as a self-regulated writer is inherently challenging, making self-efficacy crucial in this process. Without a strong belief in their own capabilities, students may struggle to effectively engage with peer feedback, missing opportunities to enhance their writing performance. This gap in the existing literature highlights the urgent need for further research into how students' self-efficacy beliefs in peer feedback can influence their writing performance.

Given that self-efficacy is a dynamic construct with a multidimensional structure, it is imperative to assess the multifaceted nature of self-efficacy within the context of peer feedback. Although Confirmatory Factor Analysis (CFA) has been widely used to examine the reliability of the self-efficacy belief scales (Teng et al., 2018; Teng & Wang, 2023), research has yet to explore self-efficacy beliefs using bifactor-exploratory structural equation modeling (ESEM), particularly concerning self-efficacy belief in peer feedback (SEBPF). Compared to CFA, bifactor models offer a distinct advantage by allowing items to directly load onto a global factor. This structural feature provides a more nuanced and meaningful representation of data, which, in turn, leads to more accurate and insightful model-fit results (Alamer et al., 2023). This direct loading onto a global factor facilitates the capture of overarching constructs that are common across all items, while still allowing for the identification of specific subdomains or factors that might influence responses to individual items. This approach contrasts with traditional CFA, where items are typically associated with specific factors, and a global factor is not explicitly modeled. The bifactor model's ability to account for both the global construct and specific factors simultaneously offers a more comprehensive understanding of the underlying structure of data. This dual focus may reveal the internal structure of a construct and enrich research methods in applied linguistics.

In response to the increased attention paid to self-efficacy belief and peer feedback in writing research, we introduce a new instrument (i.e., the Self-efficacy Beliefs in Peer Feedback (SEBPF) Scale) through bifactor ESEM. The first objective of the present study was to introduce and evaluate the construct validity of the SEBPF scale. The secondary objective was to examine the criterion-related validity of SEBPF with writing performance, encompassing various sub-scores. The findings of this study are essential to enhance our conceptual and empirical understanding of the role of self-efficacy in writing and serve as a foundation for further theoretical, pedagogical, and empirical investigations with implications for the writing domain.

2. Literature review

2.1. Understanding self-efficacy beliefs

Self-efficacy, based on sociocognitive theory, is defined as people's judgments of their abilities to organize and execute courses of action required to attain goals (Bandura, 1991). It is not a fixed attribute but rather a capability that involves the effective orchestration of cognitive, motivational, emotional, and behavioral skills to serve various purposes (Bandura, 2006). Beliefs in one's efficacy significantly impact various life aspects, including choices made, aspirations, effort levels, perseverance in challenges, stress management, and vulnerability to depression (Pajares, 2003). Therefore, perceived self-efficacy is fundamental to human motivation, performance accomplishments, and emotional well-being (Zimmerman & Schunk, 2008).

According to sociocognitive theory, self-efficacy is a critical determinant of self-regulation (Bandura, 1991). As individuals' metacognitive capabilities evolve, so does their perceived self-efficacy, leading to greater reliance on self-efficacy judgment and enhanced awareness of the self-regulatory process (Zimmerman & Schunk, 2008). This view is supported by Schunk and Ertmer (2000), who emphasize self-efficacy continuously influences the recursive self-regulatory process. Within an SRL framework, perceived self-efficacy is regarded as the capacity to regulate thoughts, motivations, affects, and actions through self-reactive influence, which is a core aspect of human agency (Schunk & Ertmer, 2000).

Self-efficacy is dynamic, interacting with different variables (e.g., strategy use, task persistence, goals, and motivations) in the self-regulating process, impacting learners' academic success. Extensive empirical research has shown that self-efficacy significantly influences learners' goal-setting, effort allocation, and regulation of emotions and motivations across different learning contexts (Pajares, 2003; Schunk & Pajares, 2010). High self-efficacy is linked to increased engagement, persistence, effective SRL strategies, and higher academic achievements (Caprara et al., 2008; Usher & Pajares, 2008). Students with positive self-efficacy are more likely to

adapt to modern demands, fostering autonomous and lifelong learning (Schunk & Pajares, 2010).

While self-efficacy has been well-studied in various fields, there remains a gap in exploring self-efficacy in second/foreign language (L2/FL) education, especially in writing proficiency. Many studies have focused on general self-efficacy or specific domains within L1 writing contexts (e.g., Bruning et al., 2013; Schunk & Pajares, 2010), often overlooking the unique challenges faced by L2 learners. The development of self-efficacy beliefs in L2 education is influenced by linguistic, cultural, and sociocognitive factors, requiring a context-specific, task-related approach (Teng, 2022; Teng et al., 2018; Teng & Wang, 2023).

Some scholars have explored different internal factors of self-efficacy tailored for specific L2 settings. Teng et al. (2018) conceptualized self-efficacy within SRL and process writing theory and developed a three-factor structure of L2 writing self-efficacy, which includes linguistic self-efficacy, performance self-efficacy, and self-regulatory efficacy. Sun and Wang (2020) confirmed multiple linguistic factors in L2 writing self-efficacy, such as ideation, organization, grammar and spelling, and the use of English in writing. Chen and Zhang (2019) evaluated EFL students' self-efficacy beliefs specifically related to text revision, identifying a two-factor structure of self-efficacy beliefs regarding high and low levels of text revision. Recently, Teng and Wang (2023) developed the Academic Writing Self-Efficacy Belief Questionnaire (AWSEBQ) and validated a five-dimensional structure of academic writing self-efficacy, including linguistic knowledge efficacy, self-regulatory efficacy, information organization efficacy, writing performance efficacy, and rehearsal and memory efficacy. These empirical endeavors have confirmed the multidimensional characteristics of self-efficacy beliefs, the internal structure of which might vary in different tasks and learning contexts. In addition, these insights have laid the groundwork for investigating EFL student writers' self-efficacy, encompassing their self-regulatory efficacy, affective factors, and self-motivations. Moreover, Lee and Evans (2019) explored a writing self-efficacy scale for peer feedback, focusing on contextual L2 writing self-efficacy related to self-regulation, apprehension, and the perceived value of peer feedback. Inspired by these findings, it appears necessary to examine additional dimensions in the current study, including self-motivation for peer feedback, the perceived utility of peer feedback, confidence in providing peer feedback, managing stress associated with peer feedback, and establishing immediate goals for peer feedback.

2.2. Self-efficacy and feedback

There is a growing recognition of the connectedness between self-efficacy and feedback in various learning domains (Bandura, 1991; Lee & Evans, 2019; Schunk & Pajares, 2010). The effectiveness of feedback is highly dependent on individuals' perceptions, responses, emotional management (Li & Reynolds, 2023), and metacognitive awareness (Teng & Ma, 2024). Timely and constructive peer feedback is crucial for effective learning, academic achievement, and substantial growth (Li et al., 2020). However, learners' level of self-efficacy often influences how they seek and use feedback (Lee & Evans, 2019). Research shows that L2 students with high self-efficacy actively seek feedback and engage in self-assessment and reflection. They can identify their strengths and weaknesses and use feedback to improve their writing skills. Conversely, students with low self-efficacy may avoid seeking feedback or rely solely on external sources without engaging in self-evaluation (Hyland & Hyland, 2006; Lee & Evans, 2019).

Feedback also plays a crucial role in shaping students' self-efficacy. Understanding how recipients actively engage with peer feedback is vital, as proactive involvement can enhance feedback efficacy and support SRL (Zhu & To, 2022). Feedback provides social persuasion and influences individuals' beliefs about their abilities (Berndt et al., 2018). It is viewed as a dialogic process where students actively engage with the received feedback, provide feedback, and evaluate peers' work (Zhu & Carless, 2018). This interactive exchange allows students to act on feedback and share their knowledge, contributing to engagement (Zhang & Hyland, 2023). Positive feedback and successful experiences in responding to feedback can boost students' self-confidence in their abilities. However, there remains a significant gap in understanding L2 students' self-efficacy beliefs, specifically in peer feedback. Given the complexity of L2 writing environments, it is imperative to delve deeper into how L2 learners perceive their self-efficacy in various aspects of peer feedback, such as the perceived usefulness of feedback, self-incentives for seeking feedback, and the goals they set to optimize the effectiveness of their learning.

2.3. The role of self-efficacy beliefs in writing

The essential role of self-efficacy in writing has long been recognized. Students' confidence in their abilities affects their success with linguistic usage and mechanical writing skills (Pajares, 2003). Writers' self-efficacy also influences their use of different strategies, engagement in motivational activities, and overall academic performance. Studies have revealed significant relationships between self-efficacy beliefs and various writing-related variables, such as writing quality, writing apprehension, and writing performance (e.g., Sun et al., 2021; Teng & Zhan, 2023; Teng & Zhang, 2020; Teng & Wang, 2023). A recent meta-analysis by Sun et al. (2021) revealed that about 9 % of the variability in English writing achievement is associated with students' self-efficacy.

While extensive research has improved our understanding of self-efficacy beliefs in writing, many studies have focused on general self-efficacy as a unidimensional construct within L1 writing contexts (Usher & Pajares, 2008). However, there is increasing recognition that self-efficacy is a dynamic construct that affects writing performance. For instance, Teng et al. (2018) checked concurrent validity and predictive validity and supported the correlations of writing self-efficacy with motivational beliefs and writing performance. Chen and Zhang (2019) reported weak yet positive correlations between self-efficacy beliefs about text revision and writing test scores. Teng and Wang (2023) found significant effects of linguistic knowledge efficacy, self-regulatory efficacy, information organization efficacy, writing performance efficacy, and rehearsal and memory efficacy on academic writing. Examining the multifaceted nature of self-efficacy provides us with a deeper understanding of its role in writing and the writing process itself (Bruning et al., 2013; Chen & Zhang, 2019; Teng et al., 2018; Teng & Wang, 2023). Thus, a nuanced understanding of the multidimensional

structure of self-efficacy in writing can help develop teaching strategies that encourage learners' proactive engagement and enhance their overall writing abilities.

Recent studies have explored how writing self-efficacy for peer feedback impacts writing performance. Jin et al. (2024) investigated students' self-efficacy in writing, focusing on their engagement levels. They found a direct correlation between students' self-efficacy in cognitive, affective, and behavioral engagement and their writing performance at the postgraduate level. The perceived value of peer feedback emerged as the most significant predictor of writing performance, underscoring the importance of constructive peer evaluation in the writing process. Xu et al. (2023) found that students who received peer feedback showed marked improvements in text quality, content organization, and accuracy. These improvements were sustained 12 weeks after the intervention, suggesting that peer feedback interventions can significantly enhance students' writing capabilities, potentially due to increased self-efficacy in both giving and receiving feedback. Chung et al. (2021) investigated the effects of a year-long writing intervention focused on revision. Their study highlighted the role of self-assessment, planning and goal-setting, and reflective practices during the revision process. Participants in the treatment group exhibited heightened self-efficacy in revision, leading to significant gains in the post-test writing assessment. This finding suggests that a sustained, reflective writing intervention can effectively improve students' self-efficacy and, consequently, their writing performance. These studies collectively underscore the pivotal role of self-efficacy for peer feedback in enhancing writing performance. They suggest a multifaceted approach to writing instruction, where peer feedback, self-assessment, and goal-setting are integral components. However, it also raises questions about how peer feedback and self-efficacy interact to influence writing performance. Further research could explore how different subcomponents of self-efficacy for peer feedback affect writing performance.

2.4. A brief introduction to bifactor-exploratory structural equation modeling

ESEM is an alternative to the well-known confirmatory factor analysis (CFA) because it combines the advantages of both exploratory factor analysis (EFA) and CFA. CFA was developed to test theoretical measurement models, enabling analysts to rely on it when examining the factor structure of various theoretical constructs (Collier, 2020). However, CFA has limitations (Kline, 2011). Recent studies indicate that even for tools with well-established factor structures, CFA solutions often fail to reach acceptable levels of model fit (Alamer & Marsh, 2022). This phenomenon is due to the highly restrictive assumptions of standard CFA, which assumes zero cross-loadings among items on non-target factors.

In contrast, EFA allows for the estimation of cross-loadings, which can have meaningful implications and reflect true score associations between items and relevant factors (Morin et al., 2020). Forcing all cross-loadings to be zero in CFA tends to inflate factor correlations (Asparouhov & Muthén, 2009). These issues have led many researchers to consider the combination of EFA and CFA (Teng et al., 2022; Teng & Zhang, 2023). However, combining EFA and CFA may lead to model misspecification (Kline, 2011). Thus, researchers advocate Exploratory Structural Equation Modeling (ESEM; Asparouhov & Muthén, 2009), a framework that incorporates cross-loadings into measurement or predictive models based on prior specifications to model the factor structure of related constructs (Alamer et al., 2023). While ESEM has been successfully applied in L2 research (e.g., Liu et al., 2022; Teng et al., 2024), its application in writing research has not yet been established.

However, there are situations where full-ESEM might not be the most suitable approach for analysis. This is particularly true when it is necessary to distinguish and align specific factors and items, separating them from unrelated groups. In these cases, smaller subsets of the ESEM model can be incorporated within a single overarching model, creating set-ESEM. This method seeks the best balance between CFA and full-ESEM, especially in terms of model fit indices (Kruk et al., 2023; Marsh & Alamer, 2024).

Bifactor-ESEM still has its advantages. It allows for the joint assessment of global and specific constructs from the same set of indicators, ensuring the consideration of the multidimensionality of psychological measurement. This requires a dual-factor (CFA or ESEM) model, which includes a global factor (G factor) representing responses to all items included in the instrument and specific factors (S factors) assessing non-redundant (orthogonal, uncorrelated) variance for each subscale beyond that explained by the G factor (Morin et al., 2020). Dual-factor models are superior to higher-order models as they allow items to load directly onto the global factor, providing meaningful representations and model fit results (Alamer, 2021) while avoiding redundancy and a series of problems implicit in imposed proportionality constraints (Morin et al., 2020). The G factor captures the extent of all factors in a scale globally, while the S factor reflects the imbalance in specific requirements.

Hence, bifactor-ESEM is an advanced statistical approach used in psychometric and structural equation modeling to examine the underlying structure of observed variables. It represents an evolution from traditional methods like CFA and EFA by integrating the strengths of both approaches. In bifactor-ESEM, the primary goal is to explore the presence of a general factor, often referred to as the "bifactor," that influences all measured variables, in addition to specific factors that capture unique variance within subsets of these variables. Unlike traditional models, bifactor-ESEM allows for cross-loadings, acknowledging that items may have meaningful associations with both general and specific factors. This flexibility makes it a powerful tool for capturing the complexity of real-world data.

In measuring self-efficacy beliefs, previous studies have limitations due to their exclusive use of standard EFA or CFA, which can lead to biased results and model misspecification (Alamer & Marsh, 2022). Although ESEM has been shown to be robust in examining the factorial structures in L2 research (Alamer, 2022), it has not yet been applied to measure the factorial structure of self-efficacy beliefs in specific L2 writing contexts, such as peer feedback.

Grounded in sociocognitive theory, the present study aimed to examine the multidimensional structure of self-efficacy beliefs in peer feedback via using rigorous statistical methods, namely bifactor ESEM, to examine the psychometric multidimensionality of the construct. The findings are expected to advance our understanding of self-efficacy in peer feedback by delineating its internal structure and elucidating its theoretical underpinnings based on sociocognitive theory in task-specific learning contexts.

2.5. The present study

The present study aimed to validate the multi-dimensional structures of self-efficacy beliefs about peer feedback in L2 writing through bifactor-ESEM. The first purpose was to develop and validate a scale on writing self-efficacy beliefs about peer feedback. The second purpose was to examine the predictive effects of various dimensions of self-efficacy beliefs on academic writing performance. The focus was on different aspects of academic writing performance for EFL students. Two research questions guide the study:

- RQ1: How reliable and valid are scores obtained from the newly developed scale on self-efficacy beliefs in peer feedback (SEBPF)?
- RQ2: How do the five factors in the SEPF scale (self-incentives for peer feedback, perceived use of peer feedback, confidence in peer feedback, managing stress in peer feedback, and setting proximal goals for peer feedback) relate to writing performance, including different sub-scores in writing?

3. Method

3.1. Participants

The participants were a total of 562 university students from a comprehensive university in China. The mean age of the students was 22.32 ($SD = 1.06$). Among them, 263 were male students, while 299 were female students. They were third-year students from different majors who were enrolled in an English for Academic Writing course. The participants used Chinese as their first language and learned English as a foreign language. In their first and second years, they attended college English courses to build a foundation in listening, reading, writing, and speaking skills. They took the English academic writing course in the third year. The learners reported that although they had extensive experience learning English, English academic writing was still quite new to them. Based on recent English test scores, which included both reading and writing components, the participants demonstrated an intermediate level of proficiency. Out of 642 volunteers, 562 were selected for data analysis because they completed the scale without providing the same responses and completed the required academic writing test. Participants received a coupon for attending the study.

3.2. Development of the Self-efficacy Beliefs in Peer Feedback (SEBPF) Scale

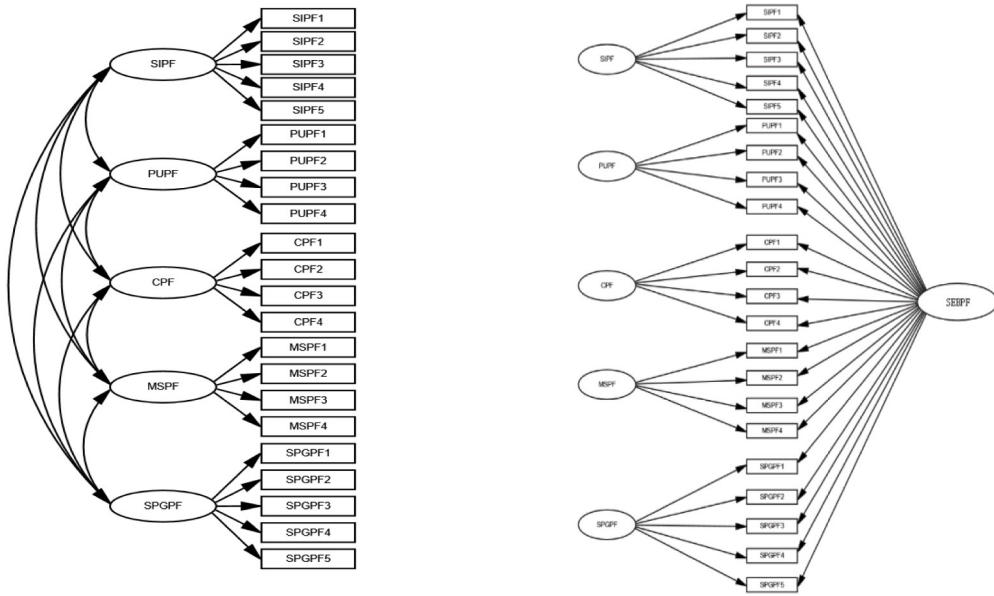
The development of the SEBPF scale was informed by key concepts from social cognitive theory and SRL theory. SRL is closely connected to self-efficacy, encompassing an individual's belief in their capability to organize and execute actions necessary to achieve specific performance attainments (Sun & Wang, 2020). According to Bandura (1997), self-efficacy beliefs are multifaceted, and social cognitive theory identifies conditions under which self-efficacy may vary across different domains. These include skills for diagnosing task demands, constructing and evaluating alternative courses of action, setting proximal goals, creating self-incentives, and managing stress and intrusive thoughts.

The SEBPF scale was developed to evaluate EFL students' beliefs related to self-incentives for peer feedback (SIPF), perceived use of peer feedback (PUPF), confidence in peer feedback (CPF), managing stress in peer feedback (MSPF), and setting proximal goals for peer feedback (SPGPF). Items were developed using a multi-method technique (Appendix A), including writing exercises and semi-structured interviews with ten Chinese undergraduates. The writing exercises solicited information about strategy use. It is assumed that learners may better reflect on their strategies when required to complete some writing exercises. The semi-structured questions focused on their self-efficacy about peer feedback. We transcribed and analyzed learners' responses and compared them with previous questionnaire items on self-efficacy belief (Oxford, 2013; Pajares & Valiante, 2006; Teng & Wang, 2023; Teng et al., 2018; Usher & Pajares, 2008). This process generated an initial pool of 40 items. Two experts in L2 writing research evaluated these items for content validity, theoretical rationale, wording, and consistency. Focus group interviews with ten Chinese undergraduate students assessed the clarity, readability, and parsimony of the scale. Four items were deleted based on experts' opinions, and two items were rephrased based on learners' comments. The final version of the SEBPF scale included 34 items, as presented in Appendix B. The scoring was based on a 7-point Likert scale that ranges from 1 (Strongly disagree) to 7 (Strongly agree). Cronbach's values for reliability are presented in the results sections.

3.3. Academic writing test

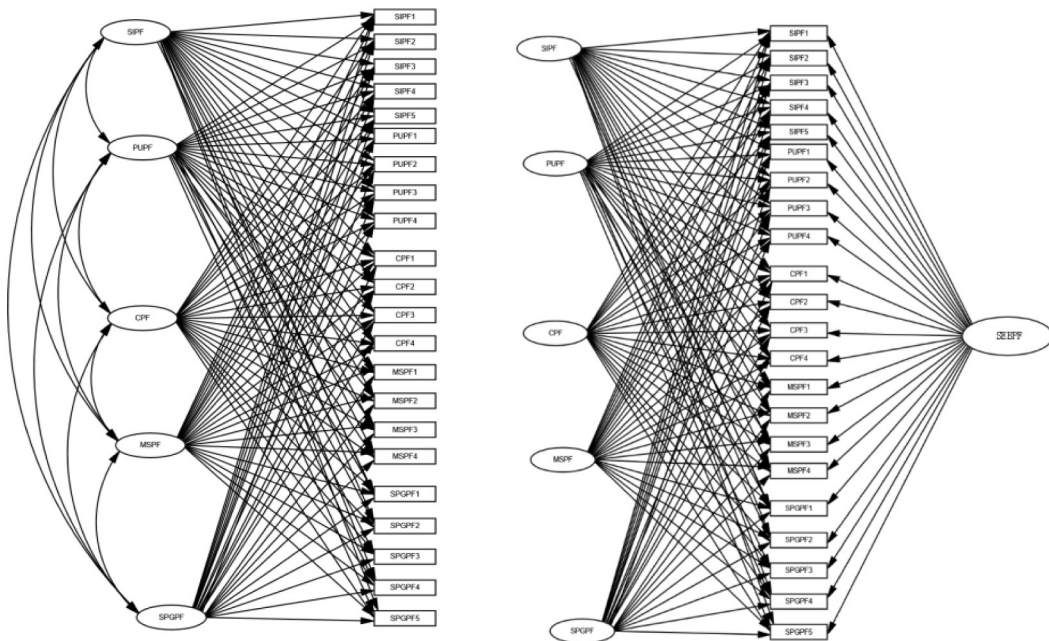
Chinese EFL learners were required to write an academic essay based on a given topic on marketing and promotion. This standardized test was developed for all students who were enrolled in the Academic Writing course. This test required learners to write a 300-word essay based on provided information about different products. The requirements were to compare various promotion strategies for these products, write a synthesis essay on the advantages and disadvantages of these strategies, and conclude their own arguments related to how to promote the products to the targeted market. The set time for this test was one hour.

The grading system was modified from the IELTS rubric, a standardized evaluation framework. The rubric focused on four components: task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy. These components are crucial criteria in the IELTS writing test, encompassing the primary skills and competencies being assessed. We included scores for each component in the data analysis to provide a quantitative measure of the test takers' proficiency in each area. This structured approach allows a detailed examination of EFL learners' writing performance. Each component was scored based on a range of 0-9 points, making the total possible score 36 points. Two raters scored the test for each class, and they were unaware of the participants'



a. Standard CFA

b. Bifactor CFA



c. Standard ESEM

d. Bifactor ESEM

Fig. 1. The differences between CFA, bifactor CFA, ESEM, and bifactor ESEM.

Note. SEBPF = Self-efficacy beliefs in peer feedback; SIPF = self-incentives for peer feedback; PUPF = perceived use of peer feedback, CPF = confidence in peer feedback, MSPF = managing stress in peer feedback; SPGPF = setting proximal goals for peer feedback.

identities. There were 22 raters for the 11 classes. All raters attended a discussion session to familiarize themselves with the rubrics. During this session, they scored three sample writings through the scoring system. The intraclass correlation coefficient (ICC) was calculated to assess the interrater reliability of co-rating five sample essays. The results indicated an ICC value of 0.79, which suggests an acceptable level of agreement among the raters.

3.4. Procedures

Learners scanned a QR code and completed the SEBPF scale online at the end of the academic writing course. Administering the scale at the end of the writing course was designed to motivate learners to reflect on their efficacy in peer feedback after a whole semester of academic writing learning. The scale was administered in Chinese to ensure better understanding. Learners spent an average of 10 min completing the scale. The academic writing test was conducted the next day using paper and pencil. Two teachers who were not teaching the class proctored the test. The test sessions and instructions were consistent across all classes. The writing test was completed within 60 min.

3.5. Analyses and models estimated in the present study

To support open sciences, all data and coding are shared through <https://osf.io/u86ne/>. All analyses were conducted using Mplus

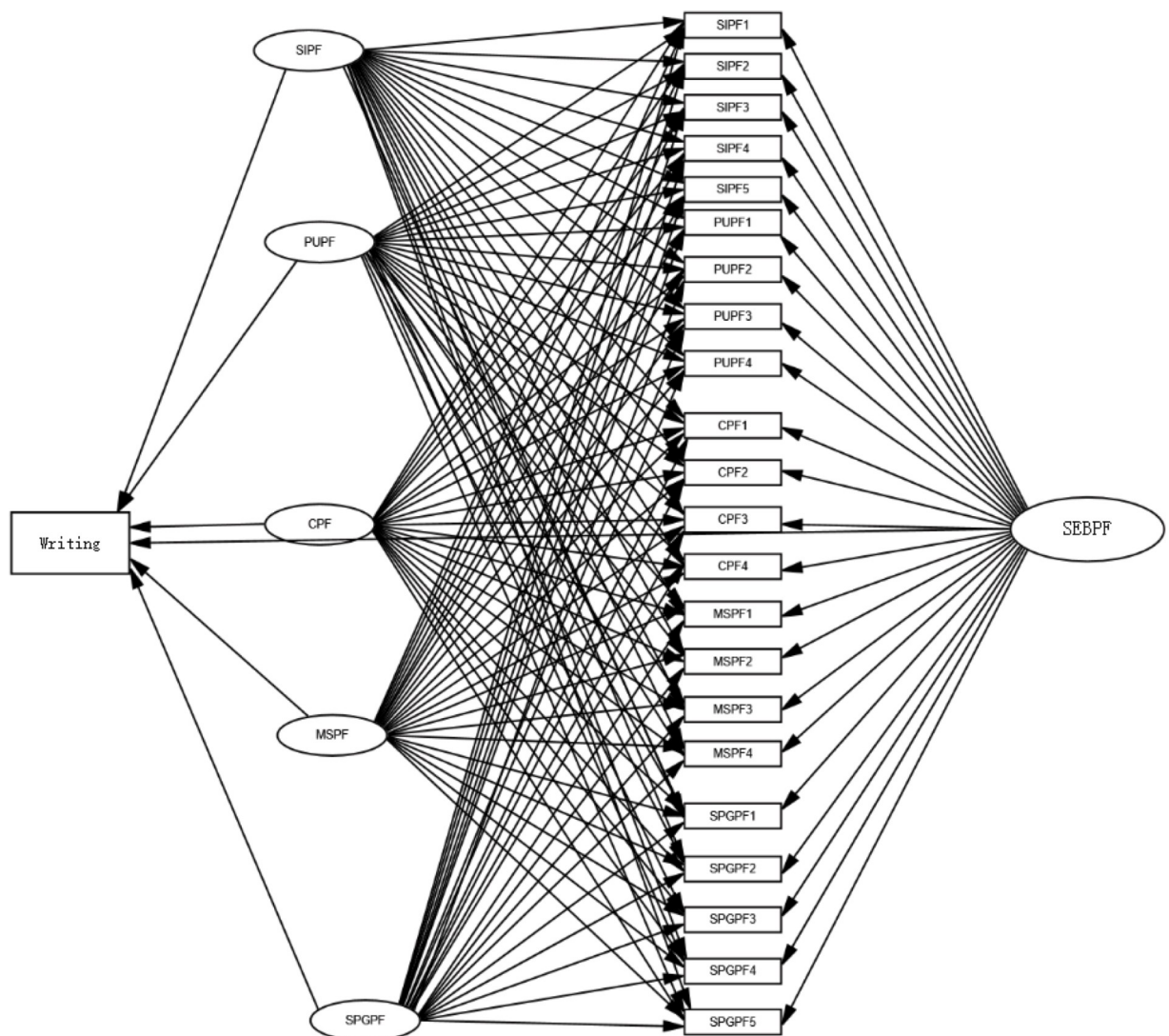


Fig. 2. Structural model based on bifactor ESEM.

Note. SEBPF = Self-efficacy beliefs in peer feedback; SIPF = self-incentives for peer feedback; PUPF = perceived use of peer feedback, CPF = confidence in peer feedback, MSPF = managing stress in peer feedback; SPGPF = setting proximal goals for peer feedback.

8.1 (Muth'en & Muth'en, 2018). The models were estimated using the Maximum Likelihood Robust (MLR) estimator (Field, 2009), known for its robustness to non-normality (Raykov & Marcoulides, 2008). Following previous studies (Alamer, 2022; Morin et al., 2020), a series of alternative measurement models were compared: (a) a one-factor CFA, (b) a five-factor CFA, (c) a five-factor ESEM, (d) a bifactor CFA including one General (G) factor and five Specific (S) factors, and (e) a bifactor ESEM including one G factor and five S factors. The one-factor CFA model was primarily used to explicitly test and reject the unidimensionality of the model. The other four alternative models are illustrated in Fig. 1. To assess the fit of these models to our data, we relied on fit indices (Hu & Bentler, 1999): Root Mean Square Error of Approximation (RMSEA) and its 90 % confidence interval, Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). CFI and TLI values approximating 0.95 indicate excellent fit, though values around 0.90 are still considered acceptable. RMSEA values ideally should be equal to or less than 0.08 (acceptable fit) or 0.06 (excellent fit). While we also reported the chi-square test of fit (χ^2), we refrained from interpreting this indicator due to its sensitivity to sample size, missing variables, and slight

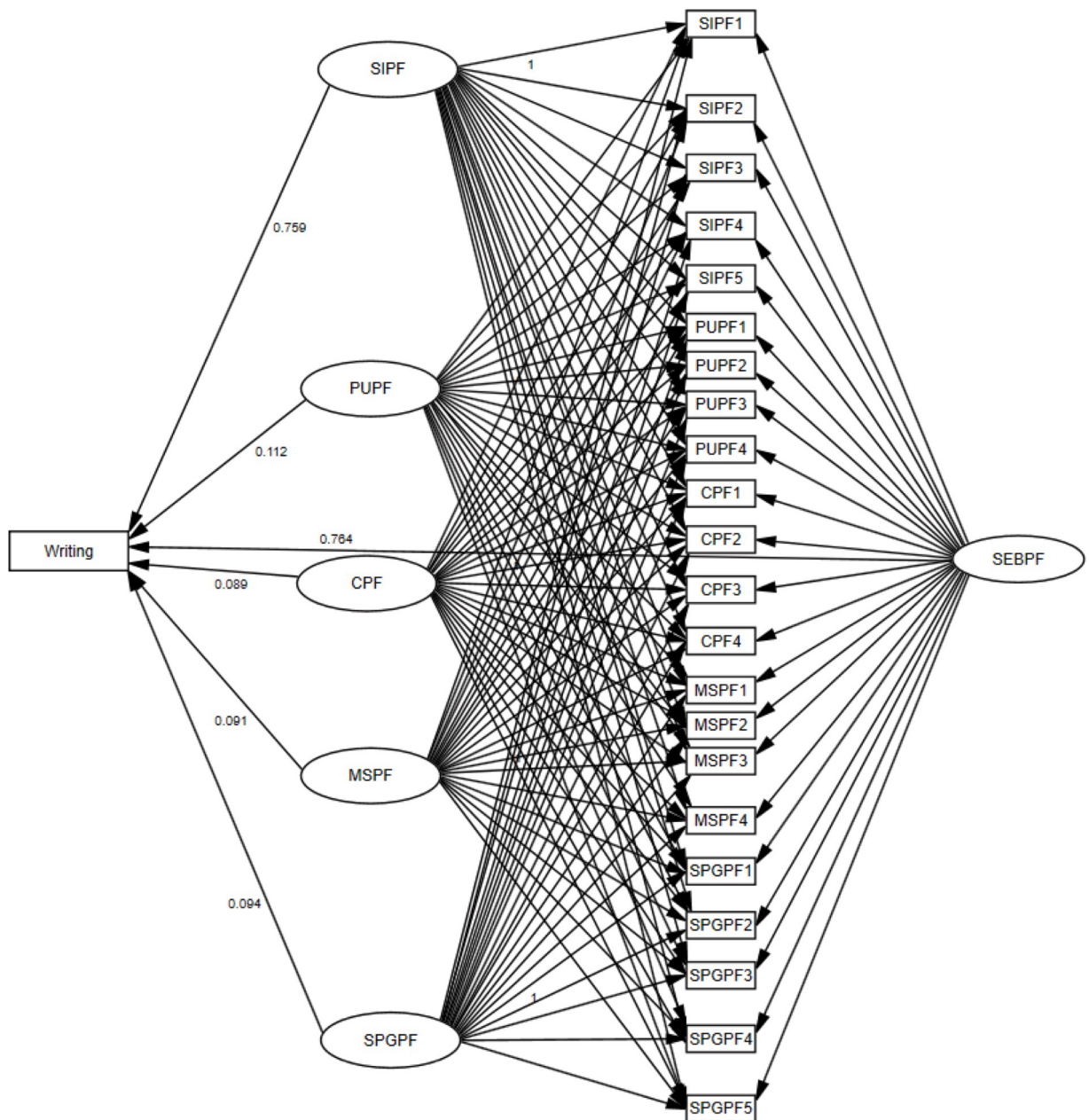


Fig. 3. The predictive effects of SEBPF on writing.

Note. SEBPF = Self-efficacy beliefs in peer feedback; SIFP = self-incentives for peer feedback; PUPF = perceived use of peer feedback, CPF = confidence in peer feedback, MSPF = managing stress in peer feedback; SPGPF = setting proximal goals for peer feedback.

specification errors (Hu & Bentler, 1999).

Finally, to test the criterion-related validity of the final model, all factors were allowed to predict the latent variable representing writing outcomes. This predictive model is illustrated in Fig. 2, presenting a single outcome without displaying its indicators (both outcomes were modeled as latent variables defined by their indicators) to avoid overcrowding in the charts (Fig. 3).

4. Results

This study first examined the means, standard deviations, and normality checks for the SEBPF scale (as shown in Table 1).

Based on Table 1, the mean scores for the five dimensions of the SEBPF ranged from 3.90 to 4.25, suggesting a moderate degree of self-efficacy beliefs regarding peer feedback. The mean score for the writing test was 17.28, with a standard deviation of 5.70, reflecting mid-range proficiency in writing and highlighting individual variances. Students performed better in grammatical range and accuracy, with a mean score of 5.26 and a standard deviation of 1.79. They scored lowest in coherence and cohesion, with an average of 3.85 and a standard deviation of 1.42. The Cronbach's alpha values indicated that both the scale and the writing test exhibited acceptable internal reliability.

4.1. Assessing measurement models

Table 2 presents the model fit indices for five alternative models assessing the factor structure of the SEBPF scores, addressing the factor validity aspect of RQ1. The fit of the one-factor CFA model was unacceptable (RMSEA = .185, CFI = .633, TLI = .594) (Hu & Bentler, 1999). The fit levels for the other four models were satisfactory. Among them, the five-factor CFA exhibited a lower fit level (RMSEA = .046, CFI = .978, TLI = .975) compared to other models. The bifactor ESEM had the best fit (RMSEA = .042, CFI = .990, TLI = .979). Next, we present the parameter estimation results for these four acceptable models. Table 3 shows the factor loadings, uniqueness, and composite reliability, while Table 4 lists the factor correlations for CFA and ESEM.

Initially comparing CFA and ESEM solutions, we observed that both yielded similarly well-defined and reliable factors (CFA: $\lambda = 0.820$ to 0.897 , $\omega = 0.914$ to 0.949 ; ESEM: $\lambda = 0.421$ to 0.556 , $\omega = 0.760$ to 0.860). However, the factor correlations were lower in the ESEM solution, particularly between the MSPF factor and associated factors (e.g., $r = 0.629$ in CFA, $r = 0.481$ in ESEM). This, coupled with the marginal fit indices of the CFA solution (TLI = 0.975, CFI = .978, RMSEA = 0.046), supports the necessity of incorporating cross-loadings into the model (e.g., Morin et al., 2020). The bifactor-CFA model also fits well (TLI = 0.973, CFI = 0.978, RMSEA = 0.048). However, the bifactor-ESEM model not only had a higher level of model fit compared to all other models (TLI = .979, CFI = .990, RMSEA = .042) but also resulted in a well-defined and reliable G factor ($\lambda = 0.642$ to 0.768), along with well-defined PUPF S factor ($\lambda = 0.419$ to 0.455 , $\omega = 0.798$), CPF S factor ($\lambda = 0.492$ to 0.577 , $\omega = 0.856$), MSPF S factor ($\lambda = 0.469$ to 0.558 , $\omega = 0.903$), and SPGPF S factor ($\lambda = 0.479$ to 0.537 , $\omega = 0.914$). These findings pertain to the reliability component of RQ1. Additionally, the bifactor-ESEM did not exhibit concerning cross-loadings (> 0.30). Therefore, the bi-factor ESEM solution is retained, supporting that the measurement can reflect both the overall level of students' SEBPF and their specific levels of self-incentives for peer feedback (SIPF), perceived use of peer feedback (PUPF), confidence in peer feedback (CPF), managing stress in peer feedback (MSPF), and setting proximal goals for peer feedback (SPGPF).

4.2. Criterion-related validity of SEBPF on writing performance

To assess the criterion-related validity of the SEBPF scores, we constructed a structural model from the retained measurement model to estimate the relationships between the factors in measurement and our criterion variables, addressing RQ 2. Criterion-related validity refers to the ability of factors in the structural model to explain the scores of external variables assumed to be related to the variables of SEBPF. In the present study, we tested the G factor and the S factors for SIPF, PUPF, CPF, MSPF, and SPGPF against four additional factors representing levels of writing. We hypothesized that S factors would be positively correlated with the outcomes. The fit indices of the complete ESEM model, including the outcomes, demonstrated a satisfactory fit to the data ($\chi^2 = 236.774$, $df = 130$;

Table 1

Means, standard deviations, and normality check for SEBPF.

Variables	M	SD	Skewness	Kurtosis	Cronbach's alpha
SIPF (5 items)	4.25	1.37	-0.73	-0.26	.912
PUPF (4 items)	4.05	1.47	-0.36	-0.51	.933
CPF (4 items)	3.96	1.30	-0.27	-0.38	.910
MSPF (4 items)	3.90	1.46	-0.25	-0.80	.919
SPGPF (5 items)	4.15	1.46	-0.39	-0.52	.949
Writing total	17.28	5.70	-0.49	-0.35	.96
Task achievement	4.43	1.41	-0.40	-0.45	-
Coherence and cohesion	3.85	1.42	-0.43	-0.33	-
Lexical response	3.74	1.38	-0.35	-0.29	-
Grammatical range and accuracy	5.26	1.79	-0.41	-0.65	-

Note. SIPF = Self-incentives for peer feedback; PUPF = Perceived use of peer feedback; CPF = Confidence in peer feedback; MSPF = Managing stress in peer feedback; SPGPF = Setting proximal goals for peer feedback.

Table 2
Model fit indices for the four measurement models.

Model	χ^2	df	RMSEA (90 % CI)	CFI	TLI
CFA (one factor)	4244.468	209	0.185(0.181; 0.190)	0.633	0.594
CFA (five factors)	437.421	199	0.046 (0.04; 0.052)	0.978	0.975
ESEM (five factors)	308.307	131	0.049 (0.042; 0.056)	0.984	0.972
Bifactor CFA (six factors)	425.843	187	0.048 (0.042; 0.054)	0.978	0.973
Bifactor ESEM (six factors)	226.051	114	0.042 (0.034; 0.050)	0.990	0.979

Note. CI: 90 % confidence interval for the RMSEA. * $p < .01$. In the bifactor CFA and ESEM, six factors included the G factor (SEBPF) and the five S factors (SIPF, PUPF, CPF, MSPF, and SPGPF).

RMSEA = 0.038; RMSEA 90 % confidence interval = 0.03 to 0.046; CFI = 0.991, TLI = 0.982). Analytical results revealed a significant positive correlation between the S factors and writing performance. The model accounted for 61.4 % of the variance in writing, representing moderate explanatory power.

The following Table 5 shows the predictive effects of SEBPF on overall writing scores, and Tables 6 to 9 show the predictive effects of SEBPF on each sub-score of the writing test, including task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy.

From Table 5, it is evident that SEBPF ($p < .01$), as well as SIPF ($p < .01$), PUPF ($p < .01$), CPF ($p < .01$), MSPF ($p < .01$), SPGPF ($p < .01$), significantly influenced overall writing scores.

From Table 6, it is evident that SIPF significantly and positively influenced task achievement (path coefficient: 0.702, $p < 0.01$), while PUPF, CPF, MSPF, and SPGPF also exhibited significant positive impacts on task achievement with path coefficients of 0.078 ($p < 0.05$), 0.088 ($p < 0.01$), 0.098 ($p < 0.01$), and 0.064 ($p < 0.05$), respectively.

From Table 7, it is evident that SIPF significantly and positively influenced coherence and cohesion, with a standardized path coefficient of 0.724 (> 0 , $p < 0.01$). Similarly, PUPF, CPF, and SPGPF also showed significant positive impacts on coherence and cohesion, with standardized path coefficients of 0.118, 0.085, and 0.095, respectively (> 0 , $p < 0.01$). MSPF had a significant positive impact on coherence and cohesion as well, with a standardized path coefficient of 0.063 (> 0 , $p < 0.05$).

From Table 8, SIPF significantly and positively influenced lexical response (path coefficient: 0.699, $p < 0.01$), while PUPF, CPF, MSPF, and SPGPF also exhibited significant positive impacts on lexical response with path coefficients of 0.124 ($p < 0.01$), 0.082 ($p < 0.05$), 0.071 ($p < 0.05$), and 0.086 ($p < 0.01$), respectively.

From Table 9, SIPF significantly and positively influenced grammatical range and accuracy (path coefficient: 0.751, $p < 0.01$), while PUPF, CPF, MSPF, and SPGPF also exhibited significant positive impacts on grammatical range and accuracy with path coefficients of 0.107 ($p < 0.01$), 0.088 ($p < 0.01$), 0.107 ($p < 0.01$), and 0.108 ($p < 0.01$), respectively.

5. Discussion

Our research aimed to conceptualize and empirically validate a multidimensional structure of writing self-efficacy beliefs within the framework of peer feedback. Using a bifactor ESEM approach, we confirmed the complex nature of writing self-efficacy beliefs in peer feedback. This included dimensions such as self-incentives for peer feedback (SIPF), perceived use of peer feedback (PUPF), confidence in peer feedback (CPF), managing stress in peer feedback (MSPF), and setting proximal goals for peer feedback (SPGPF), all of which demonstrated strong reliability and validity. Comparative analyses of models affirmed that these five dimensions were interrelated under the multidimensional nature of self-efficacy in the context of peer feedback. The correlation of writing self-efficacy with actual writing performance provided evidence for the criterion validity of the scale. These positive associations supported the theoretical perspective of a social cognitive understanding of self-efficacy within the context of peer feedback, aligning with Bandura's (2006) conceptualization of the dynamic interaction among behaviors, personal factors, and environmental conditions.

5.1. Multidimensionality nature of self-efficacy beliefs in peer feedback

The first factor, SIPF, delved into learners' perceived ability to apply metacognitive strategies and maintain goal-oriented approaches throughout the process of seeking and assimilating peer feedback. From the standpoint of SRL, writing tasks are envisioned as endeavors that are "self-planned, self-initiated, and self-sustained" (Zimmerman & Risemberg, 1997, pp. 73–74). Peer feedback serves as a critical tool for learners to evaluate their own self-regulatory efficacy, offering valuable insights that connect learners' control over their actions to cognitive processes, behaviors, and academic achievements. Such insights are in alignment with Zhu and To's (2022) assertion that understanding self-efficacy in feedback seeking and assimilation is essential. The dynamic interaction between feedback receivers and providers helps dissolve uncertainties and facilitates a deeper comprehension of feedback for task revision. Learners who feel efficacious are more likely to take ownership of the feedback process, actively engaging with it to enhance their performance. We argue that this proactive stance involves not just seeking feedback but actively engaging with it to refine their understanding and application of the feedback in their work, thereby contributing significantly to their performance improvement.

The second factor, PUPF, assesses students' evaluations of their ability to perform the mechanical skills required for providing and utilizing peer feedback. It explores how self-efficacy beliefs shape learners' perceptions of their capacity to engage with peer feedback mechanisms effectively. This dimension emphasizes the cognitive complexities involved in problem-solving during the writing process

Table 3
Standardized parameter estimates for the measurement model.

Empty Cell	CFA		ESEM					Bifactor-CFA			Bifactor-ESEM						
	λ	δ	λ	λ	λ	λ	δ	S- λ	G- λ	δ	S- λ	S- λ	S- λ	S- λ	G- λ	δ	
SIPF1	0.853	0.272	-0.291	-0.128	-0.232	-0.167	0.242	0.668	0.553	0.248	-0.289	-0.12	-0.228	-0.162	0.755	0.242	
SIPF2	0.82	0.328	-0.236	-0.15	-0.244	-0.15	0.307	0.641	0.528	0.31	-0.234	-0.142	-0.241	-0.146	0.726	0.307	
SIPF3	0.857	0.266	-0.255	-0.132	-0.225	-0.13	0.229	0.692	0.506	0.266	-0.275	-0.142	-0.231	-0.141	0.768	0.229	
SIPF4	0.824	0.321	-0.183	-0.124	-0.169	-0.091	0.338	0.717	0.394	0.331	-0.182	-0.126	-0.165	-0.089	0.76	0.338	
SIPF5	0.763	0.418	-0.109	-0.155	-0.169	-0.133	0.422	0.671	0.357	0.423	-0.109	-0.147	-0.167	-0.131	0.707	0.421	
ω	0.914							0.81									
PUPF1	0.875	0.234	0.445	-0.056	-0.036	-0.07	0.216	0.73	0.484	0.233	0.455	-0.054	-0.037	-0.07	0.752	0.213	
PUPF2	0.897	0.196	0.436	-0.074	-0.024	-0.155	0.196	0.74	0.508	0.195	0.432	-0.073	-0.025	-0.158	0.766	0.196	
PUPF3	0.89	0.208	0.448	-0.014	-0.059	-0.165	0.198	0.732	0.508	0.205	0.442	-0.021	-0.059	-0.168	0.755	0.201	
PUPF4	0.863	0.255	0.421	-0.065	0.039	-0.079	0.255	0.732	0.452	0.259	0.419	-0.071	0.04	-0.081	0.746	0.255	
ω	0.933							0.823									
CPF1	0.842	0.29	-0.053	0.524	-0.009	-0.127	0.152	0.623	0.582	0.273	-0.043	0.577	-0.009	-0.117	0.66	0.157	
CPF2	0.837	0.299	-0.073	0.542	-0.001	-0.098	0.291	0.613	0.59	0.276	-0.066	0.532	0.004	-0.09	0.642	0.29	
CPF3	0.858	0.264	-0.005	0.496	0.027	-0.064	0.242	0.675	0.514	0.28	-0.012	0.492	0.027	-0.064	0.689	0.241	
CPF4	0.848	0.28	0.058	0.515	-0.022	-0.046	0.237	0.66	0.521	0.294	0.052	0.514	-0.025	-0.047	0.673	0.237	
ω	0.91							0.738									
MSPF1	0.883	0.22	-0.027	-0.011	0.556	-0.119	0.201	0.658	0.608	0.198	-0.026	-0.012	0.558	-0.118	0.688	0.201	
MSPF2	0.856	0.268	0.024	-0.014	0.531	-0.049	0.256	0.653	0.557	0.263	0.027	-0.012	0.532	-0.047	0.675	0.258	
MSPF3	0.845	0.285	-0.008	-0.025	0.467	-0.08	0.295	0.683	0.49	0.293	-0.006	-0.023	0.469	-0.079	0.692	0.294	
MSPF4	0.86	0.26	-0.029	0.003	0.484	-0.041	0.268	0.691	0.503	0.27	-0.028	0.002	0.486	-0.039	0.704	0.267	
ω	0.92							0.766									
SPGPF1	0.89	0.209	-0.097	-0.05	-0.044	0.523	0.193	0.652	0.606	0.207	-0.089	-0.051	-0.041	0.53	0.713	0.193	
SPGPF2	0.894	0.201	-0.013	-0.072	-0.053	0.538	0.197	0.654	0.613	0.196	-0.012	-0.073	-0.054	0.537	0.711	0.197	
SPGPF3	0.887	0.213	-0.067	-0.061	-0.076	0.478	0.215	0.686	0.56	0.216	-0.065	-0.064	-0.075	0.479	0.736	0.215	
SPGPF4	0.887	0.213	-0.06	-0.086	-0.024	0.501	0.208	0.669	0.58	0.215	-0.065	-0.096	-0.025	0.499	0.724	0.208	
SPGPF5	0.884	0.218	-0.004	-0.074	-0.056	0.529	0.213	0.655	0.597	0.215	-0.001	-0.077	-0.055	0.529	0.706	0.213	
ω	0.949							0.913									

Note. λ : Standardized factor loading; δ : standardized item uniqueness; S: specific factor; G: global factor; ω = omega coefficient of model-based composite reliability shown in italic; target ESEM and bifactor ESEM factor loadings are indicated in bold.

Table 4
Factor correlations in the CFA and ESEM solutions.

Empty Cell	SIPF	PUPF	CPF	MSPF	SPGPF
CFA					
SIPF	–				
PUPF	0.673**	–			
CPF	0.628**	0.64**	–		
MSPF	0.588**	0.676**	0.629**	–	
SPGPF	0.675**	0.591**	0.533**	0.565**	–
ESEM					
SIPF	–				
PUPF	0.601**	–			
CPF	0.573**	0.569**	–		
MSPF	0.623**	0.539**	0.481**	–	
SPGPF	0.541**	0.626**	0.584**	0.529****	–

Note. $p < .01$. SIPF = Self-incentives for peer feedback; PUPF = Perceived use of peer feedback; CPF = Confidence in peer feedback; MSPF = Managing stress in peer feedback; SPGPF = Setting proximal goals for peer feedback.

Table 5
Path coefficients on the effects of SEBPF on the overall writing scores.

Empty Cell	b [standard error]	β	p
Effects on overall writing scores			
SIPF	4.320(0.206)	0.759	<.01
PUPF	0.638(0.171)	0.112	<.01
CPF	0.505(0.173)	0.089	<.01
MSPF	0.516(0.171)	0.091	<.01
SPGPF	0.537(0.168)	0.094	<.01
SEBPF	0.172(0.006)	0.764	<.01

Table 6
Path coefficients from the SEBPF on task achievement (writing sub-scores).

Empty Cell	b [standard error]	β	p
Effects on task achievement			
SIPF	0.986(0.052)	0.702	<.01
PUPF	0.110(0.046)	0.078	<.05
CPF	0.123(0.046)	0.088	<.01
MSPF	0.138(0.046)	0.098	<.01
SPGPF	0.09(0.045)	0.064	<.05

Table 7
Path coefficients from the SEBPF on coherence and cohesion (writing sub-scores).

Empty Cell	b [standard error]	β	p
Effects on coherence and cohesion			
SIPF	1.026(0.052)	0.724	<.01
PUPF	0.167(0.045)	0.118	<.01
CPF	0.121(0.045)	0.085	<.01
MSPF	0.089(0.045)	0.063	<.05
SPGPF	0.135(0.044)	0.095	<.01

Table 8
Path coefficients from the SEBPF on lexical response (writing sub-scores).

Empty Cell	b [standard error]	β	p
Effects on lexical response			
SIPF	0.961(0.051)	0.699	<.01
PUPF	0.171(0.046)	0.124	<.01
CPF	0.112(0.046)	0.082	<.05
MSPF	0.098(0.045)	0.071	<.05
SPGPF	0.118(0.045)	0.086	<.01

Table 9
Path coefficients from the SEBPF on grammatical range and accuracy (writing sub-scores).

Empty Cell	<i>b</i> [standard error]	β	<i>p</i>
Effects on grammatical range and accuracy			
SIPF	0.961(0.051)	0.751	<.01
PUPF	0.171(0.046)	0.107	<.01
CPF	0.112(0.046)	0.088	<.01
MSPF	0.098(0.045)	0.107	<.01
SPGPF	0.118(0.045)	0.108	<.01

and underscores the importance of self-efficacy in adopting planning, monitoring, and evaluation strategies throughout the writing process during peer feedback stages. These insights contribute to the broader discourse on academic writing and SRL, echoing findings from previous research (e.g., [Zhu & Carless, 2018](#)). The findings thus advocate for a nuanced understanding of how learners perceive their use of self-regulatory strategies enhances their self-efficacy for engaging with peer feedback.

The third factor, CPF, underscores the pivotal role of learners' self-assurance when engaging with peer feedback. This dimension posits that evaluations of academic writing proficiency should incorporate an understanding of learners' confidence in their ability to apply self-regulatory strategies effectively. A learner's confidence in engaging with, interpreting, and using peer feedback is integral to the development of a robust self-efficacy in academic writing, reflecting that enhanced engagement with feedback cultivates a nuanced understanding of the self-regulatory strategies essential for peer feedback ([Teng & Ma, 2024](#); [Zhang & Hyland, 2023](#)).

The fourth dimension, MSPF, emphasizes the critical role of emotional regulation and stress management in peer feedback. This aspect suggests that evaluations of academic writing proficiency should include an analysis of learners' capabilities to handle stress and emotions effectively. Providing feedback is inherently emotional, posing significant challenges for feedback providers in managing their emotional responses ([Caprara et al., 2008](#); [Li & Reynolds, 2023](#)). Effective emotional regulation is essential for ensuring that feedback is both effective and conducive to learning. This factor stresses the need for learners to develop a repertoire of emotional management techniques that allow them to navigate the emotionally charged nature of giving, receiving, and processing feedback.

The fifth validated dimension, SPGPF, involves establishing immediate, achievable objectives in the context of peer feedback. This dimension leverages cognitive skills for effective planning, monitoring, and evaluation of academic work in response to peer feedback, thereby bolstering a learner's overall self-efficacy in navigating the feedback environment. This approach aligns with existing research that emphasizes the critical role of learners' agency and their capacity for self-directed action ([Teng et al., 2018](#); [Teng & Wang, 2023](#)). Setting proximal goals for peer feedback empowers learners to make well-informed revisions and enhancements to their work based on feedback. We argue for a need to focus on the setting of proximal or near-term goals, for which learners can be encouraged to adopt a more goal-oriented perspective towards feedback, leading to deeper engagement and more effective utilization of feedback for writing.

5.2. Predictive effects of SEBPF on writing sub-scores

The five factors—SIPF, PUPF, CPF, MSPF, and SPGPF—are instrumental in enhancing writing performance. Together, these factors significantly contribute to overall improvements in writing scores and specifically across various scoring domains, such as task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy. This comprehensive enhancement can be partly attributed to the linguistic and cognitive demands inherent in composing. [Bruning et al. \(2013\)](#) highlighted a modest correlation between self-regulatory self-efficacy and statewide writing assessments ($r = .206$). [Teng et al. \(2018\)](#) also observed that a high level of self-efficacy for self-regulation was positively associated with active engagement in learning activities, increased effort, and sustained persistence, all of which contribute to improved academic performance. Despite that the influence of self-efficacy on writing performance may differ across various learning contexts, the present study, along with prior research (e.g., [Bruning et al., 2013](#); [Kong & Teng, 2023](#); [Pajares & Valiante, 2006](#); [Teng & Wang, 2023](#)), underscores that self-efficacy serves as a critical set of proximal determinants of human self-regulation, significantly impacting learners' academic achievement in EFL writing contexts ([Teng & Zhan, 2023](#)). Specifically, our study highlights the pivotal role of self-efficacy within the realm of peer feedback for writing. We argue that a nuanced understanding of self-efficacy within the context of peer feedback reveals its significant potential to motivate learners. This deeper insight into self-efficacy can drive students to engage more effectively with the writing process. By recognizing and harnessing the intricate dynamics of self-efficacy, teachers are suggested to foster a learning environment where students feel empowered and confident in their abilities. This, in turn, encourages more active participation, thoughtful critique, and continuous improvement in their writing skills. As learners become more self-assured through constructive peer feedback, they are likely to approach writing tasks with greater enthusiasm and persistence, ultimately leading to enhanced writing proficiency.

In essence, our research contributes to the broader academic discourse by emphasizing the significance of self-efficacy in peer feedback to enhance EFL writing performance. The SIPF factor emphasizes the motivational aspect of engaging with peer feedback, encouraging learners to seek and utilize feedback for their writing tasks actively. This proactive engagement fosters a deeper understanding and application of feedback, leading to enhanced task achievement ([Zhang & Hyland, 2023](#)), as well as coherence and cohesion, lexical resources, and grammatical range and accuracy. PUPF underscores the importance of recognizing the utility of peer feedback in refining writing skills. By valuing and effectively applying peer feedback, learners can improve the coherence and cohesion of their texts, ensuring that ideas are presented clearly and logically ([Lee and Evans, 2019](#)), leading to task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy. CPF highlights the role of self-assurance in the feedback process. A

higher level of confidence enables learners to more effectively incorporate feedback into their writing, which can lead to a richer lexical resource, showcasing a more varied and precise use of language for task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy (Kong & Teng, 2023). MSPF focuses on the ability to manage emotional responses and stress associated with receiving and giving feedback. Contributing to Li and Reynolds (2023), effective stress management allows for a more focused and constructive engagement with feedback, which can positively impact grammatical range and accuracy, as well as task achievement, lexical resources, and coherence by reducing anxiety-related errors. Finally, SPGPF involves setting specific, immediate objectives based on peer feedback. This goal-oriented approach ensures that learners are focused on incremental improvements in their writing, which collectively contributes to performance across the evaluated domains of task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy.

Collectively, the empirical evidence in the present study reinforces the proposition that self-efficacy beliefs exert a predictive influence on the academic writing performance of EFL students. In particular, the findings corroborate the existing literature that has identified positive predictive correlations between self-efficacy in peer feedback and writing proficiency, encompassing various evaluative domains such as task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy. Notably, an intriguing pattern was discerned within the predictive capacity of self-efficacy beliefs in peer feedback concerning students' academic writing scores, including different writing test parts. Building upon the foundational work of Teng et al. (2018) and Teng and Wang (2023), it is evident that students' perceived self-efficacy in peer feedback plays a crucial role in determining their writing performance. The perceived ability to self-regulate cognition, motivation, and behavior significantly impacts the interactions among writers, the writing environment, and overall writing achievement. Consequently, the present study accentuates the pivotal role of self-efficacy beliefs in peer feedback for fostering active and proficient writing practices. This nuanced understanding underscores the importance of integrating self-efficacy beliefs into peer feedback mechanisms as a strategic approach to enhancing the writing competencies of EFL students.

6. Conclusion

This study made an innovation in using bifactor-ESEM to explore the factorial structure of self-efficacy beliefs in peer feedback. Model comparisons confirmed a multidimensional structure encompassing self-incentives for peer feedback, perceived use of peer feedback, confidence in peer feedback, managing stress in peer feedback, and setting proximal goals for peer feedback. In addition, the findings revealed significant predictive effects of SEBPF on sub-scores of writing performance, confirming the criterion validity of the measurement.

The present study acknowledges several limitations that may impact the generalizability and interpretability of its findings. First, the sample consisted exclusively of students from a singular educational context, limiting the extent to which these results can be generalized to other educational settings or populations. Second, the reliance on quantitative data without the integration of qualitative findings restricts the depth of insights into the nuanced experiences and perceptions of students engaging in peer feedback. The third limitation pertains to the measurement instrument used in this research. The items employed may not fully capture the multifaceted nature of peer feedback, which encompasses both oral and written forms. Finally, the study did not control for individual differences, like motivation and emotion, that could significantly influence the outcomes of peer feedback on writing performance.

However, the findings of this study underscore the significant implications for educational practice, particularly in the realm of EFL writing instruction. By recognizing and leveraging the dynamic interplay between self-efficacy and peer feedback, educators are better positioned to support learners in navigating the complexities of writing. Exploring the multifaceted nature of self-efficacy in peer feedback enables educators to more effectively guide students through the intricacies of academic writing, thereby contributing to their overall success in EFL writing endeavors. To this end, practical recommendations for teachers include the development of teaching strategies aimed at identifying, challenging, and altering the perspectives of less confident students. The goal is to cultivate a learning environment that promotes the emergence of more self-efficacious learners, particularly in the context of peer feedback. This can involve implementing different forms of writing instruction, such as specialized writing programs and workshops. These initiatives should aim to develop learners' ability to make accurate judgments of their writing competence when engaging with peer feedback.

Self-efficacy in peer feedback is an internalized construct that learners can acquire and enhance over time. This development process involves a synthesis of consistent self-evaluation, effective coaching, and repeated practice. Facilitating the growth of positive self-efficacy beliefs in peer feedback is crucial for promoting students' adaptive functioning and academic success. Educators play a key role in this process by providing opportunities for learners to engage in meaningful self-reflection, receive constructive feedback, and practice their writing skills in a supportive environment. It is essential to foster learners' own agency, empowering them to take ownership of their learning process and actively engage in self-improvement. By cultivating a strong sense of self-efficacy in relation to peer feedback, students are more likely to embrace challenges, persist in the face of difficulties, and achieve significant progress in their writing abilities.

CRedit authorship contribution statement

Mark Feng Teng: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Lin Sophie Teng:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.rmal.2024.100136](https://doi.org/10.1016/j.rmal.2024.100136).

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