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Development of an Emotional Intelligence Scale for Primary School Students

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ABSTRACT

The purpose of this study is to explore the emotional intelligence status of primary school students in Beijing and develop a scientific assessment scale. First, through a systematic review of domestic and international literature on emotional intelligence, we propose a theoretical framework encompassing four dimensions: self-perception, self-regulation, external perception, and external regulation. Second, relevant scales are collected to serve as an important reference for developing questionnaire items, thereby enabling the creation of custom items based on the hypothesized structure and the finalization of the preliminary questionnaire. Third, we conducted item analysis and exploratory factor analysis using a sample of 355 elementary school students to develop a second questionnaire. In the fourth step, the reliability and validity of the retest questionnaire were assessed using a sample of 362 elementary school students, and 60 of them were selected to evaluate retest reliability one month later. The final version of the questionnaire consists of 40 items, covering four dimensions: self-perception, self-regulation, external perception, and external regulation. The overall Cronbach's α coefficient for the questionnaire was 0.927, with Cronbach's α coefficients for each dimension ranging from 0.768 to 0.905; The test-retest reliability was 0.542; the results of confirmatory factor analysis indicated that $\chi^2/df = 2.28$, GFI = 0.78, IFI = 0.94, NNFI = 0.94, CFI = 0.94, and RMSEA = 0.060, all of which met psychometric standards. This scale is divided into four dimensions, which not only address the issue of current emotional intelligence scales being too broad in scope but also better align

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with the characteristics of Chinese elementary school students, thereby facilitating the implementation of mental health education in schools.

Keywords: Emotional Intelligence; Scale Development; Primary School Students

1. Introduction

There is broad consensus at the national level that the fundamental purpose of education is to enhance the overall quality of students. Zheng Richang et al. proposed a “whole-person education” model, viewing the human being as a unity of body and mind—the body is the hardware, and the mind is the software; together, they form the two strokes of the Chinese character for “person”, neither of which can be dispensed with^[1]. In this model, emotions play a crucial role; a stable, optimistic, and positive mindset not only enhances learning and work efficiency and helps build strong interpersonal relationships but also greatly benefits one’s physical health. In recent years, as the “Double Reduction” policy has been further implemented, the psychological burden on elementary school students has eased somewhat, but emotional adjustment issues have become increasingly prominent. According to the “Ten Measures to Further Strengthen Mental Health Work for Primary and Secondary School Students” issued by the Chinese Ministry of Education in October 2025, the state explicitly states that it is necessary to “enhance students’ abilities to adapt to their environment, regulate their emotions, and cope with stress, thereby strengthening their psychological resilience and mental fortitude”^[2]. This policy direction reflects the government’s strong emphasis on the mental health of primary and secondary school students, and highlights the critical role of emotional intelligence in children’s development.

Assessing emotional intelligence requires effective and reliable tools. The most commonly used emotional intelligence scales currently include the Emotional Intelligence Scale (EIS)^[3], the Bar-On Emotional Quotient Inventory (EQ-i)^[4], and the Bar-On Emotional Quotient Inventory: Youth Version (EQ-i: YV)^[5]; however, when these tools are used in China, issues regarding their cross-cultural applicability arise. Because these scales are mostly adapted from foreign sources and do not fully account for the values and behavioral characteristics within the Chinese cultural context, their direct application to Chinese elementary and

secondary school students makes it difficult to accurately assess their true psychological characteristics^[6].

The scope of emotional intelligence has been expanding continuously, from the initial four-component model to hybrid models that incorporate personality traits. This has led to overlap with existing questionnaires on topics such as social skills and self-confidence^[7], resulting in a lack of clear boundaries in the definition of its dimensions. Identifying the core issues and grasping the essence among a multitude of concepts is not only a theoretical requirement but also a practical necessity for primary and secondary schools. Therefore, this study will explore the internal structure of emotional intelligence among elementary school students and validate it through empirical research. This holds significant value for enriching and refining theoretical research on the mental health of elementary school students. From a practical perspective, developing a scientific and effective emotional intelligence questionnaire for elementary school students can provide a scientific basis for emotional intelligence assessments in schools, thereby better promoting the implementation of mental health education programs.

2. Materials and Methods

2.1. Subject

In the initial assessment, a cluster sampling method was used to select 355 students in grades 3 through 6 in Beijing, with a balanced representation of urban and rural schools. Of these, 183 were boys, and 172 were girls.

In the second test, the researchers selected a total of 362 students in grades 3 through 6 from two public schools, including 208 boys and 154 girls.

2.2. Theoretical Modeling

Emotional intelligence was first proposed in 1990 by Salovey of Harvard University and Mayer of the University of New Hampshire, who defined it as “subset of social

intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions"[8]. In 1997, Mayer and Salovey made significant revisions to the definition, redefining emotional intelligence as "the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth." They also proposed a more influential four-branch competency model, redefining emotional intelligence as a cognitive ability comprising four competencies: emotional perception, emotional facilitation of thinking, emotional understanding, and emotional regulation[9]. This description effectively captures the harmonious integration of emotional and cognitive-rational processes and reflects the potential for emotions to stimulate and foster healthy mental development; as a result, it has garnered the support and endorsement of the vast majority of psychologists[10,11].

In his 1995 book *Emotional Intelligence*, Goleman defined emotional intelligence as "The ability to understand and manage our own emotions, to control impulses and anger, to act rationally, and to remain calm and optimistic in the face of challenges." His model comprises five components: self-awareness, self-management, self-motivation, understanding others' emotions, and interpersonal skills[12]. Baron defines emotional intelligence as "An array of non-cognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures"; his model consists of five dimensions: intrapersonal skills, interpersonal skills, adaptability, stress management, and general mood[13,14].

The key difference between these three theoretical models is that Mayer and Salovey's model focuses on the relationship between intelligence and emotions, emphasizing specific emotional competencies, and is known as the competency model; whereas Goleman and Baron's model incorporates personality traits, defining emotional intelligence as a combination of competencies and personality traits, and is known as the mixed model. Although the definitions of these models vary, they collectively highlight two fundamental aspects of emotional intelligence: self-directed abilities and other-directed abilities, while also encompassing the entire process from emotional perception to emotional regu-

lation[15].

Based on the above theories and other research on emotional intelligence, this study defines emotional intelligence as the ability to accurately recognize and express one's own emotions, regulate or alter negative emotions, empathize with others' emotions, and engage in positive and effective emotional communication with others. Based on this definition, we further considered the actual learning experiences of Chinese elementary school students and, by intersecting the dimensions of "self-other" and "perception-regulation," established the four-dimensional structure of this questionnaire: self-perception, self-regulation, external perception, and external regulation.

2.3. Development of the Formal Scale

This study consists of two phases: the initial test and the second test. Based on the results of the data analysis, the test items were screened and revised to ultimately produce the final questionnaire.

Initial Test: This preliminary questionnaire consists of 64 items divided into four dimensions, with 16 items in each dimension. Items are rated on a 5-point scale (1 = strongly disagree, 5 = strongly agree). Item analysis and exploratory factor analysis were conducted on the preliminary test data. Based on the results of these analyses, items with low discriminant validity and low factor loadings across the four dimensions—self-perception, self-regulation, external perception, and external regulation—were excluded. Following the revisions, the self-perception dimension was reduced from 16 items to 11 items, the self-regulation dimension was reduced from 16 items to 10 items, the external perception dimension was reduced from 16 items to 13 items, and the external regulation dimension was reduced from 16 items to 13 items.

Second Test: The second questionnaire consists of 47 items, and the scoring method remains consistent with that of the initial test. The researchers conducted item analysis and confirmatory factor analysis on the data from the second round of testing to validate and refine the factor structure model developed after the first round of testing. Further eliminate entries with low loadings and high correction indices, and repeat this process continuously. The final version of the questionnaire consisted of 40 items. The scale is divided into four dimensions: self-perception, self-regulation, external

perception, and external regulation. It consists of 10 items each for self-perception, self-regulation, external perception, and external regulation, and is scored on a 5-point scale.

3. Results

3.1. Reliability Analysis

This study examined the overall internal consistency reliability of the Emotional Intelligence Scale for Primary

School Students, using Cronbach's α coefficient to assess the scale's reliability index. The specific results are presented in **Table 1**. The Cronbach's α coefficients for each dimension were all strong, at 0.846, 0.768, 0.879, and 0.905, respectively. The overall Cronbach's α coefficient was 0.927, which reached statistical significance.

We also calculated the split-half reliability of the final questionnaire to be 0.838 ($p = 0.000$), and the test-retest reliability for the 60 participants one month later to be 0.542 ($p = 0.009$).

Table 1. Cronbach's α coefficients for each dimension of the Emotional Intelligence Questionnaire for elementary school students.

Self-Perception	Self-Regulation	External Perception	External Regulation	Total Emotional Intelligence Score
0.846	0.768	0.879	0.905	0.927

3.2. Structural Validity Analysis

During the preliminary testing phase, exploratory factor analysis (EFA) was conducted on all items to identify the underlying structure of the questionnaire data. A suitability test was conducted prior to analysis; the KMO value was 0.91 ($p < 0.01$), indicating that the data are suitable for factor

analysis. Factors were extracted using principal component analysis, and the method of maximum variance was applied to select factors with eigenvalues greater than 1, while values with factor loadings less than 0.3 were omitted. The analysis yielded four factors, which together accounted for 58% of the total variance. The loadings of each item on the four factors are shown in **Table 2**.

Table 2. Factor Loadings from Exploratory Factor Analysis.

Item	Loadings on Each Factor			
	Self-Perception	Self-Regulation	External Perception	External Regulation
V4	0.624			
V6	0.606			
V5	0.603			
V7	0.598			
V11	0.595			
V2	0.592			
V1	0.556			
V8	0.544			
V9	0.524			
V10	0.502			
V3	0.501			
V17		0.620		
V16		0.619		
V15		0.585		
V12		0.571		
V18		0.552		
V14		0.493		
V13		0.475		
V20		0.400		
V21		0.371		
V19		0.351		
V29			0.676	
V30			0.663	
V24			0.648	
V25			0.631	
V31			0.622	
V27			0.620	
V26			0.619	
V28			0.594	

Table 2. Cont.

Loadings on Each Factor				
Item	Self-Perception	Self-Regulation	External Perception	External Regulation
V22			0.573	
V33			0.562	
V23			0.552	
V32			0.536	
V34			0.376	
V47				0.772
V41				0.705
V36				0.672
V40				0.666
V37				0.656
V42				0.634
V35				0.623
V38				0.621
V46				0.605
V44				0.602
V39				0.568
V43				0.548
V45				0.524

The results of exploratory factor analysis indicate that the items in the initial questionnaire clustered into four factors, a structure that largely aligns with the dimensional framework proposed at the outset of the study based on theoretical constructs. This provides preliminary support for the notion that emotional intelligence in elementary school students may comprise four factors: self-perception, self-regulation, external perception, and external regulation. Based on the analysis results, 47 items with clear loadings on the four factors mentioned above were retained to form the questionnaire for subsequent formal testing.

During the second test phase, confirmatory analysis was conducted to validate the model, and items with factor loadings below 0.4 on the specified factors were excluded. Ultimately, 40 items were retained, with each dimension

comprising 10 items. The fit results are shown in **Table 3**.

As shown in the table, all key fit indices ($\chi^2/df = 2.28$, GFI = 0.78, IFI = 0.94, NNFI = 0.94, CFI = 0.94, RMSEA = 0.060) meet the psychometric criteria for a good fit. This indicates a high degree of fit between the observed data and the predefined four-factor model, suggesting that the questionnaire possesses ideal construct validity.

3.3. Gender Differences in Emotional Intelligence

This study analyzed gender differences within the sample group that underwent formal testing and found significant differences in all four dimensions and the total score, with female students scoring higher than male students across the board. See **Table 4** for details.

Table 3. Overall fit indices for the confirmatory factor analysis model.

χ^2/df	GFI	IFI	NNFI	CFI	RMSEA
2.28	0.78	0.94	0.94	0.94	0.060

Note: GFI stands for the Goodness-of-Fit Index; IFI stands for the Incremental Fit Index; NNFI stands for the Non-Normed Fit Index; CFI stands for the Comparative Fit Index; RMSEA stands for the Root Mean Square Error of Approximation.

Table 4. Test for Gender Differences.

Scale	Male		Female		t
	M	SD	M	SD	
Self-Perception	43.49	8.06	46.28	7.06	-3.091**
Self-Regulation	34.67	7.41	36.77	7.67	-3.337**
External Perception	50.52	9.45	54.10	8.60	-3.377**
External Regulation	43.31	11.52	49.22	10.55	-4.488**
Total Scale	173.98	27.01	187.85	25.29	-3.494**

Note: ** $p < 0.01$.

4. Discussion

Based on a review of the literature and theoretical integration, this study constructed a framework of emotional intelligence for elementary school students comprising four dimensions: self-perception, self-regulation, external perception, and external regulation. Empirical testing has confirmed that this construct possesses good construct validity, indicating that this theoretical framework is capable of reasonably reflecting the intrinsic characteristics of emotional intelligence in elementary school students. The Emotional Intelligence Scale for Primary School Students, developed within this framework, has undergone multiple revisions and validations. It demonstrates excellent Cronbach's α coefficients, split-half reliability, and test-retest reliability, and confirmatory factor analysis supports its construct validity. It can serve as an effective localized tool for assessing the emotional intelligence of primary school students.

At the same time, this four-dimensional framework is not only supported by statistical evidence but also aligns closely with current trends in emotional intelligence research. A study by Krasovska et al.^[16] indicates that innovative teaching techniques—such as emotional role-playing and emotional mapping—can significantly enhance elementary school students' emotional intelligence. Therefore, the external dimensions of emotional intelligence are a key component of its development. This study treated “external perception” (recognition of others' emotions) and “external regulation” (emotional expression and management) as independent factors, which is highly consistent with the findings of Krasovska et al.^[16] and confirms that the external manifestations of emotional intelligence in social interactions constitute an independent and critical dimension. This finding suggests that during elementary school, children not only need to understand their own emotions but also need to learn how to perceive others' emotions in social interactions and express them appropriately. This refined framework provides a more precise theoretical basis for measuring and intervening in emotional intelligence.

With regard to gender differences, the study found that girls scored significantly higher than boys in self-perception, self-regulation, external perception, and external regulation. This finding is consistent with the developmental characteristics of girls in elementary school, who tend to be more sensitive and perceptive in terms of emotional awareness

and empathy^[17,18]. At the same time, this finding is consistent with the results of Thakur's^[19] study of Indian students, which showed that female students significantly outperformed male students in overall emotional intelligence scores as well as in dimensions such as emotional expression and understanding. This not only indicates that gender differences in emotional intelligence are cross-culturally universal, but also reflects the advantages women have in the process of emotional socialization across different sociocultural contexts. These findings offer clear practical implications for emotional education. First, emotional education should acknowledge rather than ignore gender differences and provide targeted guidance: for girls, the focus should be on developing self-regulation and stress management skills, while for boys, the emphasis should be on enhancing emotional awareness and empathy training. Second, educational interventions should focus on key areas of disparity; rather than broadly enhancing emotional intelligence, they should specifically target areas where boys tend to be relatively weaker, such as external perception and external regulation. Ultimately, the ultimate goal of emotional education should be to bridge differences rather than entrench them, helping all children develop a full range of emotional skills.

In theory, this study contributes to research on the Chinese adaptation of the emotional intelligence framework for elementary school students. Based on empirical data from Chinese elementary schools, this study validated and refined the four-dimensional structure of emotional intelligence (self-perception, self-regulation, external perception, and external regulation), providing a practical reference framework for the subsequent development of measurement tools and intervention programs tailored to the Chinese cultural context. Compared to directly adapting Western adult scales, this structure is better suited to the cognitive development and emotional expression characteristics of elementary school-aged children. In practice, the findings align with the requirements outlined in the *Guidelines for Mental Health Education in Primary and Secondary Schools (Revised 2012)* regarding “fostering positive emotions, a well-rounded personality, and sound psychological qualities in students”^[20], providing evidence-based guidance for frontline teachers and parents. Specifically, first, teachers can use the four-dimensional framework developed in this study to design tiered emotional education activities in

their daily teaching: for younger students, the focus should be on training in emotional perception and expression; for older students, the emphasis should be on developing self-regulation and empathy skills. Second, based on the gender differences identified in this study, parents can consciously adjust their parenting approaches: encourage boys to express and recognize their emotions (external perception), and help girls build on their strengths in empathy to improve their emotional regulation strategies (self-regulation), thereby avoiding the reinforcement of ability differences due to gender stereotypes. Third, this study also provides evaluation metrics for schools to establish emotional counseling systems: teachers can conduct rapid assessments of students across four dimensions and provide group or individual counseling focused on areas of weakness, thereby enhancing the targeted approach and effectiveness of mental health education and ultimately promoting the synergistic development of students' psychological well-being and well-rounded personalities.

This study still has limitations. First, this study has a limited sample size and focuses exclusively on elementary school students in Beijing. As a first-tier city with a concentration of educational resources, Beijing may exhibit systemic differences from other regions across the country in terms of the prevalence of mental health education in schools and the importance families place on emotional nurturing. Therefore, the generalizability of the study's findings requires further verification. Second, in terms of research methodology, this study primarily relied on self-report questionnaires to collect data, which may be subject to social desirability bias. Finally, in terms of research design, this study employed a cross-sectional design, which did not allow for tracking the developmental trajectories of gender differences across different grade levels in elementary school, nor did it enable an assessment of the stability or trends in gender differences in emotional intelligence. Therefore, future research could expand the sample size and employ a variety of methods to conduct more in-depth empirical studies.

5. Conclusions

This study developed a four-dimensional framework of emotional intelligence for elementary school students, com-

prising self-perception, self-regulation, external perception, and external regulation. The framework is well-structured and demonstrates good validity. The results indicate that the overall Cronbach's α coefficient for the questionnaire was 0.927, with Cronbach's α coefficients for each dimension ranging from 0.768 to 0.905. The results of confirmatory factor analysis showed that $\chi^2/df = 2.28$, GFI = 0.78, IFI = 0.94, NNFI = 0.94, CFI = 0.94, and RMSEA = 0.060, all of which met psychometric standards. The Emotional Intelligence Scale for Primary School Students developed in this study can serve as a suitable tool for assessing the emotional intelligence of elementary school students. However, due to limitations such as sample size and the social desirability effect, the mechanisms underlying the development of emotional intelligence require further investigation in future studies.

Author Contributions

Conceptualization, S.L.; methodology, R.F. and S.L.; validation, R.F. and S.L.; formal analysis, R.F. and S.L.; investigation, R.F. and S.L.; data curation, R.F. and S.L.; writing—original draft preparation, R.F. and S.L.; writing—review and editing, S.L.; supervision, S.L. Both authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Ethical review and approval were waived for this study due to the exclusive use of anonymized, non-identifiable human data, no intervention or interaction with participants, no collection of sensitive personal information or involvement of commercial interests, and no foreseeable risk of physical or psychological harm.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

For access to the data of this study, please contact the corresponding author with a reasonable request.

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Conflicts of Interest

The authors declare no conflict of interest.

AI Use Statement

The authors declare that no artificial intelligence (AI) tools were used in the preparation of this manuscript.

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