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Translation and Validation of the Chinese Version of the Academic Advising Evaluation Scale

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Abstract:
This study aimed to translate and culturally adapt the Academic Advising Evaluation Scale and to examine its reliability and validity, thereby providing an appropriate instrument for evaluating the quality of academic advising in Chinese higher education institutions. Methods: After obtaining authorization from the original authors, the original scale was translated into Chinese following Brislin's translation model, resulting in the Chinese version of the Academic Advising Evaluation Scale. A questionnaire survey was conducted among 481 postgraduate students through the Questionnaire Star platform to assess the reliability and validity of the scale. Following the reliability and validity analyses, the entropy weight method was used to determine the objective weight of each item, and the TOPSIS method was applied to calculate the comprehensive closeness coefficient. Results: The Chinese version of the Academic Advising Evaluation Scale consisted of three dimensions and nine items. The Cronbach's α coefficient of the overall scale was 0.779, and the test–retest reliability coefficient was 0.814. Factor analysis extracted three common factors, which cumulatively explained 73.291% of the total variance. The entropy weights of the information resources, reliability, and reasonableness dimensions were 0.2929, 0.3310, and 0.3761, respectively. The mean TOPSIS closeness coefficient was 0.5569 ± 0.1386. Conclusion: The Chinese version of the Academic Advising Evaluation Scale demonstrated good reliability and validity and may be used as an instrument for evaluating the quality of academic advising. The entropy weight–TOPSIS method can further identify differences among evaluation indicators and detect potential weaknesses in academic advising services.
Keywords: *scale translation and adaptation; higher education; quality evaluation; reliability; validity; entropy weight method; TOPSIS*

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I. INTRODUCTION

Academic advising generally refers to the process of helping students achieve success in their academic development and career planning through professional consultation and support. The concept was first proposed by Burns Crookston and Terry O'Banion in 1972[1]. Wesley R. Habley[2] was among the first scholars to classify different models of academic advising. Crookston[3] divided academic advising into prescriptive advising and developmental advising. The Glossary of Higher Education Evaluation in China, compiled by the Higher Education Evaluation Center of the Ministry of Education, categorizes academic advising into several areas, including learning beliefs and attitudes, learning objectives and content, learning methods and approaches, and learning psychology and ethics[4]. With the increasing diversity of postgraduate students and the transition of Chinese higher education from mass participation to universal access, students are facing increasingly complex academic and learning-related challenges. Consequently, Chinese higher education institutions have begun to place greater emphasis on academic advising as an important means of ensuring the quality of talent cultivation. However, as academic advising has gradually developed in China, several limitations have also become apparent[5]. In particular, the lack of appropriate evaluation systems and instruments for academic advising may hinder the continuous improvement of educational quality. At present, China still lacks standardized instruments for evaluating the quality of academic advising. In contrast, academic advising has a longer history in other countries, where greater attention has been paid to the standardization of evaluation indicators. Springer and Tyran[6] developed an Academic Advising Evaluation Scale that assesses academic advising in terms of three dimensions: information resources, reliability, and reasonableness. The scale enables a rapid, objective, accurate, and comprehensive evaluation of the performance and effectiveness of academic advising and has demonstrated good reliability and validity in previous applications. Therefore, the present study translated the English version of the Academic Advising Evaluation Scale into Chinese and examined its reliability and validity, with the aim of

providing a scientific instrument for evaluating the quality of academic advising in Chinese higher education institutions.

To further enhance the interpretability of the evaluation results, this study incorporated an entropy weight–TOPSIS approach into the framework of scale translation and reliability and validity testing. The entropy weight method determines objective weights according to the degree of dispersion in the observed values of each indicator, whereas TOPSIS calculates the relative closeness of each evaluation object to the ideal solution.

1.1 PARTICIPANTS

The inclusion criteria were as follows: full-time postgraduate students currently enrolled at a higher education institution who were informed about the study and agreed to participate. In accordance with the guidelines for cross-cultural adaptation[7], the required sample size was set at a minimum of 10 participants per item. After allowing for a potential invalid-response rate of 20%, the minimum required sample size was calculated to be 113. Convenience sampling was employed. A total of 500 questionnaires were distributed, of which 481 were valid, yielding a valid response rate of 96.0%. Among the participants, 213 were male (44.3%) and 268 were female (55.7%). Regarding year of study, 83 participants were first-year postgraduate students (17.3%), 206 were second-year postgraduate students (42.8%), 145 were third-year postgraduate students (30.1%), and 47 were in other years of study (9.8%).

1.2 METHODS

1.2.1Research Instruments

Based on previous survey research conducted by several scholars, Springer et al[6] developed the Academic Advising Evaluation Scale in 2022. The scale comprises nine items across three dimensions. Dimension 1 (Items 1–3) assesses satisfaction with the information resources provided through academic advising; Dimension 2 (Items 4–6) assesses satisfaction with the reliability of academic advising; and Dimension 3 (Items 7–9) assesses satisfaction with the reasonableness of academic advising. Each item is rated on a 7-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). The total scale score is calculated by summing the scores of all nine items, with higher scores indicating a more favorable evaluation of the quality of academic advising services.

1.2.2Translation and Cultural Adaptation of the Scale

The scale was translated and culturally adapted using Brislin’s translation model[8]. First, two researchers with experience in academic advising and proficiency in English independently translated the original scale into Chinese. The research team then compared, discussed, and integrated the two Chinese translations to produce a preliminary Chinese version. Subsequently, two postgraduate students majoring in English who had not been exposed to the original scale independently back translated the preliminary Chinese version into English. The research team compared the two back-translated versions and checked them against the original scale. Finally, a panel comprising the four translators discussed and revised the translated scale, resulting in the final Chinese version of the Academic Advising Evaluation Scale used in this study.

1.3 PILOT STUDY

A pilot study was conducted using convenience sampling among 30 postgraduate students from local higher education institutions. After providing informed consent, participants were informed of the purpose of the study and the instructions for completing the questionnaire. During completion, the researchers recorded participants’ feedback regarding item wording, comprehension of the content, and response format to assess the comprehensibility and acceptability of the Chinese version and to identify any potentially ambiguous or difficult-to-understand expressions. All 30 participants completed the scale, and none reported any items that were clearly ambiguous or difficult to understand. These findings indicated that the Chinese version of the scale had satisfactory comprehensibility and was suitable for use in the formal survey.

1.4 STATISTICAL ANALYSIS

Data were analyzed using IBM SPSS Statistics version 25.0 and AMOS version 28.0. Item analysis was performed using the critical ratio method and item–total correlation analysis. Construct validity was evaluated through exploratory factor analysis and confirmatory factor analysis[9]. The reliability of the scale was assessed using Cronbach’s α coefficient and test–retest reliability, whereas content validity was evaluated using the content validity index. All statistical tests were two-sided, with the significance level set at $\alpha = 0.05$.

1.5 ENTROPY WEIGHT–TOPSIS COMPREHENSIVE EVALUATION METHOD

After the scale had undergone item analysis and reliability and validity testing, the nine items were treated as positive evaluation indicators, and the original evaluation matrix $X = (x_{ij})_{n\times m}$ was constructed, where $n$denotes

the number of participants and m denotes the number of evaluation indicators. The indicators were first normalized using the min–max normalization method as follows:

$$z_{ij} = (x_{ij} - minx_j)/(maxx_j - minx_j) \quad (1)$$

To avoid undefined logarithmic values caused by normalized values of zero, a small constant of $10^{-6}$was added during the calculation. The proportion of participant $i$under indicator $j(p_{ij})$, the information entropy (e_j), the divergence coefficient (d_j), and the objective weight (w_j) were then calculated as follows:

$$p_{ij} = (z_{ij} + 10^{-6})/\Sigma_i(z_{ij} + 10^{-6}) \quad (2)$$

$$e_j = -(1/lnn)\Sigma_i(p_{ij}lnp_{ij}) \quad (3)$$

$$d_j = 1 - e_j;\ \ w_j = d_j/\Sigma_j d_j \quad (4)$$

On this basis, a weighted normalized decision matrix was constructed, and the positive and negative ideal solutions were determined. The Euclidean distances of participant $i$from the positive and negative ideal solutions, denoted by $D_i^+$and D_i^-, respectively, were then calculated. The TOPSIS relative closeness coefficient $C_i$was subsequently calculated as follows:

$$C_i = D_i^-/(D_i^+ + D_i^-) \quad (5)$$

The value of $C_i$ranges from 0 to 1, with a higher value indicating that the participant's overall evaluation of the quality of academic advising services is closer to the ideal state. The weight of each dimension was obtained by summing the weights of its constituent items. Entropy weights reflect the amount of information arising from variation in the indicators within the sample and should not be interpreted as absolute measures of their theoretical importance.

II. RESULTS

2.1 ITEM ANALYSIS

Item analysis of the Academic Advising Evaluation Scale was conducted using the critical ratio method and item–total correlation analysis. The critical ratio method evaluates item discrimination by comparing differences between the high- and low-scoring groups. All participants were ranked in descending order according to their total scale scores, with the highest 27% assigned to the high-scoring group and the lowest 27% assigned to the low-scoring group. Independent-samples *t* tests were then performed to calculate the critical ratio for each item. A larger critical ratio indicates greater item discrimination. Item–total correlation analysis evaluates item performance by calculating the correlation between each item score and the total scale score. Higher Pearson correlation coefficients indicate stronger associations between individual items and the overall scale, reflecting greater internal consistency.

In the present study, independent samples *t* tests showed statistically significant differences in all item scores between the high- and low-scoring groups. The critical ratio values ranged from 7.535 to 11.277 (all $p < 0.05$), indicating satisfactory discrimination; therefore, all items were retained. Pearson correlation analysis showed that the correlations between individual item scores and the total scale score ranged from 0.528 to 0.679, and all correlations were statistically significant (all $p < 0.001$). These findings indicated that all items were adequately associated with the overall construct[10] , and all items were therefore retained.

2.2 VALIDITY ANALYSIS

2.2.1Construct Validity

Exploratory factor analysis: The Kaiser–Meyer–Olkin (KMO) value was 0.749, and Bartlett's test of sphericity was statistically significant ($\chi^2 = 658.728,\ p < 0.001$), indicating that the data were suitable for exploratory factor analysis[10]. Principal component analysis with varimax orthogonal rotation was performed, and factors with eigenvalues greater than 1 were retained. Three common factors—information resources, reliability, and reasonableness—were extracted, consistent with the dimensional structure of the original scale. The three factors explained 73.291% of the cumulative variance. After varimax rotation, the factor loadings of the items on their respective dimensions ranged from 0.808 to 0.890, all exceeding 0.40, indicating that the items adequately represented their corresponding dimensions. The results are presented in Table 1 and Figure 1.

Confirmatory factor analysis: A confirmatory factor analysis model was specified using AMOS version 28.0. The three dimensions were treated as latent variables, and the nine items of the Academic Advising Evaluation Scale were treated as observed variables to construct the hypothesized measurement model, as shown in Figure 2. All model fit indices met the recommended criteria, indicating that the hypothesized factor structure provided a good fit to the observed data. The model fit results are presented in Table 2.

Table 1. Rotated Factor Loadings of the Items

Item	Information Resources	Reliability	Reasonableness
1. The institution promptly provides students with information relevant to their academic advising inquiries.	0.808		
2. The institution provides comprehensive resources to support academic advising.	0.890		
3. The institution provides detailed course-related information.	0.869		
4. The institution provides the academic advising promised to students on time.		0.821	
5. After academic advising, the institution promptly and appropriately addresses issues raised in student feedback.		0.847	
6. Academic advising staff respond promptly to students' requests for services.		0.844	
7. Academic advising is scheduled at times convenient for student participation.			0.829
8. Academic advisors and relevant staff attend to students' best interests.			0.815
9. Academic advisors and relevant staff fully understand students' individual needs.			0.846

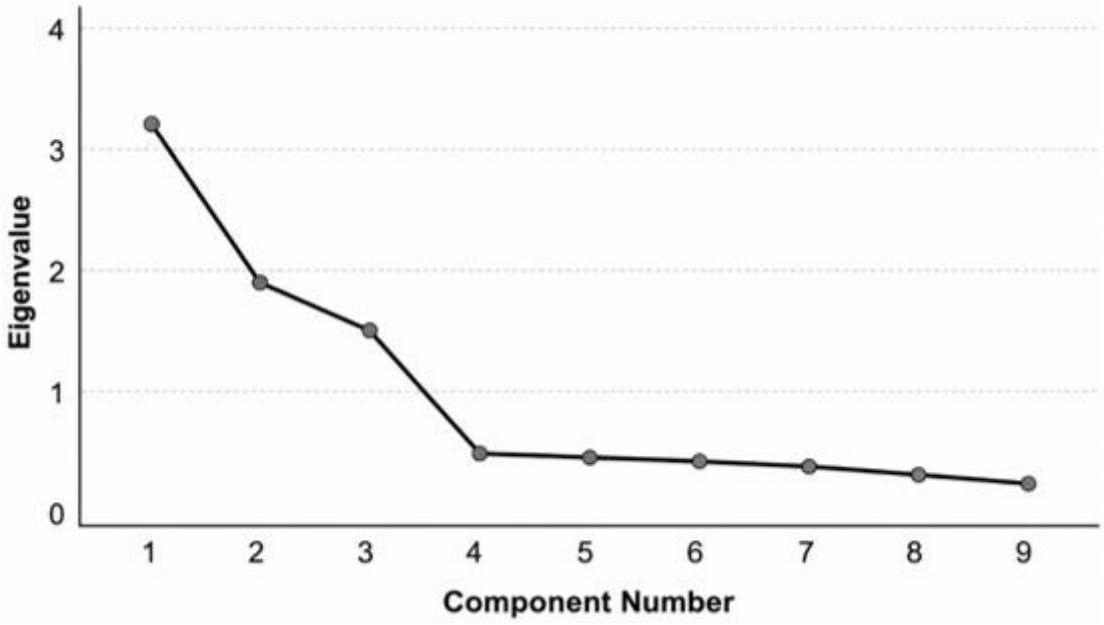

Figure 1 Scree Plot

Table 2. Goodness-of-Fit Indices for the Confirmatory Factor Model

Item	χ^2/df	GFI	AGFI	NFI	CFI	IFI	TLI	RMSEA
Recommended criterion	＜5	＞0.9	＞0.9	＞0.9	＞0.9	＞0.9	＞0.9	＜0.10
Model result	1.062	0.974	0.951	0.962	0.998	0.998	0.996	0.018

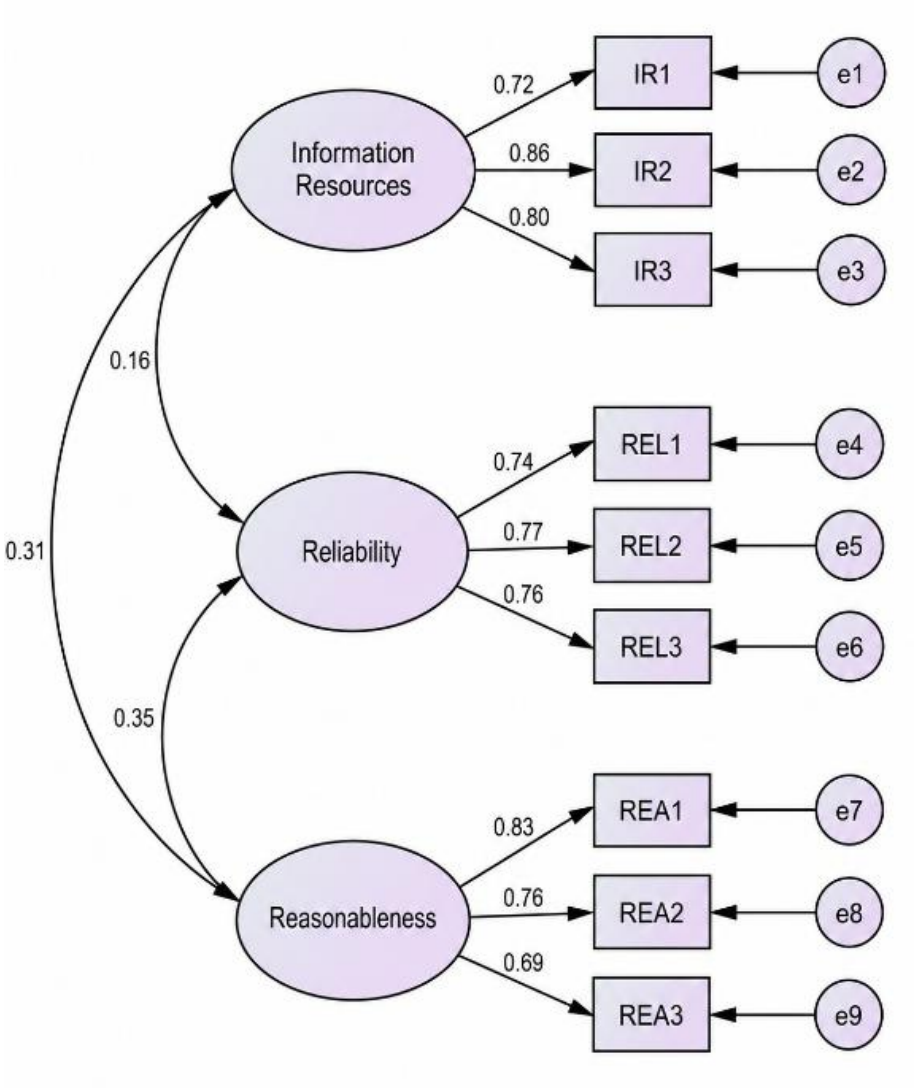

Figure 2. Confirmatory Factor Model for the Chinese Version of the Academic Advising Evaluation Scale

2.2.2Content Validity

The item-level content validity index (I-CVI) ranged from 0.83 to 0.92, and the scale-level content validity index (S-CVI) was 0.94. Both indices met the recommended criteria, indicating that the Academic Advising Evaluation Scale had good content validity[11][13].

2.3 RELIABILITY ANALYSIS

The Chinese version of the Academic Advising Evaluation Scale demonstrated satisfactory reliability. Cronbach's α coefficient was 0.779 for the overall scale and 0.832, 0.803, and 0.802 for the information resources, reliability, and reasonableness dimensions, respectively. Two weeks later, 15 participants were randomly selected to complete the scale again. The test–retest reliability coefficients for the overall scale and the three dimensions were 0.814, 0.783, 0.813, and 0.809, respectively.

2.4 RESULTS OF ENTROPY WEIGHT ANALYSIS

The information entropy values of the nine items ranged from 0.9741 to 0.9827, while their entropy weights ranged from 0.0901 to 0.1345. Item 8 ("Advising staff care about students' interests"), Item 7 ("Academic advising is scheduled at convenient times"), and Item 4 ("Promised academic advising is provided on time") had relatively higher weights, whereas Item 2 ("Comprehensive resources are provided to support academic advising") had a comparatively lower weight, as shown in Table 3. A higher entropy weight indicates only that the corresponding indicator exhibits greater variability and provides more information within the sample; it does not necessarily imply greater theoretical importance.

Table 3. Results of Entropy Weight Analysis for Each Item

Item	Dimension	Mean	Standard Deviation	Information Entropy	Divergence Coefficient	Entropy Weight	Rank
Q1	Information Resources	4.5426	1.6095	0.979458	0.020542	0.106888	6
Q2	Information Resources	4.7755	1.5876	0.982694	0.017306	0.090050	9
Q3	Information Resources	4.6757	1.5952	0.981556	0.018444	0.095973	8
Q4	Reliability	4.3077	1.6128	0.976605	0.023395	0.121732	3
Q5	Reliability	4.4096	1.5721	0.978391	0.021609	0.112438	4
Q6	Reliability	4.6590	1.5746	0.981396	0.018604	0.096801	7
Q7	Reasonableness	4.1622	1.6056	0.974227	0.025773	0.134104	2
Q8	Reasonableness	4.2017	1.6134	0.974149	0.025851	0.134512	1
Q9	Reasonableness	4.3534	1.5410	0.979340	0.020660	0.107502	5

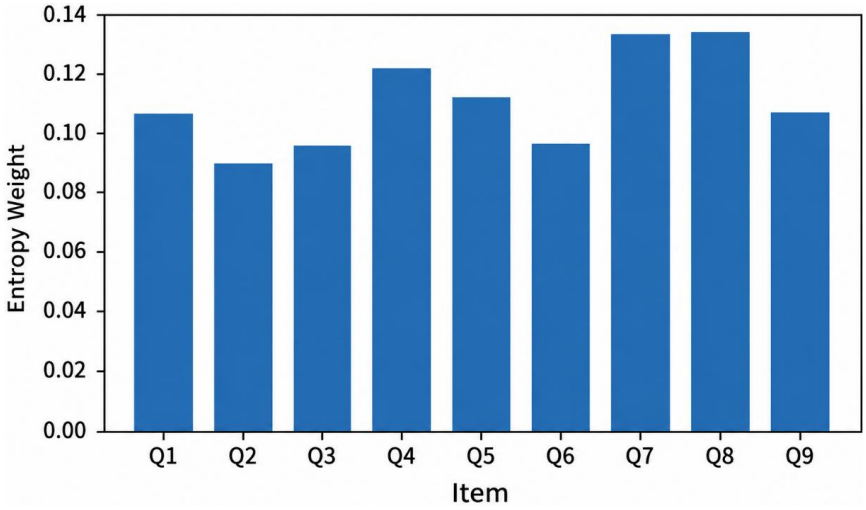

Figure 3. Distribution of Entropy Weights Across the Nine Items

2.5 RESULTS OF TOPSIS COMPREHENSIVE EVALUATION

The entropy weights of the three dimensions were 0.2929 for information resources, 0.3310 for reliability, and 0.3761 for reasonableness. Their mean scores were 4.6646, 4.4588, and 4.2391, respectively. Among the 481 participants, the mean TOPSIS relative closeness coefficient was 0.5569 ± 0.1386, with a median of 0.5614 and an interquartile range of 0.4621–0.6547. The results indicated that the information resources dimension received a relatively higher mean evaluation, whereas the reasonableness dimension received a relatively lower mean evaluation and exhibited greater within-sample variability. Therefore, the reasonableness dimension warrants particular attention in future efforts to improve academic advising services, as shown in Table 4.

Table 4. Entropy Weights and Evaluation Scores of the Three Dimensions

Dimension	Dimension Weight	Mean	Standard Deviation
Information Resources	0.2929	4.6646	1.3842
Reliability	0.3310	4.4588	1.3438
Reasonableness	0.3761	4.2391	1.3406

III. DISCUSSION

3.1 ITEM ANALYSIS

Critical ratio analysis showed statistically significant differences in the scores of all items between the high- and low-scoring groups ($p < 0.05$). This finding indicated that the items could discriminate among participants with different evaluations of academic advising. Correlation analysis showed that all inter-item correlation coefficients were below 0.80, whereas the correlations between each item and the total scale score were greater than 0.30 and statistically significant ($p < 0.001$). These results indicated that the items were relatively independent and adequately representative of the construct. Therefore, no items were removed.

3.2 VALIDITY ANALYSIS OF THE SCALE

This study evaluated the scale in terms of content validity and construct validity. Experts assessed each item of the scale, yielding item-level content validity index (I-CVI) values ranging from 0.83 to 0.92 and a scale-level content validity index (S-CVI) of 0.94 for the Chinese version of the Academic Advising Evaluation Scale. These values exceeded the recommended thresholds of I-CVI > 0.78 and S-CVI > 0.90, indicating good content validity.

Construct validity was examined using exploratory factor analysis and confirmatory factor analysis. In the exploratory factor analysis, the three factors explained 73.291% of the cumulative variance, exceeding the recommended threshold of 40%. After rotation, each common factor comprised the items assigned to its corresponding dimension, consistent with the dimensional structure of the original scale. All rotated factor loadings exceeded the recommended value of 0.40, indicating that each item adequately represented its corresponding dimension. The confirmatory factor analysis produced the following model fit indices: $\chi^2/df = 1.062$, GFI = 0.974, AGFI = 0.951, NFI = 0.962, CFI = 0.998, IFI = 0.998, TLI = 0.996, and RMSEA = 0.018, indicating a good model fit. Overall, the findings demonstrated that the Academic Advising Evaluation Scale had good content validity and construct validity and could effectively evaluate academic advising.

3.3 RELIABILITY ANALYSIS OF THE SCALE

Reliability refers to the consistency and stability of the results obtained using a test or scale. Greater reliability indicates greater confidence in the measurement results. Cronbach's α coefficient reflects homogeneity or internal correlation among items, with higher values indicating better internal consistency. According to Polit et al.[12], a Cronbach's α coefficient greater than 0.70 is acceptable for a newly developed scale, whereas a value greater than 0.80 may be considered good. In the present study, Cronbach's α coefficient was 0.779 for the overall scale and 0.832, 0.803, and 0.802 for the three dimensions, respectively. These findings indicated that the Chinese version of the scale had satisfactory internal consistency.

3.4 ENTROPY WEIGHT–TOPSIS EVALUATION RESULTS

Compared with conventional equal-weight summation, the entropy weight method determines objective weights based on the dispersion of item responses within the sample, thereby reducing the influence of subjective weighting by researchers. The TOPSIS method further converts multiple indicators into a comprehensive relative closeness coefficient ranging from 0 to 1, enabling the scale to provide an integrated diagnostic function in addition to reliability and validity assessment. In the present analysis, the reasonableness dimension had a relatively higher weight but the lowest mean score, suggesting that the convenience of advising schedules, advisors' concern for students' interests, and their understanding of students' needs may be important factors in differentiating students' evaluations. The information resources dimension had a relatively higher mean score, indicating that higher education institutions have established a certain foundation in providing course-related information and advising resources.

From an applied perspective, the information resources, reliability, and reasonableness dimensions of the scale may serve as a basic framework for evaluating hybrid advising services. Regarding the integration of academic advising and career guidance, course selection and academic planning may be coordinated with career goals, industry workforce demands, and international employment information. Regarding the integration of institution-based advisors and industry mentors, institution-based advisors may be responsible for academic guidance and programme planning, whereas industry mentors may provide guidance on industry practice and professional competencies. Information-sharing, process-feedback, and joint-evaluation mechanisms may then be established. It should be emphasized that the existing nine items primarily assess the quality of academic advising services and do not directly cover international employability indicators such as cross-cultural communication, international industry regulations, international job-seeking competencies, and the extent of industry mentor participation. Therefore, the scale is more appropriately used as a foundational instrument for the subsequent development of a specialized scale than as a comprehensive measure of international employability.

IV. CONCLUSION

The Academic Advising Evaluation Scale comprises three dimensions and nine items, consistent with the structure of the original scale. It uses a 7-point Likert response format without reverse-scored items and was evaluated for reliability and validity among currently enrolled postgraduate students. The results indicated that the scale had good reliability and validity, required relatively little time to complete, and covered a broad range of content, supporting its use as an effective instrument for evaluating academic advising in China. Building on the reliability and validity assessment, the entropy weight–TOPSIS method was applied to determine objective differential weights for the indicators and generate a comprehensive evaluation score, thereby providing methodological support for identifying strengths and weaknesses in academic advising services. Several limitations should be acknowledged. Convenience sampling was used, and the participating institutions and academic disciplines were limited. In addition, voluntary online completion through the Questionnaire Star platform may have affected the objectivity of the data. Furthermore, the current scale primarily assesses the quality of academic advising services. Future studies should incorporate indicators reflecting the characteristics of postgraduate education in transportation-related disciplines, including the integration of academic and career guidance, collaboration between institution-based advisors and industry mentors, international career information, and cross-cultural employability. Overall, the Chinese version of the Academic Advising Evaluation Scale can be

used to assess the quality of academic advising and may provide a useful reference for higher education institutions seeking to improve advising services and refine hybrid advising mechanisms.

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