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Assessing Academic Goal Orientation in Chinese Nursing Students: Psychometric Evidence from SEM and IRT Models

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Abstract

This study aimed to translate the Academic Goals Orientation Questionnaire (AGOQ) into Chinese and evaluate its reliability and validity among Chinese nursing students using structural equation modeling (SEM) and item response theory (IRT). A total of 654 nursing students aged 17–26 years (mean = 21.61 ± 1.73) participated in the study. Psychometric properties of the Chinese AGOQ were examined through a dual approach combining SEM and IRT analyses. The questionnaire demonstrated good internal consistency, with a Cronbach's α of 0.895. Exploratory factor analysis (EFA) identified a four-factor structure accounting for 71.89% of the variance. Confirmatory factor analysis (CFA) supported a four-factor model with acceptable fit indices: CMIN/DF = 4.008, GFI = 0.932, AGFI = 0.905, CFI = 0.952, IFI = 0.952, and TLI = 0.941. IRT analysis, using the Graded Response Model (GRM) selected based on AIC and BIC comparisons, showed a monotonically increasing difficulty parameter and item discrimination values above 0.19, confirming the retention of 16 items. The Chinese version of the AGOQ exhibits strong psychometric properties and is a reliable and valid tool for assessing academic goal orientation among Chinese nursing students.

Keywords: Academic goal orientation, Nursing students, Reliability, Validity, Structural equation modeling, Item response theory

Introduction

The national standards for undergraduate teaching quality in Chinese universities emphasize that nursing students should possess independent learning abilities, innovative skills, and the capacity to adapt to evolving healthcare needs [1]. Instructors are encouraged to promote student-centered teaching, enhancing active learning and fostering students' autonomy and creativity. In nursing education, learning goal orientation plays an important role in guiding teaching strategies. For instance, nursing course objectives are typically divided into three domains: knowledge, skills, and attitudes. Evaluating the achievement of these objectives allows instructors to monitor students' mastery, preferences, and provide timely professional guidance.

Academic goals are defined as the focus and direction of an individual's motivation toward academic success or failure [2, 3]. These goals are typically classified into four categories [4]: (i) learning or task goals, (ii) ego self-enhancement goals, (iii) ego self-frustration goals, and (iv) work avoidance goals. Traditionally, research has focused on learning and performance as the primary aspects of goal orientation [5]. Grounded in achievement motivation theory, goal orientation research seeks to identify different goal types among students. Earlier studies emphasized a distinction between task-oriented and self-oriented goals [6, 7], while later research also recognized avoidance-oriented behavior in learning contexts. Factor analyses have consistently shown task, self, and avoidance orientations as distinct factors.

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In 1997, Norwegian researchers found that self-oriented goals could be divided into self-enhancement and self-frustration dimensions, which were weakly correlated and independent of task orientation, and both related to academic achievement [4]. Subsequent studies also confirmed that work avoidance is distinct from task and self-reinforcement orientations, demonstrating high reliability in measurement [7-9]. Consequently, academic goal orientation is currently conceptualized as four dimensions: ego self-frustration, ego self-enhancement, work avoidance, and learning or task goals.

Students with Type I goals (learning or task goals) focus on intrinsic motivation, seeking knowledge acquisition, skill development, and problem comprehension [10]. Type II and III goals (ego self-enhancement and ego self-frustration) are socially oriented, driven by external approval. Ego self-enhancement reflects the pursuit of favorable outcomes, whereas ego self-frustration involves defensive behaviors to avoid negative evaluations [4, 11]. Type IV goals (work avoidance) are characterized by minimizing effort and avoiding challenging tasks [12]. Previous studies have shown that students with lower academic performance are more likely to exhibit work avoidance behaviors compared to higher-performing peers [13, 14].

Despite the importance of academic goal orientation, no studies have investigated this in Chinese nursing students, likely due to a lack of validated measurement tools. The Academic Goals Orientation Questionnaire (AGOQ), originally developed in Norway [4], has been translated into Spanish and applied to nursing students [8]. Further validation in Colombia confirmed its reliability and validity in assessing nursing students' academic orientation [9]. Understanding nursing students' academic goal orientation can assist educators in tailoring instruction, selecting students for specific tasks, and adjusting course content.

Therefore, this study aims to translate the Spanish version of the AGOQ into Chinese and evaluate its psychometric properties among Chinese nursing students using structural equation modeling (SEM) and item response theory (IRT) multidimensional models.

Materials and Methods

Design and sample

A cross-sectional, multi-stage sampling design was employed in this study. Data were collected from March to June 2023 among nursing students enrolled in medical schools in Jinzhou, Liaoning Province, China. The survey was conducted by trained nursing graduate students, who received standardized guidance on language and administration procedures (see Supplementary Material 1 for investigator training guidance). Participation was voluntary.

Inclusion criteria were: (1) full-time enrollment as a nursing student, (2) informed consent and voluntary participation, and (3) ability to comprehend and complete the survey. Exclusion criteria included: (1) students who had dropped out, and (2) students unwilling to participate [15, 16].

Following Kendall's principle [17], the sample size was determined as 10–20 times the number of variables. The questionnaire included 4 demographic variables and 16 AGOQ items, totaling 20 variables. Accounting for potential nonresponse or invalid questionnaires, a 20% buffer was added, yielding a minimum required sample size of 480. Ultimately, 654 valid responses were collected.

Instrument

The Academic Goals Orientation Questionnaire (AGOQ) consists of 16 items across four dimensions: (i) ego self-frustration goals (items 4, 7, 11, 14), (ii) ego self-enhancement goals (items 2, 6, 10, 3), (iii) work avoidance goals (items 3, 8, 12, 15), and (iv) learning or task goals (items 1, 5, 9, 16). Responses were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), reflecting the participant's current state. The original scale demonstrated adequate reliability with Cronbach's alpha values >0.8 for all dimensions, and a total content validity index of 0.72 [4, 8].

Translation procedure

The AGOQ was translated following established guidelines [18-20]. Two multilingual experts first translated the questionnaire from Spanish to Chinese, after which two additional experts back-translated it into English. A panel of four nursing professionals and two psychologists reviewed the items for cultural and linguistic equivalence. A preliminary test was conducted with 30 nursing students, and revisions were made based on their feedback (see Supplementary Material 2 for the AGOQ items).

Pre-survey

A pre-survey was conducted with 50 randomly selected nursing students. The total score range was 16–64 (mean: 45.62 ± 11.10), and the average completion time was 3.86 minutes (range: 3–6 minutes). Descriptive results are provided in Supplementary Material 3.

Data collection

The formal survey was conducted between March and June 2023. Multi-stage sampling was applied: first, Jinzhou Medical University was randomly selected from six nursing colleges in Liaoning Province. Next, 50% of classes in each academic year were chosen, including both undergraduate and vocational nursing programs, resulting in 24 classes. Finally, 25–30 students per class were selected via cluster sampling. Questionnaires were distributed and collected on-site, with each student completing only one questionnaire. Out of 696 distributed surveys, 654 valid responses were obtained.

Statistical analysis

Data were analyzed using SPSS 25.0, AMOS 23.0, and R 4.3.0. Internal consistency of the AGOQ and its subscales was evaluated using Cronbach's alpha (α) [21–23].

Exploratory factor analysis (EFA) with principal component extraction and Varimax rotation was conducted to assess structural validity. The suitability of EFA was confirmed using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity [24–27]. Factor loadings of ≥0.40 were considered acceptable, and the cumulative variance explained by extracted factors was required to exceed 40% [28, 29].

Confirmatory factor analysis (CFA) was conducted to assess model fit using multiple indices: chi-square/degrees of freedom (χ^2/df), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), incremental fit index (IFI), Tucker-Lewis index (TLI), and comparative fit index (CFI) [30]. Fit criteria included GFI, AGFI, IFI, TLI, and CFI values >0.90 and χ^2/df <5 [31–33].

Item response theory (IRT) models were applied to further evaluate the AGOQ. Both the Graded Response Model (GRM) and Generalized Partial Credit Model (GPCM) were compared using Akaike's information criterion (AIC) and Bayesian information criterion (BIC), with lower values indicating superior model fit [34–36]. In this study, GRM showed better fit (AIC = 27,145; BIC = 27,504) compared with GPCM (AIC = 27,259; BIC = 27,617) and was therefore selected for analysis. For each item, discrimination (α) and difficulty (β) parameters were estimated. Item characteristic curves, item information curves, and total (scale) information curves were plotted, with larger areas under the curves indicating greater precision in measuring nursing students' academic goal orientations [37, 38].

Results and Discussion

Descriptive statistics

A total of 654 nursing students participated in the study. Their ages ranged from 17 to 26 years (mean = 21.61 ± 1.73). The majority were female (n = 568, 86.85%), sophomores (n = 430, 65.75%), and from urban areas (n = 342, 52.29%) **(Table 1)**.

Table 2 presents AGOQ scores by sex and grade. Among the four dimensions, learning or task goals had the highest mean score (3.59 ± 1.05), whereas ego self-frustration goals had the lowest mean score (2.60 ± 1.08), indicating variation in the academic goal orientation among the participants.

Table 1. Frequency distribution of demographic characteristics (n = 654)

Variables	Groups	N	$\%/\bar{X} \pm S$
City	Urban	342	52.29
	Rural	253	38.69
	Suburbs	59	9.02
Sex	Male	86	13.15
	Female	568	86.85
Age (years)	17–26		21.61 ± 1.73
Grade	Freshman	297	45.41
	Sophomore	267	40.83
	Junior	90	13.76

Table 2. Descriptive results of the Academic Goals Orientation Questionnaire by sex and grade

Dimensions and items	Sex					Grade						
	Male		Female		*P*	Freshman		Sophomore		Junior		*P*
	mean	sd	mean	sd		mean	sd	mean	sd	mean	sd	
F1	2.60	1.08	2.57	0.95	0.031	2.83	1.05	2.50	0.96	2.68	0.92	0.010
Item4	2.59	1.14	2.67	1.07	0.393	2.93	1.20	2.58	1.07	2.76	1.03	0.020
Item7	2.55	1.16	2.69	1.09	0.158	2.88	1.11	2.59	1.10	2.82	1.07	0.020
Item11	2.63	1.19	2.51	1.08	0.071	2.79	1.10	2.45	1.09	2.61	1.08	0.030
Item 14	2.64	1.25	2.42	1.03	0.001	2.71	1.19	2.38	1.05	2.54	1.02	0.030
F2	3.00	0.92	3.08	0.82	0.716	3.07	0.84	3.10	0.84	2.98	0.80	0.291

Item 2	3.03	1.20	3.15	0.97	0.013	3.16	0.99	3.17	1.03	3.03	0.96	0.292
Item 6	2.98	1.18	3.16	0.98	0.118	3.16	1.03	3.19	1.00	2.98	1.02	0.079
Item 10	3.08	1.11	3.02	1.02	0.388	3.07	1.04	3.04	1.03	2.99	1.01	0.845
Item 13	2.90	1.12	2.99	1.00	0.165	2.87	0.98	3.02	1.03	2.93	0.99	0.411
F3	2.97	0.96	2.82	0.78	0.091	2.97	0.90	2.78	0.80	2.94	0.77	0.047
Item 3	3.08	1.25	2.87	1.10	0.127	3.07	1.14	2.85	1.13	2.95	1.10	0.247
Item 8	2.94	1.14	2.85	1.06	0.953	2.96	1.01	2.80	1.10	3.00	1.00	0.097
Item 12	2.94	1.22	2.78	1.01	0.029	2.94	1.16	2.74	1.02	2.90	1.04	0.131
Item 15	2.92	1.22	2.79	1.02	0.120	2.90	1.12	2.75	1.04	2.91	1.04	0.200
F4	3.59	1.05	3.72	0.84	0.003	3.49	0.92	3.75	0.84	3.68	0.90	0.062
Item 1	3.60	1.10	3.74	0.93	0.012	3.57	0.98	3.75	0.92	3.70	1.01	0.330
Item 5	3.60	1.16	3.71	0.93	0.001	3.40	1.02	3.75	0.93	3.70	1.01	0.021
Item 9	3.60	1.19	3.76	0.91	0.000	3.49	1.06	3.77	0.91	3.76	1.00	0.069
Item 16	3.55	1.16	3.68	0.97	0.011	3.49	1.04	3.73	0.99	3.58	0.98	0.087

F1(Self- frustration goal, items 4, 7, 11, 14), F2(Ego self- enhancement goal, items 2, 6, 10, 13), F3(Work avoidance goal, items 3, 8, 12, 15), and F4(Learning or task goals, items 1, 5, 9, 16)

Reliability

Table 3 presents the Cronbach's alpha coefficients for each item of the AGOQ. The overall standardized Cronbach's alpha for the Chinese version of the AGOQ was 0.859, indicating satisfactory internal consistency and reliability. Additionally, the Cronbach's alpha values calculated after the deletion of individual items were all lower than the overall alpha, suggesting that no items needed to be removed or adjusted.

Table 3. Cronbach's coefficient alpha($n = 654$, $\alpha = 0.05$)

Items	Drop if	r dropped	r
Item4	0.850	0.503	0.586
Item7	0.849	0.534	0.615
Item11	0.852	0.470	0.558
Item14	0.851	0.486	0.571
Item2	0.847	0.568	0.638
Item6	0.850	0.514	0.591
Item10	0.847	0.562	0.634
Item13	0.850	0.517	0.594
Item3	0.854	0.435	0.530
Item8	0.854	0.420	0.511
Item12	0.855	0.412	0.502
Item15	0.854	0.429	0.519
Item1	0.851	0.498	0.573
Item5	0.851	0.491	0.567
Item9	0.851	0.485	0.560
Item16	0.853	0.454	0.536

Drop if: Cronbach alpha when the item is removed; r dropped: item-total correlation without the item; r: item-total (point-biserial) correlation

Validity

Construct validity

Exploratory factor analysis

The suitability of the data for factor analysis was confirmed with a KMO value of 0.848 and a significant Bartlett's test of sphericity ($\chi^2 = 6157.990$, $P < 0.001$) [29]. Using exploratory factor analysis, four factors were extracted based on eigenvalues greater than 1 and confirmed by the scree plot **(Figure 1)** [39]. These factors collectively explained 71.892% of the total variance, with individual contributions of 20.26%, 19.79%, 17.10%, and 14.75%. The factor loadings and communalities for all 16 AGOQ items are presented in **Table 5**. Items clustered into four dimensions, consistent with the original instrument: (i) Ego self-frustration goal (items 4, 7, 11, 14), (ii) Ego self-enhancement goal (items 2, 6, 10, 3), (iii) Work avoidance goal (items 3, 8, 12, 15), and (iv) Learning or task goals (items 1, 5, 9, 16). Each item had a loading above 0.40 on its primary factor, and no item displayed significant cross-loading, supporting the structural integrity of the Chinese version of the AGOQ [40].

Table 4. Rotation Sums of Squared Loadings

Model	of Variance (%)

	Ego self-frustration goal	Ego self-enhancement goal	Work avoidance goal	Learning goal dimension	the Total Variance
Initial model	17.182	14.486	11.148	10.682	53.498
Modified model	20.256	19.788	17.099	14.748	71.892

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.848, Bartlett's Test of Sphericity, Approx. Chi-Square = 6157.990, $P < 0.001$

Table 5. Factor load and communalities of each item in AGOQ of 16 Items(n = 654)

Items	F1	F2	F3	F4	Communalities
Item 7	0.898	0.016	0.200	0.043	0.848
Item 4	0.887	-0.006	0.216	0.087	0.841
Item 11	0.859	0.016	0.276	0.012	0.814
Item 14	0.843	-0.029	0.118	0.178	0.757
Item 6	0.066	0.899	0.088	0.157	0.845
Item 13	-0.059	0.880	0.126	0.135	0.813
Item 2	0.055	0.858	0.076	0.164	0.772
Item 10	-0.067	0.834	0.166	0.175	0.758
Item 9	0.230	0.023	0.835	0.063	0.755
Item 5	0.185	0.163	0.790	0.011	0.685
Item 16	0.186	0.099	0.783	0.193	0.695
Item 1	0.176	0.178	0.702	0.200	0.596
Item 15	0.011	0.165	0.045	0.842	0.739
Item 12	0.058	0.147	0.033	0.791	0.652
Item 8	0.068	0.130	0.120	0.721	0.555
Item 3	0.158	0.124	0.239	0.531	0.380

F1(Self- frustration goal, items 4, 7, 11, 14), F2(Ego self- enhancement goal, items 2, 6, 10, 13), F3(Work avoidance goal, items 3, 8, 12, 15), and F4(Learning or task goals, items 1, 5, 9, 16)

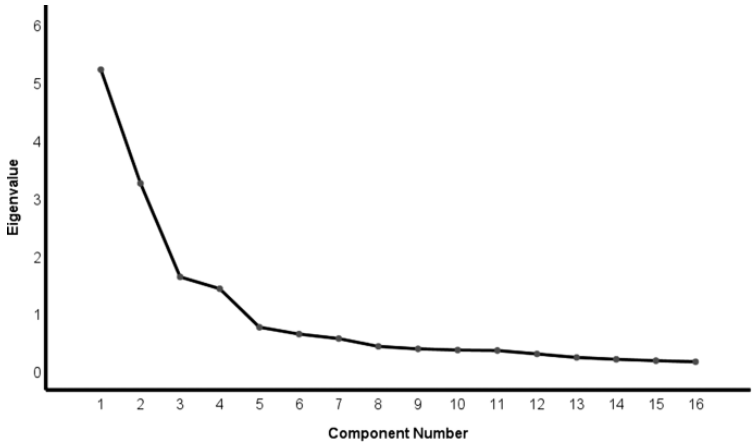

Figure 1. Scree plot

Confirmatory factor analysis

The CFA results are summarized in **Table 6**. Initially, the original four-factor structure of the Chinese version of the AGOQ did not meet acceptable fit criteria **(Table 6, Figure 2)**. To improve model fit, modification indices were applied, resulting in a revised four-factor model. The updated model demonstrated satisfactory fit across multiple indices: $\chi^2/df = 4.008$, GFI = 0.932, AGFI = 0.905, CFI = 0.952, IFI = 0.952, and TLI = 0.941 **(Table 6, Figure 3)** [33, 41–44].

Table 6. Evaluation of fitness of SEM model

Model	CMIN/DF	NFI	RFI	IFI	TLI	CFI	RMR	GFI	AGFI	PGFI	PRATIO	PNFI	PCFI
Initial model	5.010	0.921	0.903	0.936	0.921	0.936	0.061	0.912	0.878	0.657	0.817	0.752	0.764
Modified model	4.008	0.937	0.923	0.952	0.941	0.952	0.062	0.932	0.905	0.665	0.808	0.758	0.770

Standard value	< 5.000	> 0.900	> 0.900	> 0.900	> 0.900	> 0.900	> 0.500	> 0.500	> 0.500	> 0.500	> 0.500	> 0.500	> 0.500

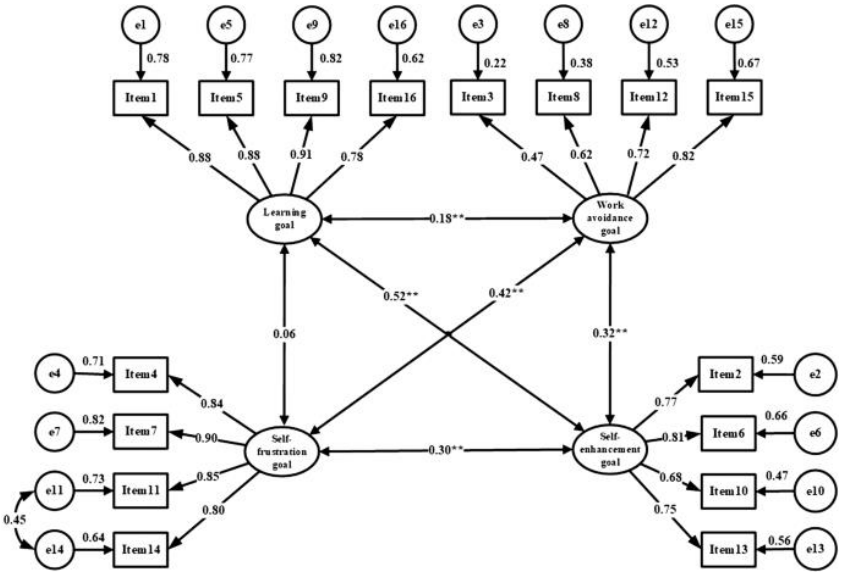

Figure 2. Standardized four-factor structural model of the Chinese version of the Academic goals orientation questionnaire (n = 654); F1(Self- frustration goal, items 4, 7, 11, 14), F2(Ego self- enhancement goal, items 2, 6, 10, 13), F3(Work avoidance goal, items 3, 8, 12, 15), and F4(Learning or task goals, items 1, 5, 9, 16)

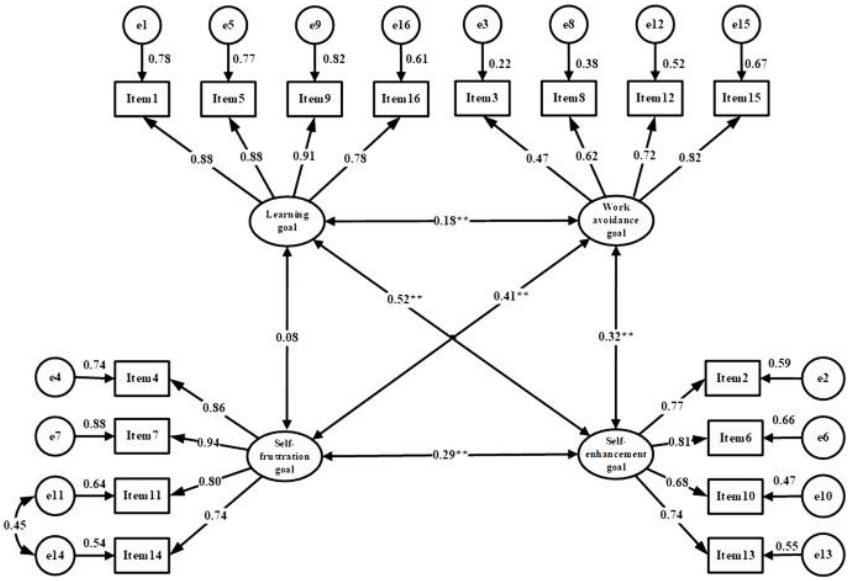

Figure 3. Standardized four-factors structural model of the modified Chinese version of the Academic goals orientation questionnaire (n = 654); F1(Self- frustration goal, items 4, 7, 11, 14), F2(Ego self- enhancement goal, items 2, 6, 10, 13), F3(Work avoidance goal, items 3, 8, 12, 15), and F4(Learning goal dimension, items 1, 5, 9, 16)

Discriminant validity

In this study, a two-tailed independent samples t-test was conducted to compare the scores of the upper 50% and lower 50% groups. As presented in **Table 7**, significant differences were observed across all item scores between the two groups (P < 0.001).

Table 7. Discriminant validity analysis in AGOQ (n = 654)

Item	Low-score group mean ± *SD*	High-score group mean ± *SD*	*t*	*P*
F1	1.68 ± 0.52	3.47 ± 0.63	-39.708	< 0.001

Item4	1.76 ± 0.61	3.55 ± 0.60	-37.910	< 0.001
Item7	1.77 ± 0.62	3.58 ± 0.62	-37.452	< 0.001
Item11	1.61 ± 0.49	3.44 ± 0.68	-39.671	< 0.001
Item 14	1.59 ± 0.49	3.31 ± 0.74	-34.875	< 0.001
F2	2.32 ± 0.69	3.82 ± 0.62	-29.411	< 0.001
Item 2	2.37 ± 0.70	3.90 ± 0.61	-29.662	< 0.001
Item 6	2.38 ± 0.70	3.90 ± 0.65	-28.743	< 0.001
Item 10	2.28 ± 0.73	3.79 ± 0.66	-27.649	< 0.001
Item 13	2.24 ± 0.70	3.72 ± 0.68	-27.301	< 0.001
F3	2.02 ± 0.67	3.66 ± 0.67	-31.620	< 0.001
Item 3	2.02 ± 0.68	3.77 ± 0.72	-31.981	< 0.001
Item 8	2.06 ± 0.72	3.67 ± 0.69	-29.063	< 0.001
Item 12	1.99 ± 0.64	3.61 ± 0.67	-31.747	< 0.001
Item 15	2.00 ± 0.69	3.61 ± 0.67	-30.151	< 0.001
F4	3.03 ± 0.83	4.38 ± 0.48	-25.579	< 0.001
Item 1	3.07 ± 0.85	4.38 ± 0.49	-24.223	< 0.001
Item 5	3.01 ± 0.83	4.39 ± 0.49	-25.909	< 0.001
Item 9	3.08 ± 0.83	4.40 ± 0.49	-24.763	< 0.001
Item 16	2.96 ± 0.86	4.37 ± 0.48	-25.829	< 0.001

F1(Self- frustration goal, items 4, 7, 11, 14), F2(Ego self- enhancement goal, items 2, 6, 10, 13), F3(Work avoidance goal, items 3, 8, 12, 15), and F4(Learning or task goals, items 1, 5, 9, 16)

Item response theory models

To assess the AGOQ, item response theory (IRT) models were applied. Both the Graded Response Model (GRM) and the Generalized Partial Credit Model (GPCM) were compared using AIC and BIC values, where lower values indicate a better model fit. In this study, the AIC and BIC values for GPCM were 27,259 and 27,617, while for GRM they were 27,145 and 27,504, respectively. Based on these results, the GRM was selected due to its superior fit. As shown in **Table 8**, item discrimination parameters ranged from 0.237 to 3.689, and difficulty parameters ranged from −16.603 to 6.460.

Table 8. Estimates of discrimination and threshold parameters for the Scale under the graded response model with the Graded Response Model (n = 654, α = 0.05)

Items	Threshold				Discrimination
	β_1	β_2	β_3	β_4	α_i
Item4	-1.073	0.034	0.868	2.290	3.300
Item7	-0.998	0.008	0.816	2.110	3.689
Item11	-0.891	0.167	0.951	2.230	3.267
Item14	-0.857	0.285	1.030	2.430	3.157
Item2	-3.447	-1.224	0.830	3.300	0.913
Item6	-4.349	-1.716	1.076	3.910	0.691
Item10	-2.739	-0.993	0.997	3.080	0.991
Item13	-3.258	-1.043	1.268	3.560	0.867
Item3	-2.870	-0.539	1.347	3.440	0.780
Item8	-2.651	-0.667	1.542	3.760	0.823
Item12	-2.688	-0.387	1.534	3.750	0.881
Item15	-2.386	-0.377	1.492	3.560	0.948
Item1	-14.584	-9.753	-2.692	6.460	0.237
Item5	-14.214	-8.639	-2.109	6.240	0.253
Item9	-16.603	-9.918	-2.790	6.260	0.241
Item16	-14.155	-6.674	-1.432	5.450	0.294

Figures 4 and 5 present the item characteristic curves and item information curves for the Chinese version of the AGOQ, respectively. The item characteristic curves indicated that the category thresholds for all items were in the expected order, confirming that each response category effectively positioned respondents on the scale. The item information curves exhibited multimodal distributions, with items 1, 5, 9, and 16 showing the steepest slopes and providing more information than the other items. Figure 6 illustrates the total scale information curve, which peaks between −1 and 1. This indicates that the AGOQ provides the most precise information for nursing students with ability levels in this range, demonstrating its strong capability to discriminate academic goal orientation among students.

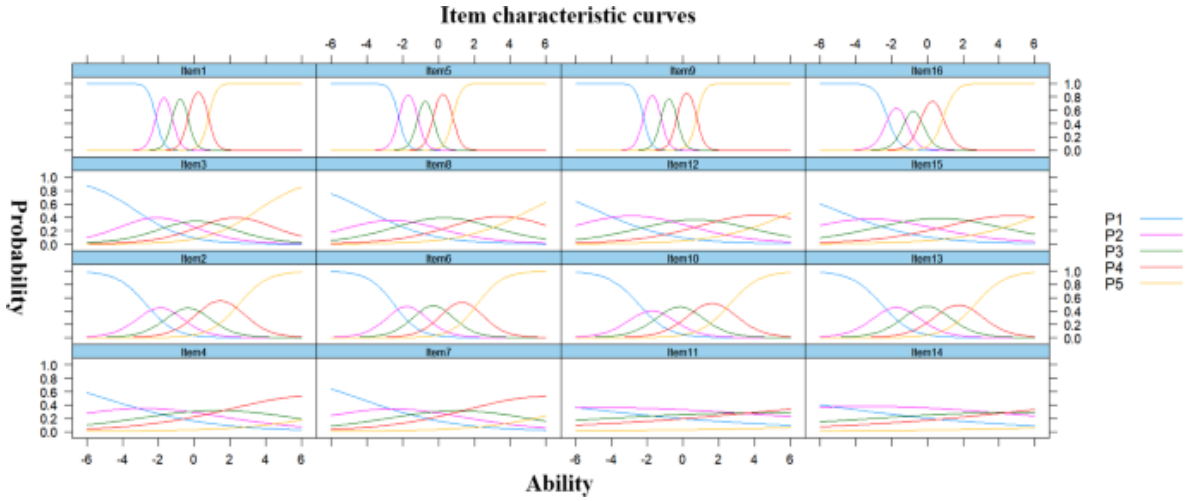

Figure 4. Item characteristic curves

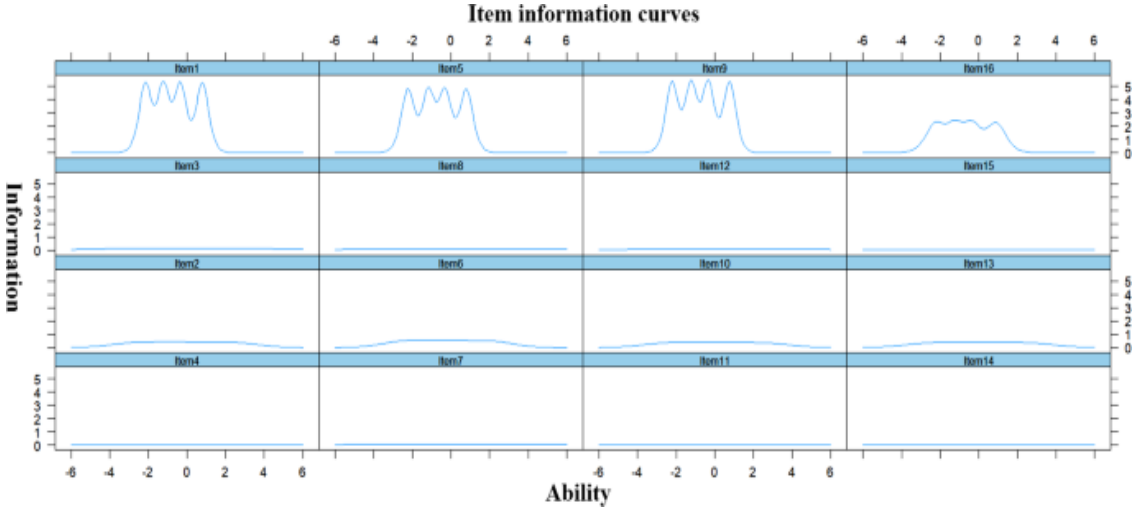

Figure 5. Item information curves

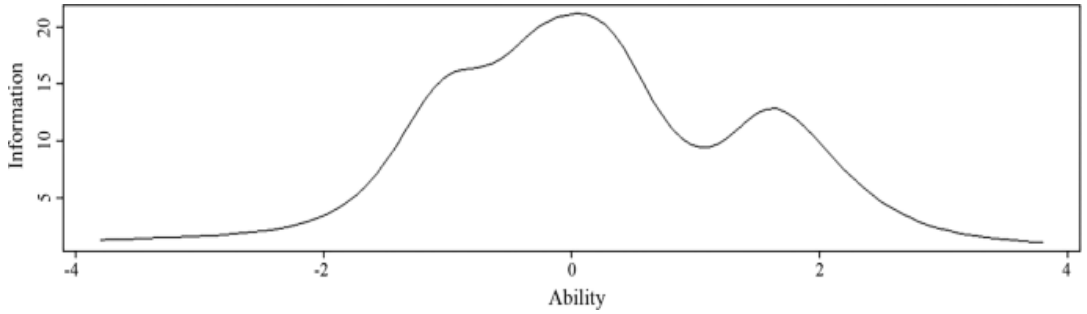

Figure 6. Total (scale) information curve

Previous nursing research has linked personal characteristics, such as childcare responsibilities or cultural differences, and academic factors, including study intensity, clinical practice, or lack of guidance, to outcomes like academic burnout, school dropout, or goal attainment [45–47]. However, few studies have explored academic goal orientation among nursing students in China.

To our knowledge, this is the first study to evaluate the Academic Goals Orientation Questionnaire (AGOQ) among Chinese nursing students using both structural equation modeling (SEM) and item response theory (IRT). Our findings demonstrate that the Chinese version of AGOQ possesses strong psychometric properties and is a reliable tool for assessing academic goal orientation. These results align with the original AGOQ developed by Skaalvik [4] and its Spanish adaptation verified by Navea Martín [8].

Earlier studies, such as Elliot [48], developed similar questionnaires for psychology students, and March [49] applied a comparable instrument to U.S. nursing students, although psychometric properties were not reported. Other language versions used in nursing populations also reported satisfactory internal consistency ($\alpha = 0.82$–

0.85) [14, 50]. Given the prior validation of the Spanish version [8], this study used Skaalvik's AGOQ as the basis for the Chinese adaptation.

Exploratory factor analysis (EFA) identified four factors, consistent with the original scale, explaining 71.892% of the total variance (20.256%, 19.788%, 17.099%, and 14.748%, respectively). Confirmatory factor analysis (CFA) demonstrated acceptable model fit (CMIN/DF = 4.008; CFI = 0.952; IFI = 0.952; TLI = 0.941), with strong factor loadings and variance explained, corroborating the EFA results. Significant discriminant validity was observed between the high- and low-score groups ($P < 0.001$).

Few differences were found across dimensions and items. The learning/task goal dimension showed a significant gender difference, with females scoring higher, consistent with previous studies [50]. Freshmen scored higher in the work avoidance dimension, reflecting their initial adaptation challenges and a tendency to minimize effort, a phenomenon reminiscent of the "Buddhist-style college student" approach observed in China [51, 52].

IRT analysis further confirmed that all discrimination parameters exceeded 0.2, indicating AGOQ effectively distinguishes academic goal orientation among Chinese nursing students. Difficulty parameters increased monotonically, demonstrating appropriate item difficulty. The total information curve peaked between −1 and 1, suggesting the scale is most informative for students with moderate ability levels, indicating strong discriminatory capacity in this range.

Limitations

Several limitations should be acknowledged. First, the study's cross-sectional design limits causal inferences; longitudinal research is needed to confirm these findings. Second, the sample was drawn from a single nursing school in Liaoning Province, which may limit generalizability to other regions of China. Future studies should include more diverse populations to validate the AGOQ across different contexts. Despite these limitations, this study represents a pioneering effort in applying SEM and IRT to evaluate the psychometric properties of AGOQ in China.

Conclusion

The Chinese version of the AGOQ demonstrates good reliability and validity among nursing students in China. It is a suitable and effective tool for assessing academic goal orientation and can support educators in understanding and guiding students' learning motivations.

Abbreviations

AGFI: Adjusted goodness of fit index
AGOQ: Academic goals orientation questionnaire
AIC: Akek's information criterion
BIC: Bayesian information criterion
CFA: Confirmatory factor analysis
CFI: Comparative fit index
CMIN/DF: Chi-square/degree of freedom
EFA: Exploratory factor analysis
GFI: Goodness of fit index
GPCM: Generalized Partial Credit Model
GRM: Graded Response Model
IFI: Incremental fit index
IRT: Item response theory
KMO: Kaiser-Meyer-Olkin
SEM: Structural equation modeling
TLI: Tucker Lewis index

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