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Development and Initial Validation of the Family Belonging Questionnaire for Migrant Older Adults with Children in China

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Abstract

Background: With increasing population aging and family-oriented migration in China, understanding family belonging among migrant older adults with children (MOAC) has become increasingly important. This study aimed to develop and initially validate a reliable and practical questionnaire to assess family belonging in this population.

Methods: A multiphase mixed-methods design was used. Items were generated through a literature review, semi-structured interviews with eight MOAC, two rounds of Delphi expert consultation, and pilot testing with 20 participants. Psychometric evaluation involved 418 MOAC, randomly divided for exploratory factor analysis(EFA) (n=201) and confirmatory factor analysis(CFA) (n=217).

Results: The final questionnaire contained 28 items across seven dimensions: emotional bonding, family role adaptation, cultural integration, family system interaction, extended social support, perceived autonomy, and future belonging expectation. The seven-factor solution explained 70.91% of the variance.CFA showed acceptable model fit (χ^2/df=1.141, RMSEA=0.026, CFI=0.982, TLI=0.979). Cronbach's α was 0.913 overall and 0.820~0.858 across dimensions; AVE ranged from 0.522 to 0.596 and Composite Reliability from 0.814 to 0.855.

Conclusions: The questionnaire demonstrated satisfactory initial reliability and validity and provides a context-sensitive measure of multidimensional family belonging among MOAC.

Keywords: migrant older adults with children; family belonging; internal migration; psychosocial assessment; questionnaire development

Background

With rapid urbanization, population aging, and continued internal migration, family-related migration in later life has become increasingly common in China[1]. Globally, the number of internal migrants has been estimated at up to 763 million [2]. In China, many older adults move to cities where their adult children live for reasons such as grandchild care, family reunification, or support in later life. Previous studies have described this group as migrant older adults with children (MOAC)[3, 4]. In this study, MOAC refers to older adults who move to another city to live with or near their adult children. Although such migration may increase opportunities for intergenerational interaction, it can also disrupt established social networks, alter daily routines, and require older adults to adapt to new family roles and living environments[5–7]. These changes may affect how older adults perceive their place and sense of belonging within the family.

The need-to-belong theory proposes that people have a basic motivation to form and maintain stable and meaningful interpersonal relationships[8–10]. For older adults who migrate to live with or near their adult children, family may become an important source of social and emotional connection after migration[11]. In this context, family belonging refers to the extent to which older adults feel accepted, valued, and connected within family relationships [12]. A stronger sense of belonging has been associated with better well-being and adaptation[13, 14], whereas unmet belonging needs have been linked to loneliness, anxiety, and psychological distress[15, 16].

Previous studies of MOAC have focused mainly on social integration, social support, loneliness, and quality of life[14, 17, 18], while family belonging has received less attention.

Social support mainly concerns the emotional, practical, or informational resources available to older adults, whereas social integration reflects their connections with the wider social environment. Family belonging concerns a different aspect of the migration experience: whether older adults feel accepted, valued, and that they have a stable place within the family after migration. An older adult may receive considerable support from family members but still experience difficulties in family roles, autonomy, or participation in family life. Existing measures of family or general belonging were developed mainly for students or general adult populations [19–21], and may not fully capture experiences specific to MOAC, including changes in intergenerational roles, family support, autonomy, cultural adaptation, and expectations about future living arrangements[22]. Therefore, this study developed the Family Belonging Questionnaire for Migrant Older Adults with Children and evaluated its initial psychometric properties.

Methods

Study Design

A multiphase mixed-methods design was used. Phase 1 generated an item pool from a structured literature review and qualitative interviews; Phase 2 refined items through Delphi expert consultation and pilot testing; and Phase 3 used a cross-sectional survey to evaluate the questionnaire's reliability and validity.

Item Generation

The initial item pool was developed through a structured literature review and qualitative interviews. CNKI, Wanfang Data, VIP Database, PubMed, and Web of Science were searched for studies on older migrants and family belonging. Relevant concepts and item wording were

extracted from existing theories and instruments. Purposive sampling was then used to recruit MOAC for semi-structured interviews, and interviews continued until data saturation was reached[23]. Eight participants aged 62–80 years were interviewed. The transcripts were analyzed using Colaizzi's phenomenological method, with NVivo 11.0 used to assist data management. Two trained graduate students independently coded the data and resolved disagreements through discussion.

Delphi Expert Consultation and Pilot Testing

Fifteen experts in nursing, psychology, or sociology with at least 10 years of professional or research experience participated in two Delphi rounds. Item importance was rated using a 5-point Likert scale, ranging from 1 ("not important at all") to 5 ("very important"). Items were retained if they met the following criteria: a mean importance score(Mj) > 3.5, a coefficient of variation (CV) ≤ 0.25, and a full-score rate (Kj) ≥ 20%. Expert comments were also considered when deleting or refining item content [24, 25]. Content validity was assessed by eight experts using the item-level content validity index (I-CVI) and the scale-level content validity index (S-CVI). In October 2025, pilot testing was conducted with 20 MOAC to assess item readability and the acceptability of questionnaire completion, and minor revisions were made to selected items accordingly.

Formal Survey and Data Collection

From October 2025 to January 2026, convenience sampling was used to recruit MOAC from community parks, community activity centers, and community health service centers in Changsha, Hunan Province, China. Inclusion criteria were: age ≥60 years; migration duration ≥6 months [26];being conscious and able to communicate verbally; and voluntary

participation in the study. Individuals with mental disorders, dementia, or severe cognitive impairment were excluded. All participants had relocated to another city to live with or near their adult children.

The formal survey used a general information questionnaire and the self-developed Family Belonging Questionnaire for Migrant Older Adults with Children. Before data collection, participants were informed of the study purpose, confidentiality procedures, and their right to withdraw, and written informed consent was obtained. The survey was administered with one-to-one guidance, and investigators read the items aloud when necessary. After completion, the questionnaires were independently checked and the data were entered by two researchers.

Instrument and Sample size

The Family Belonging Questionnaire for Migrant Older Adults with Children contained 28 items across seven dimensions, with four items in each dimension: emotional bonding, family role adaptation, cultural integration, family system interaction, extended social support, perceived autonomy, and future belonging expectation. Items use a 5-point Likert scale from 1 (not at all applicable) to 5 (completely applicable). The complete Chinese questionnaire and an English translation for review are provided in Additional file 1.

Factor-analysis sample size was estimated at 5-10 participants per item with a 10%-20% allowance for invalid questionnaires [27]. A total of 418 valid questionnaires were obtained and randomly divided into two groups: 201 participants were used for exploratory factor analysis(EFA), and 217 participants were used for confirmatory factor analysis(CFA). In addition, to assess test-retest reliability, a convenience subsample of 30 participants from the

first-stage survey completed the questionnaire again 2 weeks after the initial assessment[28].

Statistical Analysis

SPSS 27.0 was used for descriptive statistics, item analysis, and EFA; AMOS 29.0 was used for CFA. Two-sided $p < 0.05$ was considered significant.

Item analysis: The critical ratio (CR) method and item–total correlation analysis were used. Participants in the highest and lowest 27% of total scores were classified into high- and low-score groups, respectively, and compared using independent-samples t tests [29]; Items with CR < 3 or without statistically significant between-group differences were considered for deletion [30]. Items with an item-total correlation coefficient of $r < 0.40$ or without statistical significance were also considered for deletion [31].

Reliability: Internal consistency was assessed using Cronbach's α, with coefficients > 0.70 considered indicative of good reliability [32]; Split-half reliability was evaluated using the Spearman-Brown coefficient. Test-retest reliability was considered acceptable at ≥ 0.70, with a retest interval of 2 weeks [28].

Validity: Content validity was evaluated using the I-CVI and S-CVI, with I-CVI ≥ 0.78 and S-CVI ≥ 0.90 considered acceptable [33]. For structural validity, KMO and Bartlett testing were first performed ($p < 0.05$, KMO > 0.70)[34], EFA was then conducted using principal component analysis with Varimax orthogonal rotation, and the factor structure was determined based on eigenvalues > 1 in conjunction with the scree plot. Items with factor loadings < 0.40, a difference of < 0.15 between cross-component loadings, or fewer than three items on a single component were considered for deletion[35]. CFA was performed using maximum likelihood estimation, and model fit was evaluated using χ^2/df, RMSEA,

CFI, TLI, IFI, and NFI [36]. Convergent validity was assessed using standardized factor loadings, composite reliability (CR), and average variance extracted (AVE), with factor loadings > 0.40, CR ≥ 0.70, and AVE ≥ 0.50 considered acceptable. Discriminant validity was evaluated by comparing the square root of AVE for each dimension with the correlations between dimensions[37, 38].

Use of artificial intelligence

ChatGPT (OpenAI) was used during manuscript preparation to assist with English translation. No generative AI tool was used for study design, data collection, statistical analysis, interpretation of results, or generation of research data. All AI-assisted text was reviewed and revised by the authors, who take full responsibility for the final manuscript.

Results

Questionnaire Development

The literature search identified 1,126 Chinese- and English-language records, of which 38 studies were included after screening, comprising 26 cross-sectional studies, eight qualitative studies, three reviews, and one intervention study. The included studies mainly addressed the family belonging experiences of MOAC indirectly through related constructs such as family support, family cohesion, quality of family relationships, and family integration, whereas few studies have directly and systematically assessed family belonging in this population. Based on the literature review and relevant established instruments, 40 preliminary items were identified and refined into an initial pool of 35 items across seven dimensions.

The qualitative interviews included eight MOAC aged 62-80 years. All had relocated to Changsha to live with or near their adult children, with migration durations ranging from 6

183 months to more than 20 years. Based on the literature review and qualitative interviews,
184 seven dimensions were identified: emotional bonding, family role adaptation, cultural
185 integration, family system interaction, extended social support, perceived autonomy, and
186 future belonging expectation.

187 **Delphi Expert Consultation and Pilot Testing**

188 Fifteen experts in nursing, psychology, and sociology participated in two rounds of Delphi
189 consultation. All had more than 10 years of professional experience; 93.33% held associate
190 senior or higher professional titles, and 86.67% held a master's degree or higher. The expert
191 authority coefficient was 0.914 (Ca = 0.947; Cs = 0.880), and Kendall's W was 0.244 and
192 0.263 for the first and second rounds, respectively (both $p < 0.01$).
193 In the first Delphi round, three items were deleted because they did not meet the prespecified
194 quantitative criteria or were considered conceptually inappropriate. Four additional items
195 were removed through item merging, restructuring, or reassignment, reducing the
196 questionnaire from 35 to 28 items. Seven items were also revised to improve clarity and
197 applicability. In the second round, no items were deleted. Nine items underwent minor
198 wording revisions, and the definition of the extended social support dimension was refined
199 based on expert feedback. After the two Delphi rounds, the questionnaire comprised 28 items
200 across seven dimensions. Pilot testing with 20 participants identified no major difficulties in
201 understanding the items, and all questionnaires were completed within 15 minutes.

202 **Sample Characteristics**

203 A total of 418 valid questionnaires were obtained in the formal survey, yielding a valid
204 response rate of 94.6%. Participants were aged 60-82 years, with a mean age of 69.41 ± 5.87

years. Men accounted for 44.50% of the sample and women for 55.50%. Additional participant characteristics are presented in Table 1.

Item Analysis and Reliability

The CR values ranged from 6.581 to 14.578, all exceeding 3. Scores on all items differed significantly between the high- and low-score groups ($p < 0.001$). Item-total correlation coefficients ranged from 0.411 to 0.642 ($p < 0.001$). All items met the prespecified retention criteria, and no items were deleted during item analysis.

Cronbach's α was 0.913 for the overall questionnaire and ranged from 0.820 to 0.858 across the seven dimensions. The Spearman-Brown coefficient was 0.808 for the overall questionnaire and ranged from 0.794 to 0.854 across dimensions. Test-retest correlation coefficients ranged from 0.770 to 0.842 for the overall questionnaire and individual dimensions ($p < 0.01$). These results indicated good internal consistency, split-half reliability, and test-retest reliability.

Validity Assessment

Content validity: Content validity was assessed by eight experts. The S-CVI was 0.991, and the I-CVI values for individual items ranged from 0.875 to 1.000, all meeting the prespecified criteria.

Structural validity: In the EFA sample, the KMO value was 0.895, and Bartlett's test of sphericity was significant, $\chi^2 = 3092.188$ (df = 378, $p < 0.001$), indicating that the data were suitable for factor analysis. Principal component analysis with Varimax orthogonal rotation identified seven components based on eigenvalues > 1 and inspection of the scree plot (Figure 1). The seven-component solution explained 70.91% of the total variance after

rotation. Loadings for the 28 items ranged from 0.668 to 0.851, and no item showed cross-loadings that met the prespecified deletion criteria. Therefore, all items were retained (Table 2). The seven components corresponded to emotional bonding, family role adaptation, cultural integration, family system interaction, extended social support, perceived autonomy, and future belonging expectation.

CFA was conducted in an independent sample of 217 participants. The seven-factor model is shown in Figure 2. Model fit indices were $\chi^2/df = 1.141$, RMSEA = 0.026, CFI = 0.982, TLI = 0.979, IFI = 0.982, and NFI = 0.872 (Table 3). Overall, the model showed acceptable fit, with most indices indicating good fit, supporting the seven-dimensional structure.

Convergent and discriminant validity: Standardized factor loadings ranged from 0.605 to 0.826. AVE values across the seven dimensions ranged from 0.522 to 0.596, and CR values ranged from 0.814 to 0.855, meeting the prespecified criteria. The absolute values of the correlations between dimensions ranged from 0.169 to 0.469 ($p < 0.01$), while the square roots of AVE ranged from 0.722 to 0.772 and exceeded the corresponding inter-dimensional correlations. These findings indicated acceptable convergent and discriminant validity in the present sample.

Discussion

Principal Findings and Psychometric Properties

Grounded in the need-to-belong theory, this study developed a 28-item, seven-dimensional Family Belonging Questionnaire for Migrant Older Adults with Children. The questionnaire showed good internal consistency, and the seven-dimensional structure was supported by both exploratory and confirmatory factor analyses. Convergent and discriminant validity also

met the prespecified criteria. These findings provide initial psychometric support for the use of the questionnaire to assess family belonging among MOAC.

Multidimensional Family Belonging in the Context of Internal Migration

The seven dimensions represent related but distinct aspects of family belonging. Emotional bonding and family system interaction reflect the quality of family relationships and everyday interactions, while family role adaptation describes how older adults adjust to their roles within the intergenerational family after migration. Perceived autonomy relates to decision-making and personal space within family life, whereas future belonging expectation reflects older adults' expectations about the continuity and stability of family relationships. Cultural integration and extended social support may be especially relevant to MOAC. Family members can help older adults adapt to local lifestyles, access community resources, and maintain existing social ties, which may support adaptation to the new living environment[4, 39]. These dimensions highlight aspects of family belonging that become particularly salient after migration and extend beyond social adaptation alone.

Family Belonging and Psychosocial Adaptation in Later Life

Internal migration in later life may involve changes in social networks, family roles, and living environments, which may affect psychosocial adaptation. Previous studies have reported associations of belonging and social support with loneliness, depression, well-being, and related psychosocial outcomes [3, 15, 16]. Compared with a single total score, the seven-dimensional structure of the questionnaire provides more detailed information on emotional bonding, family role adaptation, cultural integration, family system interaction, extended social support, perceived autonomy, and future belonging expectation. Lower scores in these

dimensions may indicate difficulties in family relationships, role adjustment, autonomy, adaptation to the local environment, social support, or expectations regarding future family life. The questionnaire may therefore be useful in community-based research examining family belonging and psychosocial adaptation among MOAC.

Strengths and Limitations

This study combined a literature review, qualitative interviews, Delphi expert consultation, and pilot testing to develop the questionnaire, followed by psychometric evaluation using separate EFA and CFA samples. Content validity, internal consistency, test–retest reliability, convergent validity, and discriminant validity were also examined.

Several limitations should be noted. First, participants were recruited using convenience sampling from a single city, which may limit the generalizability of the findings to MOAC in other geographical and sociocultural settings. Second, the cross-sectional design did not allow assessment of changes in family belonging over time or its predictive validity. Third, the study relied on self-reported data, which may have introduced response or social desirability bias. Finally, criterion-related validity was not examined using established measures of related constructs such as family functioning, social support, or social adaptation. Further studies should evaluate the questionnaire in more diverse populations and examine its criterion validity, longitudinal stability, and measurement properties across different groups.

Conclusion

This study developed a 28-item, seven-dimensional Family Belonging Questionnaire for Migrant Older Adults with Children. The questionnaire showed good internal consistency and

test-retest reliability, and its seven-dimensional structure was supported by EFA and CFA. The findings provide initial evidence of its content, convergent, and discriminant validity. The questionnaire may be useful for assessing family belonging among MOAC, although further validation in different regions and populations is needed.

Abbreviations

MOAC: migrant older adults with children; EFA: exploratory factor analysis; CFA: confirmatory factor analysis; KMO: Kaiser-Meyer-Olkin; I-CVI: item-level content validity index; S-CVI: scale-level content validity index; AVE: average variance extracted; CR: composite reliability; RMSEA: root mean square error of approximation; CFI: comparative fit index; TLI: Tucker-Lewis index; IFI: incremental fit index; NFI: normed fit index.

Declarations

Ethics approval and consent to participate

The study was approved by the Ethics Committee of the School of Nursing, Hunan Normal University (Approval No. 2025-492) and the Ethics Committee of Kiang Wu Nursing College of Macau (Approval No. REC-2024.47). The study was conducted in accordance with the Declaration of Helsinki and relevant guidelines and regulations. All participants were informed of the purpose and procedures of the study and provided written informed consent prior to participation. Participation was voluntary, and participants had the right to withdraw at any time.

Clinical trial number

Clinical trial number: not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to participant privacy and ethical restrictions but are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

BL and SS conceived and designed the study. BL, SS, SH, and YH collected the data. BL and SS performed the statistical analyses and drafted the manuscript. LL supervised the study and critically revised the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1

Sociodemographic Characteristics of the Sample (N = 418)

Variable	Category	*n*	%
Gender	Male	186	44.50
	Female	232	55.50
Age, years	60–64	96	22.97
	65–69	128	30.62
	70–74	112	26.79
	≥75	82	19.62
Migration duration, years	0.5–1	54	12.92
	1–3	116	27.75
	4–6	104	24.88
	7–10	86	20.57
	>10	58	13.88
Education level	Primary school or below	162	38.76
	Junior high school	144	34.45
	High school/technical secondary school	78	18.66
	College degree or above	34	8.13
Marital status	Married/partnered	276	66.03
	Single/widowed/divorced	142	33.97
Number of children	≤1	48	11.48
	2	168	40.19
	≥3	202	48.33
Self-rated health	Excellent	45	10.77
	Good	142	33.97
	Fair	151	36.12
	Poor	62	14.83
	Very poor	18	4.31

Note. Migration duration is measured in years.

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477

478 **Table 2**

479 *Exploratory Factor Analysis Rotated Component Matrix*

Items	Component						
	1	2	3	4	5	6	7
A1				0.798			
A2				0.713			
A3				0.802			
A4				0.741			
B1							0.776
B2							0.851
B3							0.798
B4							0.699
C1	0.805						
C2	0.716						
C3	0.774						
C4	0.698						
D1						0.763	
D2						0.744	
D3						0.689	
D4						0.704	
E1		0.689					
E2		0.689					

Items	Component						
	1	2	3	4	5	6	7
E3		0.817					
E4		0.771					
F1			0.814				
F2			0.781				
F3			0.749				
F4			0.681				
G1					0.795		
G2					0.799		
G3					0.668		
G4					0.671		

Note: EFA, Exploratory Factor Analysis.

Table 3

Model Fit Indices for the Confirmatory Factor Analysis

Fit Index	Ideal Criterion	Acceptable Criterion	Observed Value
χ^2/df	≤3	≤5	1.141
RMSEA	≤0.08	≤0.10	0.026
CFI	≥0.90	≥0.85	0.982
TLI	≥0.90	≥0.85	0.979
IFI	≥0.90	≥0.85	0.982
NFI	≥0.90	≥0.85	0.872

Note. CFA = confirmatory factor analysis; χ^2/df = chi-square/degrees of freedom ratio; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; IFI = incremental fit index; NFI = normed fit index.

Figure Legends

Figure 1

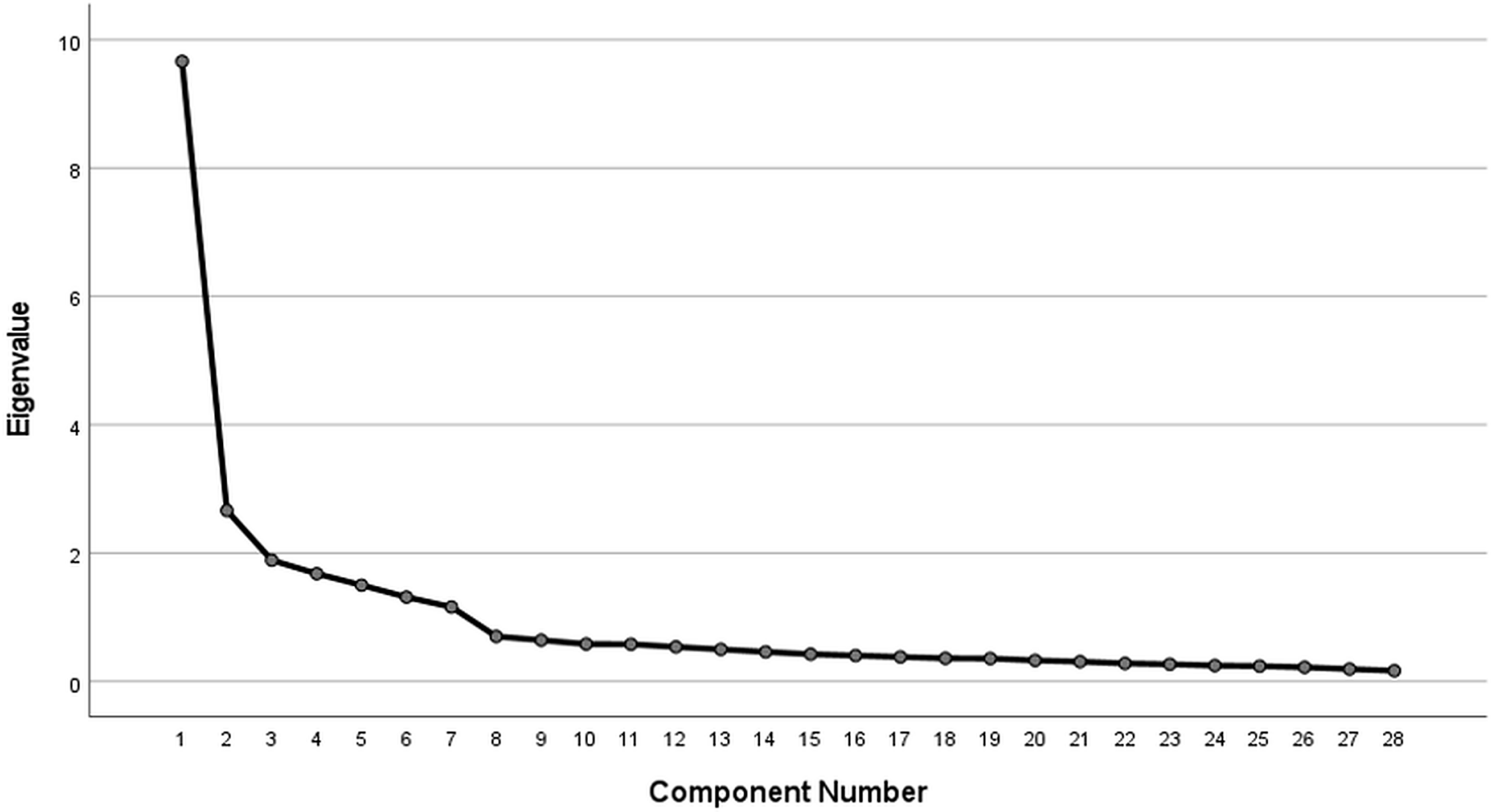
Scree Plot for the Exploratory Factor Analysis

Note. The horizontal axis represents component number, and the vertical axis represents eigenvalue.

Figure 2

Confirmatory Factor Analysis of the Seven-Factor Model

Note. Ellipses represent latent factors, rectangles represent observed items, circles represent residual terms, and curved double-headed arrows indicate correlations among latent factors.


Eigenvalue
10
8
6
4
2
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Component Number

Emotional Bonding
Family Role Adaptation
Cultural Integration
Family System Interaction
Extended Social Support
Perceived Autonomy
Future Belonging Expectation
A1
A2
A3
A4
B1
B2
B3
B4
C1
C2
C3
C4
D1
D2
D3
D4
E1
E2
E3
E4
F1
F2
F3
F4
G1
G2
G3
G4
e5
e6
e7
e8
e9
e10
e11
e12
e13
e14
e15
e16
e17
e18
e19
e20
e21
e22
e23
e24
e25
e26
e27
e28
e29
e30
e31
e32
0.78
0.77
0.76
0.78
0.73
0.74
0.69
0.73
0.73
0.71
0.82
0.74
0.73
0.75
0.75
0.79
0.74
0.76
0.68
0.72
0.78
0.75
0.74
0.77
0.75
0.83
0.72
0.75
0.42
0.26
0.33
0.37
0.40
0.42
0.47
0.50
0.41
0.35
0.33
0.47
0.35
0.43
0.42
0.29
0.34
0.40
0.40
0.47
0.40
0.17
0.26

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