

Development and Validation of a Family Resilience Scale for ICU Patients

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Abstract

Objective

To develop and validate a Family Resilience Scale for intensive care unit (ICU) patients within the Chinese cultural context, enabling assessment of family resilience levels when coping with critical illness.

Methods

Based on a previously constructed theoretical model of family resilience in ICU patients derived from grounded theory, an initial item pool was generated through literature review and qualitative interviews. Two rounds of Delphi expert consultations ($n = 17$) were conducted to screen and refine the items. A convenience sample of 300 family members of ICU patients was recruited to complete the questionnaire for reliability and validity testing. Item analysis, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) were performed to validate and optimize the scale structure. Additionally, average variance extracted (AVE) and composite reliability (CR) were used to assess convergent validity, and the heterotrait-monotrait (HTMT) ratio was applied to evaluate discriminant validity. Item response theory (IRT) with the graded response model (GRM) was employed to further examine item-level measurement properties.

Results

The final Family Resilience Scale consists of 21 items across three dimensions. The overall scale demonstrated excellent internal consistency, with a Cronbach's α of 0.950, while the subscales showed Cronbach's α values ranging from 0.834 to 0.966. The split-half reliability was 0.581 (Spearman-Brown coefficient = 0.735, Guttman Split-Half coefficient = 0.702). EFA extracted three common factors, accounting for 75.23% of the total variance. CFA indicated a good model fit ($\chi^2/df = 1.18$, CFI = 0.993, TLI = 0.992, RMSEA = 0.025, SRMR = 0.037). AVE values for each dimension ranged from 0.52 to 0.61, CR values from 0.86 to 0.92, and HTMT ratios were below 0.90, supporting satisfactory convergent and discriminant validity. IRT analysis demonstrated that the scale is particularly sensitive in identifying families with low-to-moderate resilience levels.

Conclusion

The newly developed Family Resilience Scale exhibits strong reliability and validity, making it a suitable instrument for assessing family resilience among ICU patients' families. It provides a valuable tool for clinical practitioners to identify vulnerable families and implement targeted supportive interventions.

BACKGROUND

Family members of patients in the intensive care unit (ICU) often endure significant psychological stress and emotional impact when confronting life-threatening conditions, high medical costs, and complex treatment decisions ^[1]. This unique high-stress environment not only profoundly affects the psychological well-being of family members but can also further influence patient treatment, recovery processes, and overall family functioning ^[2, 3]. Research indicates that ICU patient families commonly experience issues such as illness uncertainty and decision fatigue, which are closely related to their psychological resilience and level of social support ^[4, 5]. Within this context, family resilience serves as a crucial coping resource, helping family members strengthen connections and support when facing adversity, thereby enhancing overall coping capacity [6]. Family resilience not only improves the psychological health of family members but can also promote patient recovery and alleviate the societal disease burden ^[7, 8]. Therefore, in-depth research on the resilience of ICU families holds significant theoretical value and practical importance.

Although research on family resilience has gradually gained attention in recent years, studies focusing on this specific population of ICU families still present several shortcomings. Firstly, in terms of measurement tool development, existing scales are often designed for general families or those with chronic illnesses ^[9–13], lacking specific adaptations for the unique needs of ICU families. For instance, some scales fail to adequately reflect the acute stress context and high-intensity decision-making pressures faced by ICU families ^[14]. Secondly, regarding the investigation of resilience levels, results vary considerably across studies, potentially due to inconsistencies in sample selection, cultural background, and measurement tools ^[15]. Furthermore, research on family resilience in Chinese ICU settings is still in its nascent stages, particularly in the development and validation of measurement tools, where significant gaps remain. The existence of these issues underscores the necessity of conducting systematic research on resilience in ICU families.

Based on preceding qualitative research on ICU family resilience, this study addresses the following questions through metrological analysis and content synthesis of relevant literature: First, how can the theoretical model of ICU family resilience derived from prior qualitative research inform the theoretical construction and dimensional design of a measurement instrument? Second, how can a more broadly applicable ICU family resilience measurement tool be developed by integrating domestic and international research findings with local cultural characteristics? Third, how can the scale's reliability and validity be established through clinical investigation? Through this research, we aim to provide a reliable instrument for future domestic and international studies on ICU family resilience and to promote the advancement of research in this field.

METHODS

Study Design

In this prospective observational study, we developed and validated a new scale to measure family resilience in ICU patients' families. The scale was developed based on the previously constructed "Theoretical Model of Family Resilience in ICU Patients" through the Delphi expert consultation method and clinical survey for reliability and validity testing. The development and validation of the ICU Family Resilience Scale (IFRS) proceeded in three steps^[16]. First, the authors formulated an initial item pool based on the theoretical model, combined with qualitative interview data analysis and literature review, drawing on existing scales measuring family resilience. Second, the Delphi expert consultation method was used to screen scale items based on experts' importance ratings and comments. Finally, questionnaire surveys were conducted, and item analysis, EFA, CFA, convergent and discriminant validity testing, reliability analysis, and IRT analysis were used to validate and optimize the scale structure, further screen items, and establish the final scale.

Initial Scale Development

Theoretical Foundation

The "Theoretical Model of Family Resilience in ICU Patients" was previously constructed by our research team using classical grounded theory methodology, based on qualitative interview data from 36 family members of 14 ICU patient families and 21 ICU healthcare professionals, supplemented by secondary data analysis^[17]. This model, with "maintaining balance" as its core category, emphasizes the conditions, processes, outcomes, and covariate factors of resilience formation. The theoretical model is presented in Figure 1. The conditions for resilience formation in ICU patient families primarily encompass patient characteristics, disease characteristics, and family characteristics. The formation process constitutes the critical component of this theoretical model, comprising adaptive behaviors, interactive behaviors, and cultural environment. Among these, cost consumption and disease course represent temporal effect factors influencing the formation of ICU family resilience. ICU patient family resilience develops in two directions under the influence of various factors: collapse and positive adaptation.

Item Pool Generation

Using the "Theoretical Model of Family Resilience in ICU Patients" as the conceptual framework, we conducted a literature review on ICU family resilience^[18], combined with analysis of qualitative interview data, and drew upon existing family resilience measurement scales—such as the Family Resilience Assessment Scale (FRAS) developed by Sixbey^[19]—to develop the item pool through team discussion and analysis.

Delphi Expert Consultation

An expert consultation questionnaire was developed based on the initial scale draft. From April to June 2025, experts were invited to participate in the consultation. Inclusion criteria were: (1) engaged in any of the following professional domains or research fields: cultural psychology, family sociology, critical care medicine, or critical care nursing; (2) had 10 years or more of research or clinical work experience in any

of the aforementioned professional domains or research fields; (3) provided informed consent and voluntarily participated in this study. Exclusion criteria were: (1) inability to provide feedback within the specified timeframe; (2) self-declared inability to provide recommendations due to limited professional experience in the relevant field during the consultation process. Experts rated the importance of the proposed dimensions and primary/secondary items. Item selection criteria were: importance score ≥ 3.5 , full score ratio ≥ 0.2 , and coefficient of variation ≤ 0.25 . Items were deleted or added based on expert comments and group discussion. Expert response rate, authority coefficient, and Kendall's concordance coefficient were calculated. An expert authority coefficient > 0.7 was considered acceptable.

Pilot Study

In July 2025, purposive sampling was used to select family members of patients admitted to the ICU of a tertiary hospital in Chongqing, China, for the pilot study. Inclusion criteria were: (1) family members of patients during their ICU stay; (2) direct relatives of the ICU patient or collateral relatives with close relationships; (3) age ≥ 18 years and ≤ 90 years; (4) mentally sound, with clear verbal expression and good communication ability; (5) willing to participate in this study and accept the survey. Exclusion criteria were: insufficient time to complete the survey. Elimination criteria were: (1) incomplete questionnaires; (2) unreliable responses with obvious inaccuracies or inconsistencies; (3) substantial repetitive responses with identical or highly similar options across items. Based on the study timeline and population size, the pilot sample was determined as 30 participants. The questionnaire was revised according to issues identified in the pilot study, focusing on questionnaire items—including deletion of unnecessary items, revision of inappropriately worded items, addition of new items, reordering of items, and adjustment of response options. Additionally, the preamble, instructions, and layout were modified as needed to form the formal test questionnaire.

Formal Questionnaire Testing

Participants

From July to September 2025, convenience sampling was used to select family members of patients admitted to the ICUs of four tertiary hospitals in Chongqing. Inclusion, exclusion, and elimination criteria were identical to those of the pilot study. The sample size was determined as 5–10 times the number of questionnaire items. With 50 items in this scale and accounting for a 10% invalid response rate, 275–550 questionnaires were planned for distribution. A total of 312 questionnaires were actually distributed, and 300 valid responses were collected. All participants provided informed consent and voluntarily participated.

Survey Instruments

(1) A general information questionnaire comprising two sections: clinical data of ICU patients (including age, sex, diagnosis, ICU admission type, and medical insurance status) and demographic data of family

members (including number of family members, mean age of family members, educational level of family members, living arrangements, and family structure).

(2) The preliminary version of the "ICU Patient Family Resilience Scale," consisting of 4 dimensions, 12 first-level items, and 50 second-level items. All items were rated on a 5-point Likert scale ranging from "completely consistent" to "completely inconsistent," scored from 1 to 5.

Data Collection

Data were collected using paper questionnaires. Investigators were publicly recruited and received uniform training before commencing the survey. Standardized language was used when guiding participants through questionnaire completion and addressing questions. Investigators guided participants through questionnaire completion item by item to ensure accuracy and response rate.

Quality Control Measures

Data collection phase: Rapport was established with participants to gain trust and cooperation. Before participants completed the questionnaire, investigators used standardized instructions to explain the questionnaire requirements. Standardized language was used to address any questions. When conditions permitted, participants were invited to complete the questionnaire in a relatively quiet, private room to minimize external interference. If participants preferred to take the paper questionnaire home, standardized explanations were provided for potential questions and considerations, with precautions written on the questionnaire. Upon return, questionnaires were re-verified as completed by the core family member or primary caregiver, and checked for completeness. Missing items were supplemented by the primary family member. Participant privacy was assured, and completed paper questionnaires were sealed in envelopes.

Data entry and analysis phase: Dual data entry with double verification was used to ensure accuracy. Logical checks were performed on entered data. Data with one or more missing variables, or with missing data exceeding 10% for any variable, were excluded from final analysis. Missing data were supplemented using mean imputation. Statistical methods were selected in strict accordance with the conditions for their use.

Data Processing and Statistical Analysis

Epidata 3.1 software was used for dual data entry and database creation. Python was used for statistical analysis. General participant data were described using percentages, means, and standard deviations. Internal consistency analysis (Cronbach's α coefficient) was used to test scale reliability. Validity was examined through content validity and construct validity: (1) content validity was assessed primarily through expert judgment; (2) construct validity was examined using EFA and CFA. EFA was performed using principal component analysis with Varimax orthogonal rotation. CFA was conducted using

maximum likelihood estimation for parameter estimation, with model fit indices including χ^2/df , CFI, TLI, and RMSEA. (3) Convergent validity was assessed by calculating AVE (≥ 0.50) and CR (≥ 0.70). Discriminant validity was evaluated using the HTMT ratio, with HTMT < 0.85 considered good and < 0.90 considered acceptable. (4) During EFA, items with factor loadings < 0.40 , cross-loadings ≥ 0.35 , or communality < 0.40 were candidates for elimination. Additionally, IRT with the GRM was used to estimate item discrimination parameters (a) and threshold parameters (τ), and item characteristic curves and item information functions were plotted to supplement the classical test theory findings.

RESULTS

Delphi Expert Consultation Results

A total of 17 experts from 15 medical institutions or universities across 9 provinces/cities in China (Chongqing, Beijing, Guizhou, Liaoning, Tibet, Shandong, Shaanxi, Zhejiang, Yunnan) and Singapore were invited to participate in the consultation. Among them, 3 were critical care physicians, 11 were critical care nurses, and 1 each specialized in family studies, psychology, and sociology. The mean age of experts was (42.82 ± 5.07) years; mean work experience was (16.82 ± 6.24) years. Detailed characteristics are presented in Table 1. The questionnaire response rate was 100% for both Delphi rounds. In the first round, 11 experts provided 101 suggestions for revision; in the second round, 10 experts provided 100 suggestions. The authority coefficients for both rounds were 0.81. Kendall's concordance coefficients for the two rounds were 0.159 and 0.202, respectively (both $P < 0.001$).

Table 1
Consultant expert demographic profile

Item	Response	N(%)
Gender	Male	7(41.18)
	Female	12(70.59)
Education Level	Doctoral	6(35.29)
	Master's	5(29.41)
	Bachelor's	7(41.18)
Position	Advanced Practice Nurse	1(5.88)
	Advanced Nurse Clinician	1(5.88)
	Department Head	1(5.88)
	Head Nurse	8(47.06)
	Department Director	1(5.88)
	None specified	5(29.41)
Professional Field	Critical Care Nursing	11(64.71)
	Critical Care Medicine	3(17.65)
	Psychology	1(5.88)
	Sociology	1(5.88)
	Family Studies	1(5.88)

Based on expert comments and importance ratings from the two Delphi rounds (item retention criteria: importance score ≥ 3.5 , full-score ratio ≥ 0.2 , coefficient of variation ≤ 0.25), the research team discussed and screened the scale items. At the dimensional level, the initial 7 dimensions were adjusted to 4 dimensions (family characteristics, adaptive behaviors, interactive behaviors, and cultural values). First-level items were reduced from 15 to 11, and second-level items from 89 to 50, forming the pilot version.

Participant Demographic Characteristics

A total of 312 questionnaires were distributed, with 12 invalid responses excluded, yielding 300 valid responses (effective response rate: 96.15%). Detailed demographic characteristics are presented in Table 2.

Table 2
Participant demographic profile

Item	Response	N(%)
Patient Characteristics		
ICU Type	General ICU	147(49.00)
	Neurological ICU	11(3.67)
	Cardiac ICU	47(15.67)
	Respiratory ICU	38(12.67)
	Surgical ICU	57(19.00)
Gender	Male	199(66.33)
	Female	101(33.67)
Education Level	University	62(20.67)
	High School	65(21.67)
	Middle school	85(28.33)
	Primary school	75(25.00)
	Illiterate	13(4.33)
Medical insurance	Self-pay	15(5.00)
	New rural cooperative	73(24.33)
	Resident	72(24.00)
	Employee	130(43.33)
	Other	10(3.33)
Family Characteristics		
Patient's Family Role	Financial provider	82(27.33)
	Primary decision-maker	99(33.00)
	Other	119(39.67)
Highest education in family	Doctoral	2(0.67)
	Master's	23(7.67)
	Bachelor's	165(55.00)
	High school	51(17.00)
	Middle school	49(16.33)

Item	Response	N(%)
	Primary school	9(3.00)
	Illiterate	1(0.33)
Living arrangement	Living alone	20(6.67)
	With spouse/partner only	89(29.67)
	With spouse/partner and children	132(44.00)
	With children only	14(4.67)
	With Parents/Elders	36(12.00)
	With siblings	1(0.33)
	With friends/roommates	1(0.33)
	Other	7(2.33)
Family Structure	Nuclear Family	97(32.33)
	Stem family/three generations	142(47.33)
	Single-parent family	11(3.67)
	Couple-only family	34(11.33)
	Single-person family	10(3.33)
	Blended family	3(1.00)
	Other	3(1.00)

Item Analysis Results

Item analysis revealed that extreme group t-values for all items ranged from 4.23 to 11.56 (all $P < 0.001$), indicating good discrimination for all items. Corrected item-total correlation (CITC) values ranged from 0.48 to 0.82, all exceeding the acceptable threshold of 0.40, indicating good homogeneity between items and the total scale. Deletion of any single item did not substantially increase the Cronbach's α coefficient of its respective dimension (all changes < 0.01); therefore, all 50 items were retained. Skewness and kurtosis tests for all 50 items showed absolute skewness values ranging from 0.006 to 0.277 and absolute kurtosis values ranging from 0.586 to 1.312, both satisfying the criteria of $|\text{skewness}| < 3$ and $|\text{kurtosis}| < 8$, indicating that all items conformed to univariate normal distribution and were suitable for subsequent parametric analyses.

Validity Testing Results

Construct Validity – Exploratory Factor Analysis (EFA)

The overall scale KMO value was 0.983, and Bartlett's test of sphericity yielded $\chi^2 = 13042.72$ ($P < 0.001$), indicating suitability for factor analysis. Using principal component analysis with Varimax orthogonal rotation, and applying item retention criteria of factor loadings ≥ 0.40 , cross-loadings < 0.35 , and communality ≥ 0.40 , 29 items were eliminated, leaving 21 items. Three principal components were extracted, with a cumulative variance explained of 70.189%, exceeding the acceptable threshold of 60%.

Construct Validity – Confirmatory Factor Analysis (CFA)

A CFA model with three latent factors was constructed using the retained 21 items and estimated with maximum likelihood. Model fit indices showed: $\chi^2/df = 1.18$ (< 3.0), CFI = 0.993 (> 0.95), TLI = 0.992 (> 0.95), RMSEA = 0.025 (< 0.05), and SRMR = 0.037 (< 0.08). All fit indices reached excellent standards, confirming that the three-factor model was stable and reliable. Standardized factor loadings of the 21 items on their respective latent variables ranged from 0.58 to 0.89, all statistically significant ($P < 0.001$).

Convergent and Discriminant Validity

Convergent validity analysis showed that AVE values for the three dimensions ranged from 0.52 to 0.61, all exceeding the good standard of 0.50. CR values ranged from 0.86 to 0.92, all exceeding the threshold of 0.70, indicating good convergent validity for all dimensions. Discriminant validity was assessed using the HTMT ratio, with HTMT values across dimensions ranging from 0.349 to 0.868, all below the acceptable threshold of 0.90, indicating good discriminant validity between dimensions.

Reliability Testing Results

The overall scale Cronbach's α coefficient was 0.950, with dimension-specific Cronbach's α coefficients ranging from 0.834 to 0.966, all exceeding the acceptable threshold of 0.70, indicating good internal consistency. Split-half reliability analysis showed a split-half reliability of 0.581, with Spearman-Brown coefficient of 0.735 and Guttman Split-Half coefficient of 0.702, all reaching psychometrically acceptable standards.

Final Scale Structure and Scoring Rules

Through the above item selection and reliability/validity testing, the final ICU Patient Family Resilience Scale consists of 3 dimensions with 21 items. The specific items are presented in Table 3.

Table 3
Items of the ICU Patient Family Resilience Scale

Item No.	Item
Family Characteristics	
1	When facing a family member's admission to the ICU, our family can unite together and cope strongly
2	Our family members are all willing to contribute to the family and actively assume family responsibilities
3	We have strong external communication skills
4	Our family members are always honest with each other and understand one another
5	When facing problems, we can reach consensus through discussion and communication
6	Our family has a relatively good financial status
7	Our family can obtain good financial support
8	Our family members have relatively high educational levels
9	Our family has members working in the medical field
10	Our family members have relatively rich medical knowledge
Adaptive Behaviors and Cultural Values	
11	We can quickly adapt to the ICU environment and management system
12	We believe the ICU is the best place for the treatment and recovery of critically ill patients
13	We are well psychologically prepared for this crisis
14	We believe we can cope with this crisis
15	When making medical decisions, ICU doctors can always provide us with clear recommendations
16	We believe that ICU healthcare professionals provide the best treatment and care for patients
17	We are willing to have more contact with the patient and even participate in patient care
Interactive Behaviors	
18	We have many relatives and friends who care about us
19	We have been actively seeking help and have received good support beyond the family
20	We have done our utmost and fulfilled our family obligations and responsibilities
21	Having experienced this crisis, we have gained new perspectives on crisis and the value of life

Dimension 1—Family Characteristics (10 items): reflects the inherent stable attributes of families when coping with ICU crises. Dimension 2—Adaptive Behaviors and Cultural Values (7 items): reflects the cultural concepts, value orientations, and proactive adjustment behaviors families adopt when facing ICU crises. Dimension 3—Interactive Behaviors (4 items): reflects families' capacity for interaction and support acquisition with professionals, patients, and social resources.

This scale uses a 5-point Likert scale, with each item scored from 1 ("completely inconsistent") to 5 ("completely consistent"). All items are positively scored, with higher scores indicating higher levels of family resilience. The total scale score is the sum of all 21 items, ranging from 21 to 105.

Item Response Theory Analysis Results

IRT using the GRM was applied to analyze the 21 items. Discrimination parameter a values ranged from 0.12 to 0.39, with item Q18 ("We believe the ICU is the best place for the treatment and recovery of critically ill patients") showing the highest discrimination ($a = 0.3857$). Threshold parameters were: $\tau_1 = -2.587$, $\tau_2 = -0.579$, $\tau_3 = 0.114$, and $\tau_4 = 0.252$, indicating that the overall scale was relatively easy and suitable for measuring populations with low-to-moderate ability levels. Item information function analysis showed that the scale has relatively high sensitivity in identifying families with low resilience levels. The IRT results provide a reference for future scale revision and optimization.

DISCUSSION

Scientific Rigor of the Scale Development Process

This study strictly followed psychometric standards, ensuring the scientific rigor of the scale development process. The item pool was constructed based on the "Theoretical Model of Family Resilience in ICU Patients" derived from prior grounded theory research, extracting concepts from in-depth interviews with 36 family members of 14 families and 21 healthcare professionals, combined with systematic literature review. This approach aligns with the scale development standards proposed by DeVellis^[20], ensuring that items have a sound theoretical and empirical foundation.

The expert consultation phase rigorously adhered to Delphi method standards. The 17 invited experts spanned multiple fields including critical care medicine, critical care nursing, psychology, sociology, and family studies, representing 15 medical institutions or universities across Singapore and 9 provinces/cities in China. The expert authority coefficient was high, indicating broad representativeness and authority. The two Delphi rounds achieved 100% response rates, with an authority coefficient of 0.81 and Kendall's concordance coefficients of 0.190–0.227 (both $P < 0.001$), indicating high expert response rate, strong authority, and good consensus. The scale-level average content validity index reached 0.95, exceeding Lynn's^[21] recommended excellent standard of 0.90.

Pilot study results showed an average completion time of 12.5 minutes, with items clear and understandable, and no items causing notable comprehension difficulties or adverse reactions, confirming good feasibility and acceptability of the scale.

Psychometric Properties and Clinical Applicability

The ICU Patient Family Resilience Scale developed in this study demonstrated good psychometric properties, establishing a psychometric foundation for clinical application.

Regarding reliability, the overall scale Cronbach's α of 0.950 indicates good internal consistency, enabling stable measurement of the ICU family resilience construct. In clinical use, scale items work cohesively to produce reliable measurements. The split-half reliability (Spearman-Brown coefficient = 0.735) further supports scale stability. These values are comparable to Sixbey's FRAS^[22] (overall Cronbach's α = 0.96) and superior to McCubbin's FHI^[23] (dimension-specific α = 0.70–0.84), which may be attributable to the scale's grounding in grounded theory qualitative research and its high specificity to the ICU context. Given the significant dynamic and context-dependent nature of ICU family resilience^[24] and the relatively short average patient length of stay (median 4 days in this study), determining an appropriate test-retest interval was challenging; therefore, test-retest reliability was not included as a core indicator in this study.

Regarding validity, the three principal components extracted through EFA explained 70.189% of the total variance, exceeding the 60% standard recommended by Hair et al.^[25]. The three-component structure—Family Characteristics, Interactive Behaviors, and Adaptive Behaviors and Cultural Values—was clear and stable, with CFA confirming good model fit. This structure has important practical implications: clinical nurses can quickly identify areas of weakness in family resilience based on scores across the three dimensions, determining whether low-resilience families have deficits in internal characteristics, external interaction barriers, or cultural adaptation difficulties, thereby enabling targeted interventions.

IRT analysis showed that the scale has relatively high sensitivity in identifying families with low resilience levels. This characteristic is critical for clinical screening—it means the scale can effectively identify "hidden vulnerable families" who may appear to be coping adequately on the surface but are already at risk in terms of deeper adaptation and cultural meaning-making. Clinically, it can serve as an early warning tool, with assessment completed within 72 hours of ICU admission to provide a basis for initiating enhanced support for high-risk families. The finding that some items (particularly those related to family financial status) had relatively low discrimination suggests they may be susceptible to social desirability bias. In clinical use, nurses can cross-validate financial-related item scores through informal conversations or observation of family interactions to avoid bias from relying solely on scale scores.

Comparison with Existing Family Resilience Scales

Compared with family resilience scales widely used internationally, the present scale demonstrates good cultural adaptability and contextual specificity, representing an important complement to existing international measurement tools for family resilience.

Sixbey's FRAS, developed based on Walsh's family resilience model, is one of the most widely used instruments^[22]. However, its items focus predominantly on family functioning under routine stress in general families, inadequately addressing the acute decision-making pressures, interactions with complex medical systems, and specific Chinese family cultural values encountered by ICU families. Through its "Interactive Behaviors" dimension, our scale specifically measures families' interactions with professionals, patients, and social resources, more closely matching the actual needs of ICU families.

McCubbin et al.'s FHI^[23] focuses primarily on families' cognitive appraisal of stress, with relatively less attention to behavioral dimensions. Our scale not only encompasses the cognitive aspects of family characteristics but also systematically measures proactive adjustment behaviors across environmental, psychological, and functional domains through the "Adaptive Behaviors" dimension, reflecting the theoretical positioning of resilience as a "dynamic process."

Dai et al.'s^[26] family resilience assessment scale, developed in the Chinese cultural context, primarily targets disaster situations and lacks specific measurement of the unique ICU medical environment. While inheriting local cultural characteristics, our scale was developed specifically for the ICU context with the addition of ICU-specific items such as medical decision-making adaptation and professional interactions, providing stronger guidance for clinical practice.

Based on these comparisons, we recommend selecting instruments according to assessment purpose in clinical practice: for rapid screening of psychological risk in ICU families, our scale—with its 21 items and strong specificity—can be completed in approximately 12 minutes; for comprehensive assessment of family functioning under chronic stress, the FRAS may be more appropriate; for measuring only cognitive appraisal of stress, the FHI can serve as a supplement. The unique advantage of our scale lies in its "ICU contextual specificity"—it directly measures families' perceptions of ICU environment, visitation policies, medical decisions, and other specific issues, with results better reflecting families' real-time status during ICU crises rather than general family functioning.

STUDY LIMITATION

This study has several limitations. First, the sample was drawn exclusively from multiple tertiary hospitals in Chongqing. Although this provides some representativeness, future research should validate the scale across broader geographic regions and at different hospital levels to further assess its generalizability. Second, while this study examined internal consistency and construct validity, test-retest reliability has not been tested and should be addressed in future research. Finally, family resilience is a dynamic developmental process, and as a cross-sectional assessment tool, this scale cannot fully capture its trajectory over time. Future studies incorporating longitudinal designs could provide deeper insights into the dynamic evolution patterns of family resilience in ICU patient families.

CONCLUSION

This study successfully developed and validated a family resilience assessment scale suitable for families of ICU patients. Grounded in robust qualitative research and validated through rigorous Delphi expert consultation and large-sample investigation, the final scale comprises 21 items across 3 dimensions. The results demonstrate that the scale has good reliability and validity, qualifying it as a reliable and effective instrument for assessing resilience levels in ICU patient families. Its application will facilitate the translation of ICU family research from theory to practice, provide critical technical support for assessment-based precision family support services, and ultimately promote the development of family-centered care models in ICUs.

Declarations

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DATA AVAILABILITY STATEMENT

This study is registered with the National Whole-Population Health Security Information Platform—specifically, the Medical Research Registration and Filing Information System (China) (Registration ID: MR-50-25-032130) <https://www.medicalresearch.org.cn/index>. The original research data can be accessed and retrieved through this system.

CONFLICT OF INTERESTS

We declare there is no conflict of interest.

ETHICS STATEMENT

This study has been approved by the Ethics Committee of Chongqing General Hospital (Approval No.: KY S2024-046-01, Date of approval: Sep. 4, 2024). The study was conducted with the Declaration of Helsinki, and report adheres to the COSMIN (Consensus-based Standards for the selection of health status Measurement INstruments) reporting guidelines.

AUTHOR CONTRIBUTION

All authors have contributed to the creation of this manuscript for important intellectual content and read and approved the final manuscript.

Shunxia Sun: Methodology, Formal analysis, Investigation, Resources, Data Curation, Writing - Original Draft, Funding required.

Li Guan: Conceptualization, Validation, Writing - Review & Editing.

Jin Yang: Literature search, Data Curation.

Judan Tan: Software, Formal analysis.

Caie Wu: Literature search, Validation, Investigation.

Caiping Song: Conceptualization, Resources, Writing - Review & Editing, Visualization, Supervision, Project administration.

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Figures

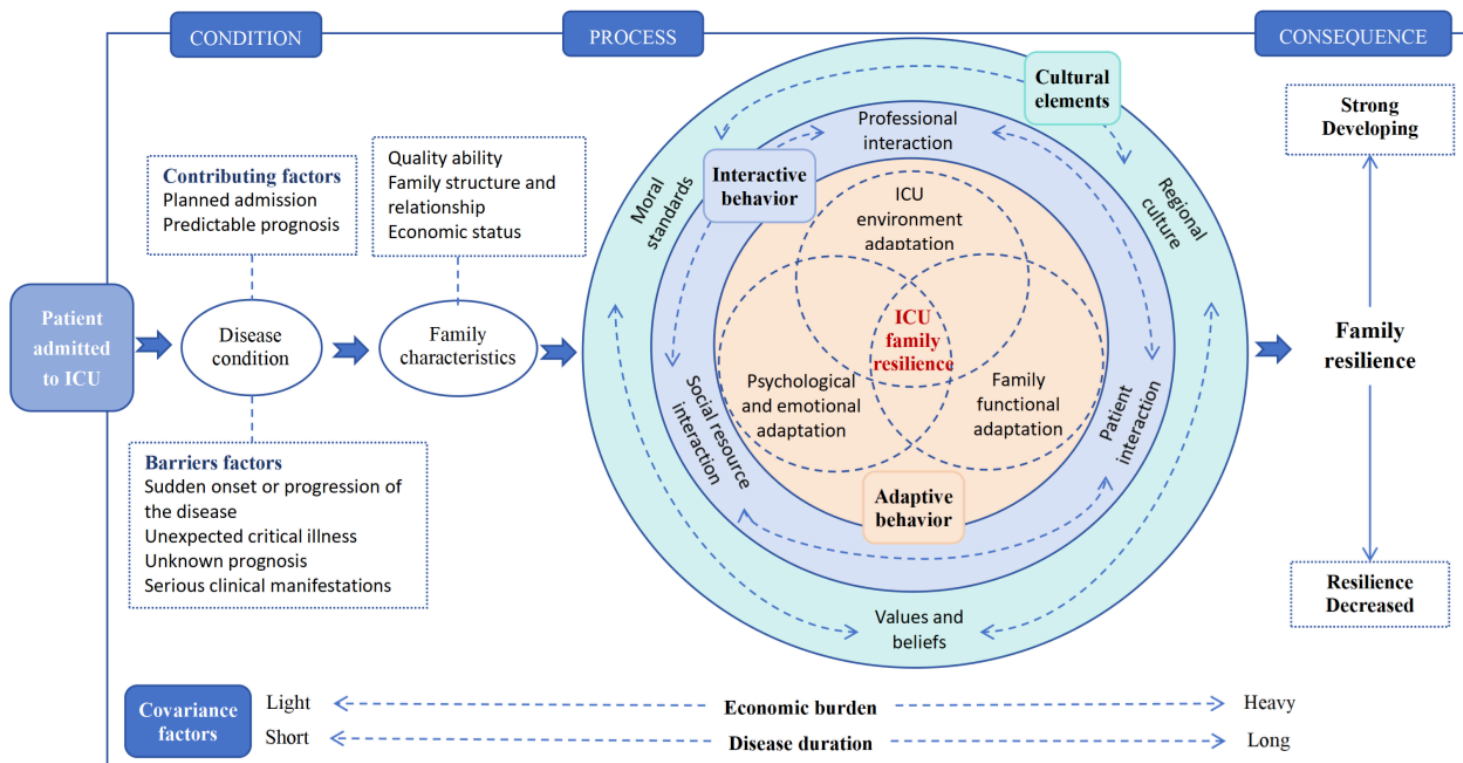


Figure 1

The theoretical framework for ICU patients' family resilience