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ORIGINAL ARTICLE

DEVELOPMENT AND PSYCHOMETRIC VALIDATION OF AN INSTRUMENT TO MEASURE MOTHERS' PERCEPTIONS OF NURTURING CARE PRACTICES FOR HOSPITALIZED CHILDREN UNDER FIVE

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ABSTRACT

Nurturing care measures were developed mainly for community and home settings, and to our knowledge none assesses how mothers perceive nurturing care practices while their young child is in hospital. This study aimed to develop an instrument to measure mothers' perceptions of nurturing care practices for hospitalized children aged 6–59 months, based on the WHO Nurturing Care Framework (NCF), and to test its psychometric properties. The MEASURE approach guided development. Twenty draft items were reduced to 18 during expert consultation, rated for content validity by three experts, and tested for face validity with 15 mothers. Construct validity and reliability were examined in 106 mothers recruited consecutively at Panti Rapih Hospital, Yogyakarta, Indonesia, between June and October 2025, using two-stage exploratory factor analysis (principal axis factoring with Varimax rotation) and Cronbach's alpha. Every item reached an I-CVI and I-FVI of 1.0, and sampling adequacy was high (KMO = 0.907). After two cross-loading items were removed, 16 items formed two factors explaining 60.6% of the variance, namely responsive caregiving capacity and caregiver well-being (10 items, loadings 0.629–0.841, α = 0.937) and the importance of stimulation and child safety (6 items, loadings 0.518–0.826, α = 0.880). Three retained items still loaded above 0.40 on both factors. The 16-item instrument shows initial evidence of content validity, a two-factor structure, and internal consistency for assessing mothers' perceptions of nurturing care in Indonesian pediatric wards, but confirmatory factor analysis, test-retest reliability, and convergent validity must be established before wider use.

Keywords: *Exploratory factor analysis; instrument development; nurturing care; psychometric validation; WHO Nurturing Care Framework*

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BACKGROUND

Early childhood development (ECD) during the first three years of life establishes foundational capacities for health, learning, and behavior throughout the lifespan (Black et al., 2017; Richter et al., 2017). The World Health Organization (WHO) Nurturing Care Framework (NCF), endorsed at the 71st World Health Assembly in 2018, identifies five interconnected components essential for optimal child development: good health, adequate nutrition, safety and security, responsive caregiving, and opportunities for early learning (World Health Organization & UNICEF, 2018). This framework, grounded in three decades of neuroscience and developmental research synthesized in The Lancet Series on Early Childhood Development, emphasizes that nurturing care, particularly responsive caregiving, is the primary mechanism through which early environments shape brain

architecture and lifelong trajectories (Britto et al., 2017).

Despite the global policy adoption of the NCF, with a 48% increase in countries implementing ECD-focused policies since 2018, significant measurement gaps persist (World Health Organization & UNICEF, 2023). About 250 million children under five years old in low- and middle-income countries (LMICs) are at risk of not reaching their developmental potential, with the highest risks in South-East Asia and sub-Saharan Africa (Black et al., 2017; Daelmans et al., 2021). Most nurturing care measures, however, were developed for household surveys and community programs, and evidence on the care that hospitalized young children and their parents receive remains limited (Jeong et al., 2022; Ndwiga et al., 2022).

Hospitalization disrupts nurturing care for young children, who depend on a familiar caregiver for comfort and may respond to separation with protest, despair, and withdrawal (Bowlby, 1969). Parents carry their own burden as well. In a general children's hospital, parental stress was shaped by the parent's emotional distress, the child's condition, and the support received from family and staff (Zdun-Ryżewska et al., 2021). Studies from pediatric cardiac intensive care, where stressors are more severe, add that loss of the parental role is closely linked with maternal depressive symptoms (Lisanti et al., 2017) and that parental anxiety and child distress can reinforce each other (David Vainberg et al., 2019). These intensive care findings cannot be transferred directly to general wards, but together they suggest that a mother's capacity to give nurturing care during hospitalization deserves attention in its own right.

Family-centered care (FCC) has become the prevailing framework in pediatric nursing, emphasizing dignity and respect, information sharing, participation, and collaboration (Butler et al., 2025). FCC principles have not, however, been formally linked with the components of the NCF, and over 54% of FCC research originates from North America while Southeast Asia accounts for only 1.9% of studies (Butler et al., 2025). Indonesian studies point to the same need from the family side, as mothers caring for children with COVID-19 at home and in hospital described guilt and worry alongside their efforts to help the child recover (Wanda et al., 2024), and parents of children with thalassemia reported exhaustion, disrupted family roles, and insufficient institutional support (Setiyowati et al., 2025).

Several instruments measure constructs adjacent to nurturing care during hospitalization, yet none captures maternal perceptions of nurturing care practices aligned with the NCF. The Parental Stressor Scale: Pediatric Intensive Care Unit (PSS: PICU) measures sources of parental stress in intensive care rather than nurturing care capacity (Carter & Miles, 1989), and its more recent brief version keeps the same stress focus (Rodríguez-Rey & Alonso-Tapia, 2016). The Nurse-Parent Support Tool (NPST) assesses support received from nurses but not maternal caregiving (Miles et al., 1999), and the Measure of Processes of Care (MPOC-20) was designed for children with chronic conditions in rehabilitation services rather than for acute hospitalization (King et al., 2004). Home-based tools such as the HOME Inventory rely on home observation and interviews (Jeong et al., 2022), which cannot be carried out on a hospital ward.

A scoping review of 239 studies measuring nurturing care found that responsive caregiving, which is central to the NCF, was assessed in only 78 studies compared with 166 studies that assessed nutrition, and the authors called for new tools to measure responsive caregiving (Jeong et al., 2022). A second scoping review of hospitalized children under 24 months found that the available evidence was built mainly around small and sick newborns and premature infants, with little on older infants and young children (Ndwiga et al., 2022).

To our knowledge, and based on the reviews cited above, no instrument measures how mothers perceive nurturing care practices during a young child's hospitalization. Responsive caregiving is measured far less often than nutrition despite its central place in the NCF, children beyond the first year of life are studied less often because 62% of studies focused on infancy (Jeong et al., 2022), and hospital evidence concentrates on newborns (Ndwiga et al., 2022). The hospital instruments that do exist capture stress, support, or care processes rather than nurturing care, and FCC research from Southeast Asia remains scarce (Butler et al., 2025).

This study aimed to develop an instrument to measure mothers' perceptions of nurturing care practices for hospitalized children aged 6–59 months and to test its content validity, face validity, factor structure, and internal consistency. The intended contribution is a hospital-specific, NCF-based measure that shows how mothers view their nurturing care role on the ward, an aspect that existing stress and support instruments do not capture.

METHOD

Study design

This instrument development study used a quantitative design and followed the MEASURE approach (Kalkbrenner, 2021), which consists of seven steps, namely making the purpose and rationale clear, establishing an empirical framework, articulating a theoretical blueprint, synthesizing content and scale development, using expert reviewers, recruiting participants, and evaluating validity and reliability. In this study the purpose and rationale came from the measurement gap described above, the empirical framework from the NCF and related literature, and the blueprint from the four domains described under Conceptual framework. Items were then written and refined, reviewed by experts for content validity, tested for face validity with mothers, and examined for construct validity and reliability in mothers of hospitalized children aged 6–59 months.

Participants and sampling

Mothers were recruited by consecutive sampling, in which every eligible mother is invited in order of presentation until recruitment closes (Bujang et al., 2022). The minimum sample for exploratory factor analysis was set at five respondents per item (Gunawan et al., 2021), which gave 90 respondents for the 18-item version, and all 106 eligible mothers who agreed to take part at Panti Rapih Hospital, Yogyakarta, Indonesia, between June and October 2025 were included.

Inclusion criteria were as follows: (1) mothers of children aged 6 to 59 months hospitalized at Panti Rapih Hospital, Yogyakarta; (2) those who provided informed consent; and (3) those able to communicate effectively. Exclusion criteria included: (1) mothers of children experiencing deteriorating conditions or decreased consciousness; and (2) mothers of children with disabilities.

Data were collected in three sequential stages, namely content validity testing by an expert panel, face validity testing with 15 mothers, and construct validity and reliability testing with 106 mothers. In the third stage, the first author approached eligible mothers on the pediatric wards,

explained the study, obtained written consent, and gave each mother a paper questionnaire to complete herself at any time during the child's stay when she was available and the child was clinically stable. The first author then collected the completed questionnaires.

Instrument development process

Conceptual framework

The WHO NCF served as the primary framework, and its components were narrowed to those that a mother can act on while her child is in hospital. Responsive caregiving, opportunities for early learning, and safety and security were taken directly from the NCF. Good health and adequate nutrition were not set as separate domains because treatment and hospital diets are largely managed by staff, although nutrition-related care was kept as one item within responsive caregiving (P3). A fourth domain, caregiver well-being support, was added because the NCF treats caregivers' own health and well-being as a condition for providing nurturing care (World Health Organization & UNICEF, 2018).

Within these domains, attachment theory (Bowlby, 1969) shaped the responsive caregiving items on closeness, comfort, and consistent attention to the child, such as offering hugs and gentle words. Swanson's caring processes of being with, doing for, and enabling (Swanson, 1991) shaped the caregiver well-being items on the mother's energy, her own health, and her need for support from family and health workers. Bronfenbrenner's bioecological model (Bronfenbrenner & Morris, 2006) framed the ward as the child's immediate environment, which guided the early learning and safety items on low-energy play, talking, singing, reading, and hazards such as small objects and medicines. FCC principles (Butler et al., 2025) informed the emphasis on partnership between mothers and health workers.

Item generation

The item pool was built by synthesizing NCF guidance on nurturing care for sick young children into a blueprint of four domains, namely responsive caregiving, opportunities for early learning, safety and security, and caregiver well-being support. Twenty draft items (P1 to P20) were written as declarative statements about mothers' perceptions rather than their actual behavior or self-efficacy. Two items were dropped during expert consultation, so the 18-item version kept its draft codes and P5 and P13 do not appear in the analyses. All items were written in Bahasa Indonesia, the language of the target population, and were not adapted from an existing instrument, so translation procedures were not required. Each item is rated on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

Content validity

Content validity was evaluated by three faculty members specializing in pediatric nursing at the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada. They were chosen because each held a doctoral degree and had published research related to nurturing care, which matched the construct of the instrument. The first expert reviewed the initial draft and found that most items measured actual behavior or self-efficacy rather than perception, so the items were revised to separate perception from behavior and attitude and to simplify the wording. For example, phrases that expressed self-belief (e.g., "I believe") were replaced with statements about a role or understanding (e.g., "As a mother, I have an important role..."). After the first expert approved the revised draft, the two other experts reviewed it and suggested only minor editorial changes, such as stressing the hospitalization context and clarifying ambiguous sentences.

Each expert rated the relevance of every item on a 4-point scale, and ratings of 3 or 4 were counted as agreement. The item-level content validity index (I-CVI) and the scale-level indices based on the average (S-CVI/Ave) and on universal agreement (S-CVI/UA) were calculated from the three experts' ratings of the revised 18-item version, following Yusoff (2019a), who recommends an I-CVI of 1.0 for panels of three to five experts and an S-CVI/Ave of at least 0.90.

Face validity

Face validity was assessed with 15 mothers of hospitalized children aged 6–59 months whose education ranged from junior high school to university, and these mothers did not take part in the construct validity stage. Each mother rated the clarity of every item on a 4-point scale (1 = not clear, 4 = very clear). The item-level face validity index (I-FVI) and the scale-level indices (S-FVI/Ave and S-FVI/UA) were calculated, with values of 0.80 or higher considered acceptable (Yusoff, 2019b).

Data analysis

Normality and extraction method

The distribution of each item was examined with the Kolmogorov-Smirnov test, and principal axis factoring was used for extraction because it does not assume multivariate normality (Watkins, 2018). The analysis was based on Pearson correlations because each item had five response categories, although polychoric correlations can represent ordinal responses more accurately (Watkins, 2018). Varimax rotation was applied to obtain a simple structure, and because it assumes uncorrelated factors, which may not hold for related nurturing care domains, this choice is considered in the Discussion.

Exploratory factor analysis

Exploratory factor analysis (EFA) was used to identify the factor structure, and the suitability of the data was checked with the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (above 0.50) and Bartlett's test of sphericity ($p < 0.05$) (Watkins, 2018). The number of factors was based on eigenvalues greater than 1.0 and the scree plot, and a cumulative explained variance of at least 60% was used as the benchmark for an adequate solution. Communalities of 0.50 or more were regarded as adequate, and items below 0.50 were flagged for review but not removed on that basis alone.

The analysis was run in two stages, and an item was considered cross-loading when it loaded above 0.40 on both factors and the difference between its two loadings was below 0.20 (Dalawi et al., 2025; Guvendir & Ozkan, 2022; Lu, 2025). After the first-stage EFA on all 18 items, cross-loading items with nearly identical loadings or the lowest communality were removed, whereas cross-loading items needed to keep a domain represented were retained and monitored. A second-stage EFA was then run on the remaining items.

Reliability analysis

Internal consistency was assessed with Cronbach's alpha for each factor, with 0.70 as the minimum acceptable value (Tsang et al., 2017). Alpha was not calculated for the total score because the final structure was two-dimensional and alpha assumes that the items measure a single construct (Streiner et al., 2015).

Ethical considerations

The study was conducted after ethical approval was obtained from the Ethics Committee of Panti Rapih Hospital, Yogyakarta (No. 046/SKEPK-KKE/V/2025) and the Ethics Committee of the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada (Reference No. KE/FK/1909/EC/2025), and both approvals were in place before recruitment began in June 2025. All mothers in the face validity and construct validity stages gave written informed consent, and the expert panelists took part voluntarily as reviewers.

RESULT

Content validity and face validity

Expert review led to one round of major revision, after which the first expert approved the perception-based items and the two additional experts approved the instrument with minor editorial suggestions. All 18 items received an I-CVI of 1.0 from the three experts, so both the S-CVI/Ave and the S-CVI/UA were also 1.0, which meets the standard recommended for a panel of three experts (Yusoff, 2019a).

In face validity testing every item reached an I-FVI of 1.0, and the S-FVI/Ave and S-FVI/UA were both 1.0, above the 0.80 threshold. Mothers with junior high school to university education therefore rated all items as clear.

Construct validity

Participant characteristics

Most mothers were aged 25–34 years (67.9%) and had completed higher education (67.9%). Most had one or two children (84.9%), and 76.4% had previously received counseling on caring for a sick child (Table 1). Children's clinical characteristics were not included in this analysis.

Table 1. Respondent Characteristics

Variable	Category	Frequency (n=106)	Percentage (%)
Age	20–24 Years	4	3.8
	25–34 Years	72	67.9
	≥ 35 Years	30	28.3
Education Level	Junior High School (equivalent)	4	3.8
	Senior High School (equivalent)	30	28.3
	Higher Education	72	67.9
Parity	First	48	45.3
	Second	42	39.6
	Third	11	10.4
	More than three	5	4.7
Experience receiving child-care counseling for sick children	Yes	81	76.4
	No	25	23.6

Exploratory factor analysis

None of the 18 items were normally distributed (Kolmogorov-Smirnov test, all $p < 0.001$). Five items met the cross-loading criterion in the first-stage EFA, two of them were removed, and the second-stage EFA was run on the remaining 16 items.

Both the 18-item and the 16-item data sets were suitable for factor analysis, with KMO values of 0.912 and 0.907 and a significant Bartlett's test of sphericity at each stage ($p < 0.001$) (Table 2). In the first stage, item-level measures of sampling adequacy ranged from 0.842 to 0.962.

Table 2. Kaiser-Meyer-Olkin and Bartlett's Tests in the First- and Second-Stage EFA

Test		First stage (18 items)	Second stage (16 items)
Kaiser-Meyer-Olkin measure of sampling adequacy		0.912	0.907
Bartlett's test of sphericity	Approx. chi-square	1405.463	1238.838
	df	153	120
	Sig.	<0.001	<0.001

Factor structure and item reduction

The first-stage EFA extracted two factors that together explained 58.8% of the variance (Table 3). Seven items had secondary loadings above 0.40 (P3, P4, P7, P10, P11, P12, and P17), and five of them also had a loading difference below 0.20 and therefore met the cross-loading criterion (P3, P10, P11, P12, and P17). P11 was removed because its loadings on the two factors were almost identical (0.505 and 0.504), and P17 was removed because it had the lowest communality in the pool (0.397) together with nearly equal loadings (0.433 and 0.458). P10 and P12 also cross-loaded but were retained because they were the only remaining safety and security items, and P3, whose difference of 0.196 lay at the border of the criterion, was retained as the only item on nutrition-related care.

Table 3. Rotated Factor Matrix and Communalities, First-Stage EFA (18 Items)

Domain	Item	Factor 1	Factor 2	Diff.	h^2
Responsive Caregiving	P1	**0.629**	0.381	0.248	0.540
Responsive Caregiving	P2	**0.642**	0.346	0.296	0.532
Responsive Caregiving	P3*	**0.626**	0.430	0.196	0.577
Responsive Caregiving	P4	**0.635**	0.430	0.205	0.589
Early Learning	P6	0.163	**0.696**	0.533	0.511
Early Learning	P7	0.422	**0.731**	0.309	0.713
Early Learning	P8	0.301	**0.769**	0.468	0.683

Domain	Item	Factor 1	Factor 2	Diff.	h²
Early Learning	P9	0.220	**0.811**	0.591	0.706
Safety and Security	P10*	0.440	**0.531**	0.091	0.475
Safety and Security	P11*	**0.505**	0.504	0.001	0.509
Safety and Security	P12*	0.470	**0.528**	0.058	0.499
Caregiver Well-being Support	P14	**0.747**	0.245	0.502	0.618
Caregiver Well-being Support	P15	**0.664**	0.249	0.415	0.503
Caregiver Well-being Support	P16	**0.738**	0.334	0.404	0.655
Caregiver Well-being Support	P17*	0.433	**0.458**	0.025	0.397
Caregiver Well-being Support	P18	**0.712**	0.343	0.369	0.625
Caregiver Well-being Support	P19	**0.840**	0.280	0.560	0.784
Caregiver Well-being Support	P20	**0.800**	0.184	0.616	0.674
Sum of squared loadings		6.20	4.39		
% of variance		34.4	24.4		

*Note: Primary loadings are in bold. Diff. = difference between the two loadings; h² = communality. *Item met the cross-loading criterion described in the Method. Loadings were obtained with principal axis factoring and Varimax rotation.*

The second-stage EFA on 16 items again produced two factors, which together explained 60.6% of the variance (Factor 1, 36.2%; Factor 2, 24.4%) (Table 4). Factor 1 contained 10 items with primary loadings from 0.629 to 0.841, and Factor 2 contained six items with primary loadings from 0.518 to 0.826. P3, P10, and P12 still had secondary loadings above 0.40 with differences below 0.20 (0.186, 0.077, and 0.050), so their assignment to a single factor is provisional. Three items had communalities slightly below 0.50 (P6 = 0.488, P10 = 0.463, and P12 = 0.497), while those of the other 13 items ranged from 0.505 to 0.783.

Table 4. Rotated Factor Matrix and Communalities, Second-Stage EFA (16 Items)

Domain	Item	Factor 1	Factor 2	Diff.	h²
Responsive Caregiving	P1	**0.630**	0.382	0.248	0.543
Responsive Caregiving	P2	**0.647**	0.367	0.280	0.553
Responsive Caregiving	P3*	**0.629**	0.443	0.186	0.592
Responsive Caregiving	P4	**0.636**	0.425	0.211	0.585
Early Learning	P6	0.172	**0.677**	0.505	0.488
Early Learning	P7	0.427	**0.718**	0.291	0.698
Early Learning	P8	0.302	**0.773**	0.471	0.689
Early Learning	P9	0.216	**0.826**	0.610	0.729
Safety and Security	P10*	0.441	**0.518**	0.077	0.463
Safety and Security	P12*	0.473	**0.523**	0.050	0.497
Caregiver Well-being Support	P14	**0.746**	0.227	0.519	0.608
Caregiver Well-being Support	P15	**0.667**	0.245	0.422	0.505
Caregiver Well-being Support	P16	**0.742**	0.331	0.411	0.660
Caregiver Well-being Support	P18	**0.716**	0.343	0.373	0.630
Caregiver Well-being Support	P19	**0.841**	0.275	0.566	0.783
Caregiver Well-being Support	P20	**0.798**	0.171	0.627	0.666
Sum of squared loadings		5.79	3.90		
% of variance		36.2	24.4		

*Note: Primary loadings are in bold. Diff. = difference between the two loadings; h² = communality. *Item met the cross-loading criterion described in the Method. The two factors explained 60.6% of the total variance.*

The two eliminated items, their original domains, and the reasons for their removal are shown in Table 5.

Table 5. Eliminated Items and Reasons for Elimination

Item	Domain	Statement	Reason for Elimination
P11	Safety and Security	"Providing clean and safe toys is very important to help my child stay active and happy during hospitalization."	Cross-loading: near-identical loadings on Factor 1 (0.505) and Factor 2 (0.504), with an inter-factor difference of <0.01; the item did not uniquely measure a single factor.
P17	Caregiver Well-being Support	"If my family invites my child to play, I still allow it as long as it does not strain my child's physical condition."	Lowest communality in the item pool (0.397, below 0.50), combined with cross-loading (loadings of 0.458 and 0.433; inter-factor difference of 0.025).

Factor labeling and final instrumentation

The first factor was labeled "Mothers' perceptions of responsive caregiving capacity and caregiver well-being in the hospital." It combines items on the mother's role and responsiveness to her child with items on her own energy, health, and need for family and professional support, which suggests that mothers may see their ability to respond to the child and the support they receive as connected (Table 6).

The second factor was labeled "Mothers' perceptions of the importance of stimulation and child safety in hospital caregiving." It combines the early learning items on play, talking, singing, and reading with the two safety items on hazardous objects and medicines. The final instrument therefore has 16 items in two subscales (Table 6). Scores are calculated by summing the items within each subscale, which gives possible ranges of 10–50 for Factor 1 and 6–30 for Factor 2, with higher scores indicating more positive perceptions. No cut-off points were set in this study, so scores should be interpreted as continuous values.

Table 6. Instrument for Mothers' Perceptions of Nurturing Care Practices for Hospitalized Children (English Translation)

No	Statement
Factor 1. Mothers' perceptions of responsive caregiving capacity and caregiver well-being in the hospital	
1	I understand that mothers have an important role in monitoring and accompanying their child throughout the course of hospitalization.
2	Offering hugs, kisses, or gentle words is important for supporting my child's development even while they are ill.
3	I understand the importance of providing nutritious foods, including carbohydrates (rice, corn, sweet potato), protein (animal sources: fish, eggs, chicken, beef, lamb; or plant-based: tofu, tempeh, legumes, avocado), vegetables, and fruits when my child is ill, to support recovery and overall health.
4	I understand that attending consistently and continuously to my child's needs is an essential part of caregiving.
5	I understand that family support is greatly beneficial during the process of caring for a child in the hospital.
6	I understand that I still need to make time to care for my child even when I am feeling exhausted.
7	I understand that caring for a child in the hospital requires considerable energy and time.
8	When I am unable to be fully present with my child in the hospital, support from my husband and family is greatly needed.
9	Support from family members and healthcare professionals is essential throughout the process of caring for a hospitalized child.
10	Maintaining my own health is important so that I am able to continue caring for my sick child.
Factor 2. Mothers' perceptions of the importance of stimulation and child safety in hospital caregiving	
11	In my view, even while ill, a child still needs to engage in low-energy play activities.
12	I understand that playing and talking with my child can support their development even during illness.
13	In my view, talking or singing to my child during hospitalization is important for their comfort and well-being.
14	I understand that reading storybooks to a sick child is highly beneficial for their learning and development.
15	If a sick child is not closely supervised, they may place hazardous objects in their mouth.
16	Storing a child's medications in an unsafe location may result in the risk of overdose or poisoning.

Note: Items were developed and administered in Bahasa Indonesia, and the English wording is a translation for publication. Items 1–10 correspond to P1, P2, P3, P4, P14, P15, P16, P18, P19, and P20, and items 11–16 to P6, P7, P8, P9, P10, and P12. Each item is rated from 1 (strongly disagree) to 5 (strongly agree). The Indonesian version is available from the corresponding author on request.

Reliability

Cronbach's alpha was 0.937 for Factor 1 and 0.880 for Factor 2, both above the 0.70 threshold (Table 7). The value for Factor 1 exceeds 0.90, which may reflect overlap among items with similar content, particularly the three family support items (items 5, 8, and 9).

Table 7. Cronbach's Alpha for Each Factor

Factor	Number	Item	Cronbach's alpha
Mothers' perceptions of responsive caregiving capacity and caregiver well-being in the hospital	10	P1, P2, P3, P4, P14, P15, P16, P18, P19, P20	0.937
Mothers' perceptions of the importance of stimulation and child safety in hospital caregiving	6	P6, P7, P8, P9, P10, P12	0.880

DISCUSSION

This study developed a 16-item instrument to measure mothers' perceptions of nurturing care practices for hospitalized children aged 6–59 months and provided initial evidence of its content validity, face validity, two-factor structure, and internal consistency. To our knowledge no earlier instrument has addressed this construct in a hospital setting, as recent reviews found nurturing care measurement concentrated in community programs and hospital evidence concentrated on newborn care (Jeong et al., 2022; Ndwiga et al., 2022).

Content and face validity

All items reached an I-CVI of 1.0 and the S-CVI/Ave reached 1.0, above the recommended minimum of 0.90 (Yusoff, 2019a). This agreement followed a major revision in which the first expert found that most draft items measured behavior or self-efficacy rather than perception, a common difficulty when a perceptual construct is put into words (DeVellis & Thorpe, 2021). Because all three experts were pediatric nursing academics from one faculty, their agreement reflects consensus within that discipline, and reviewers from child development, nutrition, psychology, or ward practice might have judged the items differently.

Face validity was also high, as mothers with junior high school to university education rated every item as clear. This matters because the instrument is intended for mothers with varied literacy on Indonesian pediatric wards. Clarity ratings do not show how mothers interpret each item, however, so cognitive interviewing would be a useful step in future refinement.

Construct validity

Sampling adequacy was high in the final analysis (KMO = 0.907), and Bartlett's test confirmed that the item correlations were sufficient for factor extraction (Watkins, 2018). The item-level MSA values of 0.842 to 0.962 come from the first-stage analysis.

The four domains used to build the instrument resolved into two factors, with responsive caregiving and caregiver well-being support forming Factor 1 and early learning and safety and security forming Factor 2. The structure is therefore compared here with these four domains rather than with all five NCF components, since good health and adequate nutrition were not set as separate domains.

One possible explanation for Factor 1 is that mothers see their capacity to respond to a sick child as tied to their own energy, health, and support, which is consistent with Swanson's caring processes through which nurses sustain caregivers (Swanson, 1991) and with evidence that parental stress during hospitalization affects caregiving (Lisanti et al., 2017; Zdun-Ryżewska et al., 2021). Methodological explanations are equally plausible. Varimax rotation treats the factors as uncorrelated, which can blur the boundaries between related domains, and every item was positively worded, many beginning with "I understand", which can create shared response patterns unrelated to content. The sample of 106 also limits the precision of the solution, so the merged factor should be read as one possible structure that needs testing with oblique rotation and confirmatory factor analysis.

For Factor 2, mothers may regard safety as a condition for stimulation on a ward where infusion lines, medicines, and shared spaces create hazards. This interpretation is speculative because data on the hospital environment were not collected, and the safety component rests on only two items (P10 and P12) that also loaded on Factor 1 and had communalities below 0.50. Safety and security is therefore the weakest part of the instrument, and new items on ward hazards, safe play materials, and infection prevention should be written and tested.

Only two items were removed, P11 from safety and security and P17 from caregiver well-being support, and both were removed for psychometric reasons rather than redundancy. Caregiver well-being support kept six items, so its coverage was little affected, whereas the removal of P11 on safe toys left safety and security with two items. Whether the remaining items preserve the intended breadth of each domain, and whether the two-factor structure holds, should be tested with confirmatory factor analysis in an independent sample.

Nutrition and good health were not separate domains, so their absence as factors follows from the design rather than being a finding. Nutrition-related care was represented by a single item within responsive caregiving (item 3, P3), which loaded on Factor 1 but also cross-loaded on Factor 2. Whether mothers' perceptions of feeding and health care during hospitalization form distinct dimensions remains a question for future versions that include these components.

The final two-factor solution explained 60.6% of the variance and therefore met the 60% benchmark set in the Method, whereas the first-stage solution explained 58.8%. Three retained items had communalities just below 0.50 (P6, P10, and P12), and two of them are the safety items discussed above, which supports the need to strengthen that domain.

Reliability

Both factors exceeded the 0.70 minimum commonly required for research instruments (Tsang et al., 2017), with alpha values of 0.937 and 0.880. An alpha above 0.90, as found for Factor 1, may indicate redundant items rather than better measurement (Streiner et al., 2015), and the three family support items (items 5, 8, and 9) are the most likely source. Alpha also rises with the number of items, which partly explains the higher value for the 10-item Factor 1, and corrected item-total correlations should guide item reduction in the next version.

Comparison with existing instruments

The instrument differs from existing pediatric family assessment tools in both construct and setting. The PSS: PICU measures sources of parental stress in intensive care (Carter & Miles, 1989; Rodríguez-Rey & Alonso-Tapia, 2016), the NPST measures support received from nurses (Miles et al., 1999), and the MPOC-20 evaluates service processes for children with chronic conditions (King et al., 2004). The present instrument asks instead how mothers view their own nurturing care role during an acute stay on a general ward, a strength-based focus that fits the promotive emphasis of the NCF (World Health Organization & UNICEF, 2018).

None of these instruments was developed for Indonesian or Southeast Asian hospitals, where FCC research is scarce (Butler et al., 2025). We found no earlier instrument with the present purpose in Indonesian hospital settings, although a systematic search of Indonesian instruments was beyond the scope of this study. Because the instrument was developed at a single site, these data do not allow conclusions about the cross-cultural relevance of the NCF.

Implications

With further validation, the instrument could help nurses understand how mothers view their caregiving role on the ward and where they may need support. Factor 1 points to maternal well-being and family support as areas for nursing attention, and Factor 2 points to safe opportunities for play and talking during the hospital stay. Because scoring norms, cut-off points, and evidence of responsiveness and criterion validity are not yet available, using the instrument to identify individual mothers who need support, or as an outcome measure for family-centered care programs and nursing education, should be explored in future studies rather than adopted now.

Study Limitations

The main limitation is that only exploratory factor analysis was performed, so confirmatory factor analysis in an independent sample of 200–300 mothers from several hospitals is needed to test the two-factor structure in line with COSMIN guidance. The analysis also used Varimax rotation and Pearson correlations, whereas an oblique rotation would allow correlated factors, polychoric correlations would better reflect the ordinal responses, and parallel analysis would give a sounder basis for the number of factors (Watkins, 2018). Three retained items (P3, P10, and P12) still cross-loaded, and item-level descriptive statistics, including possible ceiling effects, were not reported.

Participants were recruited consecutively at a single tertiary hospital, which limits generalizability to other regions and hospital types. Mothers of children with deteriorating conditions or disabilities were excluded and fathers or other caregivers were not included, so the findings apply to mothers of children in stable condition. Children's clinical characteristics, such as diagnosis, ward, and length of stay, were not analyzed although they may shape mothers' perceptions. The sample of 106 met the 5:1 participant-to-item ratio but lies at the lower bound for stable EFA, and future studies should use multicenter samples of more than 200 for exploratory and 300 for confirmatory analysis.

Convergent, discriminant, and criterion validity were not examined, so expected associations with related constructs such as maternal anxiety or perceived family-centered care remain to be tested. The expert panel also came from one discipline and one faculty, which may have narrowed the content review.

Self-report may be affected by social desirability, since mothers in hospital may wish to appear competent, and because all items were positively worded, acquiescence bias cannot be ruled out. Including negatively worded items or observational data in future versions would reduce these risks.

Test-retest reliability and responsiveness were not assessed, so the temporal stability of scores and their sensitivity to change during hospitalization remain unknown. Future studies should examine stability over an interval suited to the length of hospital stay, test responsiveness to interventions that promote nurturing care, and establish how scores should be interpreted, including possible cut-off points.

CONCLUSION AND RECOMMENDATION

This study developed a 16-item instrument to measure mothers' perceptions of nurturing care practices for hospitalized children aged 6–59 months. Initial evidence supports its content validity, a two-factor structure, and internal consistency. Confirmatory factor analysis, test-retest reliability, and convergent validity should be tested, and the safety and security items strengthened, before wider use.

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