

CROSS-CULTURAL ADAPTATION AND VALIDATION OF THE CO-PARTNER INDONESIAN VERSION

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ABSTRACT

The CO-PARTNER instrument was developed to measure parental participation in neonatal care settings, but an Indonesian-language version is not currently available. The purpose of this study was to adapt the CO-PARTNER instrument for cross-cultural use in Indonesian. Cross-cultural adaptation was conducted following Sousa's guidelines. Psychometric testing was conducted between September 2025 and May 2026. Eligibility criteria for participants were parents of infants admitted to a neonatal care unit. The study involved 257 respondents. The questionnaire's structural variables were tested using Confirmatory Factor Analysis (CFA) in RStudio version 4.5.2. Based on established CFA criteria, one item (CCI 31) was eliminated due to low factor loading, resulting in a refined CO-PARTNER structure comprising 30 items across six domains. Cronbach's alpha coefficients demonstrated strong internal consistency at both initial testing and retest for each of the six subscales (all > 0.70). Model fit indices showed satisfactory values: Comparative Fit Index (CFI) = 0.994; Root Mean Square Error of Approximation (RMSEA)=0.044; and degrees of freedom (DF)=390. The CO-PARTNER Indonesia Version proved to be a reliable and valid tool for evaluating parental involvement in infant care within neonatal care units across six key components: daily care, medical care, acquiring information, parent advocacy, time spent with the infant, and closeness and comforting of the infant. The CO-PARTNER Indonesia Version is applicable for assessing parental involvement in neonatal wards, where such participation contributes to improved outcomes for both infants and parents.

Keywords: *Involvement; neonatal; nurse; NICU; parents*



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BACKGROUND

Family-Centered Care (FCC) is a healthcare approach that prioritizes collaboration among healthcare providers, patients, and families (Cantarino et al., 2020; Maatman et al., 2020). FCC programs have been associated with improved parental well-being, reduced anxiety, and increased participation in care for both infants and parents (Ding et al., 2019; Larocque et al., 2021). However, implementing FCC often encounters significant barriers from both healthcare professionals and parents. Resource constraints, including

limited staffing and high workloads, present substantial challenges (Mirlashari et al., 2020). Furthermore, insufficient knowledge and training among healthcare professionals regarding FCC principles and neonatal care practices have also been reported. Increased parental presence and involvement may elevate ward workload, potentially diminishing nurses' supportiveness and hindering effective communication between nurses and parents (Jafari, Kermanshahi, & Vanaki, 2023). Additionally, a lack of support from nurses, peers, and extended family members has been

identified as a barrier to FCC implementation (Zauche et al., 2020).

Recent research indicates that family-integrated programs can complement and strengthen FCC initiatives (Franck, Waddington, & O'Brien, 2020; O'Brien, 2021). Family-Integrated Care builds upon FCC by assigning families a more active role in patient care. While FCC involves families in providing input and support, the primary responsibility remains with medical staff. In contrast, Family Integrated Care incorporates families as essential members of the care team, requiring their active participation in managing patients' daily needs (Franck, Axelin, Veenendaal, & Bacchini, 2023). Evidence from a Canadian study demonstrates that Family-Integrated Care programs are associated with improved infant weight gain, breastfeeding rates, neurodevelopment, reduced length of hospital stay, and a lower risk of infection (Benzies et al., 2020; Murphy et al., 2021). A California study reported enhanced maternal well-being and self-efficacy, along with reduced maternal stress (Franck, Gay, et al., 2023). These findings are supported by a study in China, which observed reductions in maternal anxiety and stress (Zhang et al., 2024).

Parental involvement in infant care within neonatal intensive care units encompasses basic nursing practices, breastfeeding, skin-to-skin contact, and participation in clinical decision-making (Alferink et al., 2024). The CO-PARTNER questionnaire conceptualizes parental participation as parents' active involvement in their infant's care and their partnership with healthcare professionals in the neonatal unit (Veenendaal et al., 2021). Hospital neonatal care standards increasingly highlight the significance of family involvement and integration in care, often referred to as Family Integrated Care (FICare) (O'Brien, 2021; O'Brien et al., 2018). Despite this emphasis, there is a lack of standardized Indonesian-language instruments to objectively assess parental involvement in infant care, particularly for neonates in neonatology wards, considering Indonesia's unique cultural context and healthcare system.

The CO-PARTNER instrument was designed to assess parental participation and collaboration in infant care, particularly within neonatal intensive care units (Veenendaal et al., 2021). This instrument has been cross-culturally adapted into Norwegian and is currently being adapted in several other countries, underscoring its growing relevance and applicability across diverse healthcare settings (de Britto Guimarães Oliveira et al., 2025; Tandberg et al., 2025). Cross-cultural adaptation into Indonesian is essential to ensure cultural relevance, including substituting terms with those more familiar to the local population (Beaton et al., 2000). Indonesia is among the countries with the highest incidence of preterm births worldwide. As one of the most populous nations, Indonesia reports over 5 million births annually, with approximately 600,000 preterm births each year, representing a substantial burden of prematurity (Rohsiswatmo et al., 2023). Many of these infants require hospitalization in neonatal intensive care units (NICUs), where prolonged separation between mothers and infants can negatively affect both maternal and infant outcomes. Family Integrated Care (FICare) has been increasingly promoted to enhance parental involvement in neonatal care (Ansari et al., 2023; Moreno-Sanz et al., 2024). However, effective implementation requires reliable instruments to assess the partnership between parents and healthcare professionals. Currently, no Indonesian version of the CO-PARTNER questionnaire has undergone comprehensive cross-cultural adaptation and psychometric validation.

Therefore, translating and evaluating this instrument is therefore necessary to provide researchers and clinicians with a valid tool for assessing collaborative care in Indonesian neonatal settings. Furthermore, accurate assessment is required to capture parents' perceptions of participation, thereby improving the instrument's acceptability and usability. Therefore, this study aimed to develop an Indonesian version of the CO-PARTNER instrument to ensure its accuracy, comprehensibility, and cultural relevance for the target population.

METHOD

Study design

A cross-sectional design was employed in the cross-cultural adaptation and validation study of the Indonesian version of the CO-PARTNER instrument. The cross-cultural adaptation process followed Sousa's guidelines, which included obtaining permission from the original developer, forward translation, synthesis, backward translation, expert committee review, pre-testing, and psychometric evaluation to ensure semantic, conceptual, and cultural equivalence (Sousa & Rojanasrirat, 2011).

Sample

A total of 257 parents of infants in the neonatal ward participated between September and December 2025. This full-scale psychometric evaluation phase encompassed 257 respondents, comprising both mothers and fathers, recruited through convenience sampling. The sample size was determined based on a minimum ratio of 1:5 between participants and questionnaire items (Sousa & Rojanasrirat, 2011). Inclusion criteria required participants to be mothers or fathers of infants receiving treatment in the neonatal ward during the study period. Exclusion criteria applied to parents who did not complete the questionnaires completely. No minimum length of hospital stay was required, and eligibility was not restricted by gestational age. Most infants represented in the sample were preterm, although some term infants with congenital conditions requiring NICU care were also included.

CO-PARTNER Instrument

The CO-PARTNER (Collaboration and Parent Participation) questionnaire assesses parents' active participation and collaboration with healthcare professionals, and was developed in the Netherlands (Veenendaal et al., 2021). Prior to initiating the translation process, written permission to translate, culturally adapt, and validate the CO-PARTNER questionnaire was obtained from the original instrument developers. The original instrument consists of 31 items across six domains: daily care (DC, 11 items), medical care (MD, 4 items), acquiring information (AI, 3 items), parent advocacy (PA, 3 items), time spent with the infant (TSI, 3 items), and closeness and comforting the infant (CCI, 7 items). The total score is calculated by summing the scores from all domains. Domains 1, 2, and 6 use a three-point scale (0–2), with higher scores reflecting greater parental participation and collaboration. Actually, the scores are 0 for "the nurse does this, 1 for " we do this together, and 2 for "I do this independently". Domains 3 and 4 use yes/no responses (yes = 1; no = 0). Domain 5 is based on the total time spent with the infant and is divided into quartiles of the population tested obtaining a median value of 540 minutes: Quartile 1 (≤ 360 minutes, score 3), Quartile 2 (>360 –540 minutes, score 6), Quartile 3 (>540 –1080 minutes, score 9), and Quartile 4 (>1080 minutes, score 12). A score of 0 is assigned if no time is recorded in domain 5. The total score of the original CO-PARTNER questionnaire ranges from 0 to 62; however, in the Indonesian adaptation, the total score

ranges from 0 to 60 because one question (CCI31) was removed from domain six. Scoring for each item within each domain remains unchanged.

Translation procedure

The translation process involved several detailed and rigorous steps to ensure the instrument's accuracy and equivalence in the target language. First, the original version of the instrument was independently translated from its source language into Bahasa Indonesia by two bilingual translators with different backgrounds. The first translator (TL1) was a lay translator from the Language Unit of Universitas Jenderal Soedirman, unfamiliar with the health concepts used in the instrument. In contrast, the second translator (TL2) was a pediatric nursing lecturer fluent in the instrument's original language and knowledgeable about the clinical concepts being measured. Next, the two translated versions (TL1 and TL2) were objectively compared, reviewed, and synthesized by three researchers (ER, YR, and DW). This step aimed to reach consensus on the translation results and resolve any terminological differences or semantic discrepancies, producing a uniform initial translation (synthesis version).

The synthesized Indonesian version was then independently back-translated into the instrument's original language by two new translators (BTL1 and BTL2) to avoid conceptual bias. The first back-translator was an Australian native speaker with extensive experience in Indonesia, while the second was an Indonesian citizen who had lived in the United States for five years. Neither back-translator was familiar with the original version's content to ensure objectivity. Subsequently, both back-translated versions (BTL1 and BTL2) were evaluated and synthesized by the three researchers (ER, YR, and DW) in collaboration with the original instrument creator (NVV). This thorough review aimed to confirm that each item was appropriate, accurate, and retained the source meaning, resulting in a single valid back-translated version prepared for subsequent verification.

Pilot testing of the pre-final version

The instrument equivalency evaluation was conducted by an expert panel consisting of six doctoral-level neonatal nurses from various regions and higher education institutions. The recommended number of expert panel members is six to ten (Sousa & Rojjanasrirat, 2011). The primary task of this panel was to conduct an in-depth assessment of each questionnaire item, focusing on clarity and relevance to the measured variables. The expert panel reviewed all versions of the document (the first questionnaire, the forward synthesis version, and the back-translation version) based on two equivalence criteria: clarity and relevance. The panel's evaluations were then quantified to calculate the Item-Content Validity Index (I-CVI) and Scale-level Content Validity Index (S-CVI), which were used, to produce a pre-final version of the questionnaire. The I-CVI and S-CVI values reported by the expert team were as follows: clarity ($\geq 83\%$; 98%) and relevance ($\geq 83\%$; $\geq 99\%$). Additionally, the kappa coefficient (K^*) value for clarity and relevance among experts were $\geq 81\%$. The standard threshold applied were Item-Content Validity Index (I-CVI) $\geq 78\%$, Scale-Content Validity Index (S-CVI) $\geq 90\%$, and modified kappa statistic (K^*) $\geq 74\%$ (Polit, 2008; Shi, Mo, & Sun, 2012). If the value fell below the standard, the item will be revised or removed.

The pre-final version of the questionnaire was pilot-tested on a small sample of the target population, involving 30 parents of infants receiving care for in the neonatal ward. The recommended sample size for testing within the target

population is 10 to 40 (Sousa & Rojjanasrirat, 2011). Accordingly, this study included 30 respondents. During this stage, parents were asked to rate each questionnaire item on four key aspects: relevance, clarity, ambiguity, and readability. Respondent feedback and scores were used to calculate the Item-level Content Validity Index (I-CVI) and Scale-level Content Validity Index (S-CVI) from the parents' perspective. The values reported by parents were as follows: clarity ($\geq 76\%$; 93%), relevance ($\geq 93\%$; 93%), ambiguity ($\geq 93\%$; 96%), and readability ($\geq 93\%$; 92%).

The research team (ER, YR, DS) analyzed the I-CVI and S-CVI results, along with the pre-final version of the pilot test, to gather parent input and identify improvements for each item before distributing the final questionnaire. For question items containing the word "child's," this term was replaced with "infant" to better tailor the instrument to measure involvement and participation in the NICU setting. In item DC3, the word "feed" was replaced with "drink," as neonates are only given liquids. In item DC11, the terms "drink" and "feed" were replaced with "drink only" to reflect the neonate's age and feeding method. In item MD13, the term "bradycardia" was replaced with "decrease the infant's heart rate" because "bradycardia" is a medical term unfamiliar to most parents. For items PA19, PA20, CCI28, CCI29, and CCI31, examples were added to clarify and specify the meaning of the phrase "to do" in the context of actions.

Psychometric evaluation

The final questionnaire, consisting of 31 items and having passed the field trial, was distributed to the full research sample for validity and reliability testing. This full-scale psychometric evaluation phase encompassed 257 respondents, comprising both mothers and fathers. The study was conducted in neonatal wards at two regional hospitals in Banyumas, Central Java, Indonesia. The units primarily cared for preterm, low-birth-weight, and clinically unstable infants and served families from the surrounding districts. The collected data were used to examine the construct validity of the Indonesian version of the CO-PARTNER questionnaire through confirmatory factor analysis, as well as its internal consistency reliability.

Data analysis

Statistical software was used to analyze the data. The participants' characteristics were determined through descriptive data analysis. Descriptive statistics for the CO-PARTNER scale are presented, including the mean, standard deviation, kurtosis, skewness, and the value of Cronbach's alpha coefficient. The relationships between CO-PARTNER and its subscales were investigated using Spearman's correlation (Hirsch, 2021). Subsequently, researchers conducted Confirmatory Factor Analysis (CFA) to assess whether the questionnaire measured the same constructs as the original version. This analysis aimed to determine if the Indonesian version retained the original factor structure. CFA was performed using RStudio software, version 4.5.2 (2025). Model estimation employed the weighted least squares mean and variance adjusted (WLSMV) estimator to obtain robust results when modeling categorical or ordinal data that do not satisfy the normality assumption (Li, 2016). Model fit was determined using several standard indices, including the Root Mean Square Error of Approximation (RMSEA ≤ 0.06), Comparative Fit Index (CFI ≥ 0.95), Tucker-Lewis Index (TLI ≥ 0.95), and Standardized Root Mean Square Residual (SRMR ≤ 0.08), which serves as threshold criteria for indicating a good model fit. To further confirm fit, the Chi-square test (χ^2) and its p value (≥ 0.05 for the acceptable fit and ≥ 0.10 for good fit) were also included, along with

tolerance value for loose fit limit: RMSEA $\leq$ 0.08, CFI $\geq$ 0.85, and TLI $\geq$ 0.80. This model fit was considered adequate if it met at least three of these adequacy indices within the specified threshold limits (Goretzko et al., 2024).

Ethical considerations

Ethical approval for the legal and moral aspects of the study was obtained from the Ethics Committee of the Faculty of Nursing, University of Indonesia, under approval number: KET-243/UN2.F12.D1.2.1/PPM. 00.02/2025. All participants involved provided written informed consent after receiving a clear explanation of the study's process and urgency. Participants retained the right to withdraw from the study at any time without any consequences.

RESULT

The characteristics of the respondents

A total of 257 parents participated in this study. The majority of women (71.6%) had a mean age of 30.77 years (SD= 6.27). Most parents had a secondary education, with 49.3% of fathers and 43.5% of mothers having completed secondary school. There was a significant difference in employment status between parents: 100% of fathers were actively employed, whereas the vast majority of mothers (82.1%) were not working.

Table 1. The socio-demographic statistics of respondents (n=257)

Variable	n (%)	Mean $\pm$ SD
Age		30.77 $\pm$ 6.27
Gender status		
Male	73 (28.4)	
Female	184 (71.6)	

Variable	n (%)	Mean $\pm$ SD
Education level: Father		
Primary level	29 (39.7)	
Secondary level	36 (49.3)	
Tertiary Level	8 (11)	
Employment status: Father		
Not Employed	0 (0)	
Employed	73 (100)	
Education level: Mother		
Primary level	69 (37.5)	
Secondary level	80 (43.5)	
Tertiary Level	35 (19)	
Employment status: Mother		
Not Employed	151 (82.1)	
Employed	33 (17.9)	

Internal consistency and reliability CO-PARTNER

The Indonesian version of the CO-PARTNER instrument demonstrated satisfactory internal consistency and reliability. Cronbach's alpha coefficients for the six domains ranged from 0.759 to 0.905, indicating good to excellent reliability across the subscales. The domains assessed included daily care, medical care, information acquisition, parent advocacy, time spent with the infant, and closeness and comforting of the infant. These findings suggest that the items within each domain consistently measure the intended constructs. Furthermore, construct validity testing revealed significant correlations between each domain and the total score ($p < 0.05$), supporting the notion that all domains collectively assess a common underlying construct, namely parental collaboration and participation in neonatal care.

Table 2. Spearman Correlation Coefficients Between the dimension CO-PARTNER and Total Score (n = 257)

	Dimension of CO-PARTNER					
	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6
Domain 1						
Domain 2	0.400**					
Domain 3	0.171**	0.165**				
Domain 4	0.313**	0.186**	0.158*			
Domain 5	0.338**	0.174**	0.117*	0.230**		
Domain 6	0.647**	0.401**	0.198**	0.299**	0.232**	
Total score	0.848**	0.561**	0.257**	0.469**	0.622**	0.791**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Daily care (DC, 11 items), medical care (MD, 4 items), acquiring information (AI, 3 items), parent advocacy (PA, 3

items), time spent with the infant (TSI, 3 items), and closeness and comforting the Infant (CCI, 7 items).

Table 3. Reliability Assessment (n = 257)

Items CO-PARTNER Indonesian version	Corrected item-Dimension Correlation	Alpha if item deleted	Cronbach's Alpha
Domain 1. Perawatan Harian			0.886
1. Memandikan/membersihkan bayi saya dengan kain basah	0.582	0.878	
2. Mengganti popok bayi saya	0.749	0.867	
3. Memberi minum bayi saya (menyusui langsung atau menggunakan botol/sendok/cangkir)	0.755	0.868	
4. Mengganti pakaian bayi saya	0.676	0.872	
5. Mengeluarkan bayi saya dari inkubator / boks bayi	0.733	0.868	
6. Memberikan obat kepada bayi saya	0.506	0.885	
7. Menimbang berat badan bayi saya	0.557	0.881	
8. Memantau keluaran (buang air kecil dan buang air besar) bayi saya	0.569	0.879	
9. Mengukur suhu tubuh bayi saya	0.710	0.870	

Items CO-PARTNER Indonesian version	Corrected item-Dimension Correlation	Alpha if item deleted	Cronbach's Alpha
10. Mencatat berat badan bayi saya	0.564	0.882	0.816
11. Mencatat takaran asupan minum bayi saya	0.515	0.883	
Domain 2. Perawatan Medis			
12. Memberikan minum melalui selang minum bayi saya			0.759
13. Memantau alat monitor bayi saya dan menanganinya sesuai kebutuhan (misalnya: menstimulasi saat denyut jantung bayi turun)	0.700	0.738	
14. Mengatur orang lain yang berkunjung ke bayi saya	0.650	0.779	
15. Berpartisipasi dalam kunjungan harian bersama dokter	0.617	0.777	
Domain 3. Mendapatkan Informasi			
16. Apakah anda meminta informasi kepada tenaga kesehatan tentang kondisi kesehatan bayi Anda?	0.601	0.718	0.829
17. Apakah anda meminta informasi kepada tenaga kesehatan tentang kondisi bayi anda ketika anda sedang tidak berada di tempat?	0.636	0.700	
18. Apakah anda berkomunikasi dengan orang tua lain tentang pengalaman anda?	0.656	0.612	
Domain 4. Advokasi Orangtua	-	-	0.866
19. Saya membela bayi saya. saya memberi tahu seseorang untuk melakukan tindakan dalam merawat bayi saya (misalnya ada lendir di area mulut atau bayi saya tampak tidak nyaman. saya segera memberi tahu tenaga kesehatan atau seseorang disitu dan meminta tindakan yang diperlukan agar bayi saya lebih nyaman dan aman)	0.728	0.722	
20. Saya membela bayi saya; saya memberi tahu seseorang untuk TIDAK melakukan sesuatu pada perawatan bayi saya; Saya menetapkan batasan (misalnya saya melarang seseorang untuk menggendong/menyentuh bayi saya)	0.732	0.718	
21. Saya memberikan penjelasan kepada tenaga kesehatan tentang kegiatan harian bayi saya	0.605	0.842	0.905
Domain 5. Waktu bersama bayi			
22. Rata-rata. berapa jam anda hadir menemani bayi anda di rumah sakit?	0.672	0.938	
23. Rata-rata. berapa jam Anda kontak dengan bayi Anda dalam sehari?	0.850	0.724	
24. Rata-rata. berapa jam anda benar-benar dekat dengan bayi anda?	0.798	0.796	0.905
Domain 6. Kedekatan dan Memberi Kenyamanan pada Bayi			
25. Menggendong/menimang/mendekap bayi saya	0.753	0.885	
26. Memberikan kenyamanan bayi saya saat dia membutuhkannya	0.776	0.882	
27. Perawatan Metode Kanguru (PMK)/ kontak kulit dengan kulit	0.640	0.901	
28. Bersama bayi saya dekat dengan bayi (hadir lebih intim, misalnya mengusap lembut kepala bayi, berbicara pelan, menyanyikan lagu untuk bayi)	0.805	0.878	
29. Bersama bayi saya (hadir secara fisik misalnya berada didekat bayi, mengamati kondisi bayi atau hadir saat jadwal pemeriksaan)	0.795	0.879	
30. Menenangkan bayi saya selama menjalani prosedur yang menyakitkan (misalnya saat pengambilan darah)	0.681	0.897	

Descriptive Statistics of CO-PARTNER

Table 4 presents the descriptive statistics for each CO-PARTNER domain, including the mean, standard deviation, skewness, and kurtosis. These statistics were reported to describe the central tendency, variability, and distributional characteristics of the responses prior to psychometric analysis. The time spent with infant domain had the highest mean score ($M = 6.90$, $SD = 3.693$), whereas the parent advocacy domain had the lowest ($M = 1.42$, $SD = 1.288$). According to the criteria established by Kim et al. (2013), data are considered normally distributed if the skewness is less than 2 and the kurtosis is less than 7 (Kim, 2013). Table 4

presents skewness values ranged from -5.078 to 1.151, and kurtosis values ranged from -1.700 to 27.044, indicating variability in score distributions across domains. The acquiring information domain demonstrated marked negative skewness and high kurtosis, consistent with a pronounced ceiling effect, indicating that responses were clustered toward the upper end of the response scale. In contrast, the medical care and parent advocacy domains showed evidence of floor effects, with responses concentrated toward the lower end of the scale. These distributional patterns provide important information about participants' response characteristics and should be considered when interpreting the instrument's

psychometric properties.

Table 4. Descriptive Analysis (n = 257)

Domain CO- PARTNER	Mean	SD	Skewness	Kurtosis
Domain 1: Daily Care (0-22)	3.25	3.982	1.151	0.700
Domain 2: Medical Care (0-8)	1.73	1.933	0.708	-0.815
Domain 3: Acquiring Information (0-3)	2.90	0.436	-5.078	27.044
Domain 4: Parent Advocacy (0-3)	1.42	1.288	0.082	-1.700
Domain 5: Time Spent with Infant (0-12)	6.90	3.693	0.045	-1.353
Domain 6: Closeness and Comforting the Infant (0-12)	5.41	3.936	-0.160	-1.312
Score total (0-60)	21.35	10.354	0.083	-0.964

Construct validity

Confirmatory Factor Analysis (CFA) was conducted to assess the construct validity of the research instrument. The measurement model comprised six latent constructs: daily care, medical care, acquiring information, parent advocacy,

time spent with the infant, and closeness and comforting the infant. The Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator was utilized to accommodate the ordinal nature of the data.

Table 5. Goodness of Fit for the Confirmatory Factor Analysis Models

	$\chi^2(df)$	TLI	CFI	RMSEA
M1: CO-PARTNER original version (31 items)	612.228 (419)	0.993	0.994	0.042
M2: CO-PARTNER modified version (30 items)	582.899 (390)	0.993	0.994	0.044

Table 5 compares the goodness-of-fit indices for the initial and modified CFA models. The initial 31-item model demonstrated good model fit, with $\chi^2(df)=612.228(419)$, TLI=0.993, CFI=0.994, and RMSEA=0.042. After removing item CCI31 was removed from the Closeness and Comforting the Infant domain, the modified 30-item model also showed good fit, with $\chi^2(df)=582.899(390)$, TLI=0.993, CFI=0.994, and RMSEA=0.044. Although the RMSEA value slightly increased after item removal, it remained below the recommended threshold, indicating that the modified model retained an acceptable and stable factor structure. The removal of CCI31 was based on item-level performance and contextual considerations. At the item level, CCI31 did not meet the expected factor loading criterion in the CFA model. Contextually, the item "recognize my infant's signals" may have been interpreted differently by Indonesian parents, as identifying infant cues in neonatal care settings often requires clinical interpretation and close guidance from healthcare professionals.

Most items in the modified 30 item model demonstrated strong standardized factor loadings above 0.70 (Figure 1). However, two items, AI17 in the Acquiring Information domain and PA19 in the Parent Advocacy domain, showed standardized factor loadings greater than 1.00. This condition indicates a potential Heywood case, which may occur when parameter estimation yields negative error variance or when very high correlations exist among indicators within the same domain. In this study, these items were retained because the affected domains consisted of only three indicators, and removing additional items could weaken construct representation and reduce the content coverage of the instrument. The decision to retain AI17 and PA19 was also supported by their theoretical relevance and content validity. Although these items showed statistical irregularities, they remained conceptually important for representing parental information-seeking behavior and parental advocacy in neonatal care. Overall, the CFA findings support the six-

factor structure of the Indonesian CO-PARTNER instrument after the removal of CCI31, resulting in a culturally adapted 30-item version suitable for further use in Indonesian neonatal care settings.

DISCUSSION

The CO-PARTNER instrument was developed to assess parental participation and collaboration in infant care, specifically within neonatal intensive care units (Veenendaal et al., 2021). The instrument consists of six domains: daily care, medical care, acquiring information, parent advocacy, time spent with the infant, and closeness and comforting of the infant. Originally developed in the Netherlands, adaptation to the Indonesian context is essential due to the distinct characteristics of the Dutch community, ensuring the instrument's continued relevance. The CO-PARTNER instrument has previously been cross-culturally adapted into Norwegian and Portuguese, with additional adaptations currently underway in different countries, reflecting its growing relevance and applicability across diverse healthcare settings (de Britto Guimarães Oliveira et al., 2025; Tandberg et al., 2025). Cross-cultural adaptation studies emphasize that translation cannot be literal and must consider cultural factors and local practices. In Indonesia, the CO-PARTNER questionnaire has been adapted both linguistically and substantively to ensure that each item is clearly understood by respondents and accurately reflects parental experiences.

This study evaluates the suitability of the CO-PARTNER instrument for measuring parental involvement in neonatal care in Indonesia. The main findings indicate that the CO-PARTNER tool can be effectively utilized in Indonesia after modification, specifically by removing one item from the closeness domain to better align with the local context. This modification ensures the instrument remains reliable and valid for assessing parental involvement in neonatal care.

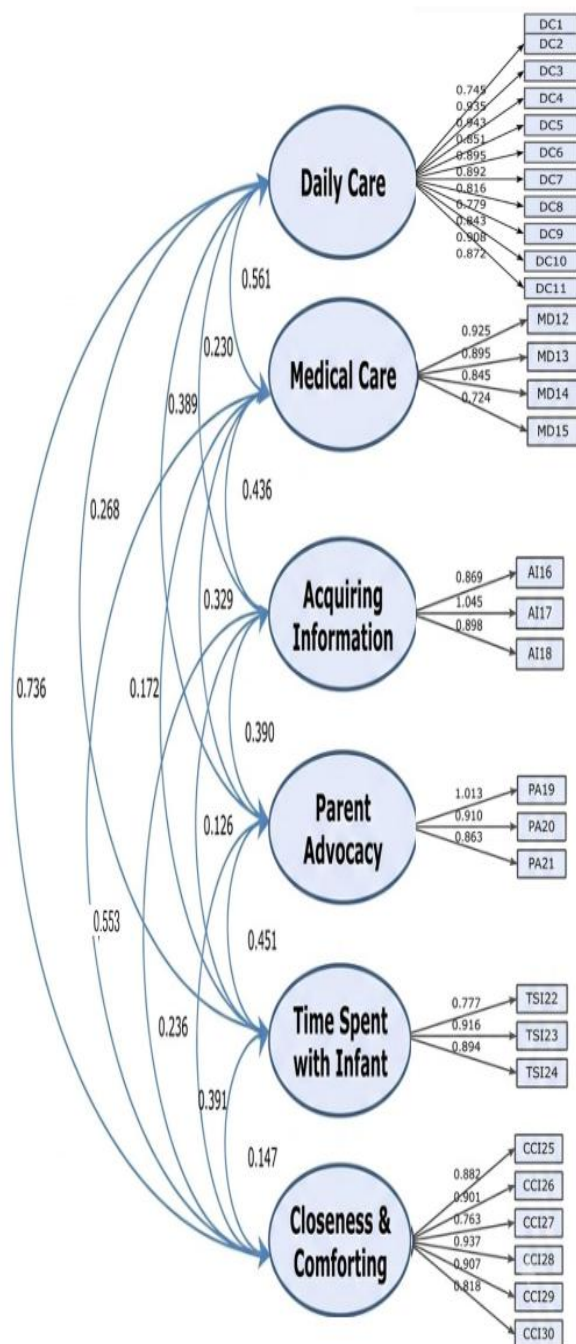


Figure 1. Standardized factor loadings and covariances of the modified 30-item CO-PARTNER

Descriptive analysis reveals that the domains of time spent with infant and closeness and comforting the infant achieved the highest mean scores, highlighting the predominance of emotional involvement and direct interaction within the context of Indonesian neonatal care. In contrast, the parent advocacy and medical care domains received the lowest mean scores, indicating limited involvement in advocacy and medical care. The acquiring information domain showed a significant deviation, characterized by a notably high kurtosis. These findings likely reflect differences in the opportunities available for parental participation across domains. Information sharing is commonly incorporated into routine neonatal care. In contrast, participation in medical decision making and advocacy may remain more limited due to clinical responsibilities, organizational policies, or the infant's medical condition.

The Indonesian version of the CO-PARTNER retained the six-domain design of the original instrument, supporting the conceptual relevance of daily care, medical care, acquiring information, parent advocacy, time spent with the infant, and closeness and comforting across cultural settings. This overall structure is comparable with the Norwegian and Portuguese adaptations, which also strived to preserve the original version construct while guaranteeing linguistic and cultural appropriateness (Alves de Britto Guimarães Oliveira et al., 2025; Tandberg et al., 2025). However, differences were observed in the performance of individual domains. In the Indonesian version, the presence of floor effects in domains such as medical care and parent advocacy may indicate that some parents had limited opportunities to participate in clinical activities or advocate for their infant within the neonatal care setting. Conversely, the ceiling effect observed in acquiring information may reflect activities that were more consistently available or culturally expected. These data suggest that although the underlying construct of parental participation is broadly transferable, the extent to which particular behaviors are experienced and reported remains influenced by local policies, professional roles, and the organization of neonatal care (McNair et al., 2024; Neske et al., 2026).

Testing results demonstrate that the adapted instrument possesses strong construct validity and adequate reliability for measuring collaboration between nurses and parents in neonatal intensive care units. Although communication outcomes were not directly measured, the instrument may help identify areas in which communication and collaboration between healthcare professionals and parents could be strengthened, thereby strengthening parents' roles as integral members of the care team during hospitalization (Lorié, Wreesmann, Veenendaal, Kempen, & Labrie, 2021; Mirlashari et al., 2020). These findings suggest that structured parental involvement, supported by effective communication, can enhance family satisfaction and boost the quality of nursing care (Mahmoudzadeh et al., 2026).

CFA indicates that the Indonesian version of CO-PARTNER demonstrates an adequate model fit, as evidenced by Goodness-of-Fit indices meeting statistical criteria. Each domain exhibits high internal consistency. Reliability was assessed using Cronbach's alpha coefficients and item-total correlation analysis, with consistent results supporting the instrument's reliability for clinical use within the local cultural context. These findings align with other psychometric adaptation studies, which affirm that instruments with strong validity and reliability can effectively assess parental perceptions and involvement (Oliveira, Melo, Graça, & Brandão, 2025; Veenendaal & Lyngstad, 2025). The consistency of core domains across cultural adaptations indicates that parental involvement in neonatal care constitutes a shared construct measurable across diverse cultural and healthcare contexts. While specific forms of involvement may differ locally, the fundamental concept remains broadly comparable worldwide (Lim et al., 2026; Reiter et al., 2022). This study recommends using the CO-PARTNER instrument with 30 items, including six modified items, and removing item CCI31. The Indonesian version comprises eleven daily care items, four medical care items, three information acquisition items, three parent advocacy items, three time-spent-with-infant items, and six closeness and comfort items. The item CCI31, "recognize my infant's signals" was removed during initial psychometric testing because the factor loading analysis did not meet the threshold (Goretzko et al., 2024). This finding suggests that differences in parents' responsiveness to infants' cues may

be more closely related previous caregiving experience. These characteristics may influence how parents recognize, interpret, and respond to their infant's signals (Niedźwiecka et al., 2026). Infant signals may be considered too ambiguous or inconsistent with parents' experiences in Indonesian neonatal intensive care units compared to other engagement indicators (Yildiz & Besirik, 2025). Signals are nonverbal forms of infant communication that reflect physiological or emotional needs, such as crying, body movements, facial expressions, and changes in sleep patterns (Hawthorne, 2002). In the context of adapting the CO-PARTNER questionnaire in Indonesia, these signals must be interpreted in line with parents' experiences in neonatal intensive care units, where interpreting infant signals often varies among parents. Therefore, items related to "infant signals" were removed.

Several statements were reworded to ensure semantic clarity. In all questions, the term "child" was replaced with "infant" to align with the NICU involvement instrument. In DC3, "feed" was changed to "drink" because neonates receive only fluids. In DC11, "drink" and "feeding" were modified to "drink only," reflecting for the child's age appropriately. These adjustments help minimize ambiguity and improve data accuracy (Goretzko et al., 2024). MD13 was revised by replacing "bradycardia" with "decrease the infant's heart rate" to avoid unfamiliar medical terminology for parents and enhance their understanding (Rocha et al., 2020). Medical terms can impede comprehension and require adaptation for parents while preserving clinical substance (Mendes et al., 2019). Questions PA19, PA20, CCI28, CCI29, and CCI31 were clarified by adding examples and specifying the verb "do" more precisely. These examples help respondents in interpreting questions more accurately (Efsthathiou, 2018), encouraging more precise responses regarding involvement in infant care and thereby minimizing bias. This language adaptation aligns with validation methods that emphasize cognitive evaluation and comprehension of clinical terms. Providing practical examples links questionnaire items to real experiences, helping preserve the original meanings during cross-cultural adaptation (Coêlho et al., 2025; Novrianda et al., 2024).

The correlations between constructs showed a positive relationship across all domains. Notably, the strongest relationship was observed between daily care and infant closeness ($r = 0.647$), indicating that greater parental involvement in daily care correspond with greater parental closeness to the infant. Furthermore, medical care also demonstrated a positive relationship with infant closeness ($r = 0.401$). In contrast, time with the infant exhibited weakest correlation with gathering information ($r = 0.117$), although this relationship remained statistically significant. The consistently high need for information, regardless of how much time parents spent with their infant, suggests that parental presence and access to information are distinct aspects of participation. Spending more time in the neonatal unit may increase opportunities for closeness and direct care, but it does not necessarily guarantee timely or sufficient clinical information. Taken together, these findings underscore the multidimensional complexity of parental involvement, with each domain contributes distinctively to the formation of emotional bonds and closeness with the infant during intensive care (Filippa et al., 2019; Hullumani et al., 2026). Building on these results, the factor structure from this adaptation strengthens the instrument's construct validity in mapping the dimensions of parental participation in the NICU environment. Previous research has shown that factors influencing maternal-infant closeness include parental

contact with the infant and confidence in the parental role (Waal, Boekhorst, Nyklíček, & Pop, 2023). Additionally, evidence suggests that the frequency and duration of time spent together between parents and infants can increase parental involvement in the intensive care unit, eventually reducing stress caused by separation and communication barriers between medical personnel and families (Murphy et al., 2021; Waddington, Veenendaal, O'Brien, & Patel, 2021).

This study has several limitations. Primarily, data collection was confined to a single district in Indonesia. Cultural diversity and variation in urban and rural socio-economic status may influence parental participation. Future studies should incorporate larger samples and multiple regions across Indonesia. The CO-PARTNER instrument offers nursing professionals with an objective tools to evaluate and optimize family involvement in neonatal intensive care. Additionally, the assessment results from this questionnaire can guide the development of more inclusive communication strategies that account for parents' health literacy and cultural backgrounds, thereby supporting more effective collaborative care. Differences in these characteristics between the Indonesian sample and the original Dutch population may influence how parents understand information, communicate with healthcare professionals, and participate in their infant's care; however, these differences were not directly examined in the present study.

CONCLUSION AND RECOMMENDATION

The Indonesian version of the CO-PARTNER tool is a validated instrument designed to measure parental involvement across six domains: daily care, medical care, information acquisition, parent advocacy, time spent with the infant, and closeness and comforting of the infant. The CO-PARTNER is particularly applicable for assessing parental involvement in infant care within the neonatal units, where such participation leads to improved outcomes for both infants and parents. The Indonesian version of the CO-PARTNER has been slightly modified by removing the CCI31 item. This adapted version is suitable for use in research and other relevant contexts.

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