

Validation of the questionnaire for assessing the childbirth experience [QACE] in a Polish population

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Research Article

Keywords: childbirth experience, questionnaire validation, reliability, postpartum women, QACE

Posted Date: October 5th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10796898/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Positive childbirth experiences are an important component of high-quality maternity care and may influence maternal psychological well-being, mother–infant bonding, and future reproductive decisions. The Questionnaire of Assessment of Childbirth Experience (QACE) is a validated instrument developed to assess women's experiences of childbirth. This study aimed to translate, and validate the Polish version of the QACE.

Methods

A cross-sectional methodological study was conducted among 398 postpartum women recruited at a tertiary referral hospital in Poland. The Polish version of the QACE was developed using a standardized forward–backward translation process. Psychometric evaluation included assessment of construct validity, internal consistency, cross-language reliability, measurement invariance, and known-groups validity.

Results

The Polish version of the QACE demonstrated excellent psychometric properties. The original four-factor structure was confirmed, and the questionnaire showed good construct validity, satisfactory consistency, and excellent agreement between the Polish and English versions. Measurement invariance analyses supported comparisons between women with different modes of delivery, while known-groups validity confirmed the instrument's ability to distinguish between clinically relevant groups.

Conclusions

The Polish version of the QACE is a reliable and valid instrument for assessing childbirth experiences among Polish women. Its use may facilitate standardized evaluation of maternity care, support clinical practice, and promote research on women's childbirth experiences in Poland and international settings.

Background

Mental health and good well-being are very important factors of optimal functioning in contemporary world [Ryff, 1995]. During pregnancy, labor, and the immediate postpartum period, obstetric care has traditionally prioritized physical health to ensure the delivery of a healthy neonate. However, the psychological health is frequently overlooked. This gap may be addressed using a standardized questionnaire such as the Questionnaire of the Childbirth Experience [QACE]. It measures a woman's subjective experience of childbirth. It's a very relevant problem, because childbirth is one of the most

emotionally charged experiences in a woman's life. Use of appropriate, validated scales can improve quality of intrapartum care. This conduct has a lot of benefits, including strengthening the mother-child bond, minimizing psychological trauma and, increasing the likelihood of subsequent pregnancies, and facilitating the early identification of individuals at risk for postpartum depression or post-traumatic stress disorder [Gamble et al., 2005].

QACE is worldwide used, it was adopted and validated in Iran [Mirghafourvand et al., 2020], Spain [Rodríguez Coll et al., 2021], France [Chabbert et al., 2021], China [Zhong et al., 2025], and Turkey [Emir & Ozturk, 2025]. There is no Polish version of QACE. Moreover, according to authors knowledge there is lack of validated Polish-language tools to evaluate a patient's emotional experience of childbirth. The QACE scale appears to fulfill this need by assessing a woman's emotional state, perceived control during labor, initial interactions with the newborn, and her relationship with healthcare professionals.

Several instruments have been developed to assess women's childbirth experiences, including the Childbirth Experience Questionnaire [CEQ/CEQ2] [Dencker et al., 2010], the Birth Satisfaction Scale-Revised [BSS-R] [Martin et al., 2017], the Mackey Childbirth Satisfaction Rating Scale [MCSRS] [Goodman et al., 2004] and the Wijma Delivery Experience Questionnaire [WDEQ-B] [Wijma et al., 1998]. Although these tools have demonstrated good psychometric properties and have been widely used in international research, they differ in their conceptual focus. Compared with these instruments, the QACE provides a broader and more multidimensional assessment of childbirth experience. It evaluates not only women's emotional responses and relationships with healthcare professionals but also their first interactions with the newborn and their reflections on childbirth one month postpartum. This broader conceptual framework may offer a more comprehensive understanding of childbirth experiences and their longer-term psychological impact. Therefore, the availability of a valid and reliable Polish version of the QACE expands the range of standardized instruments available for perinatal research and clinical practice.

This study aims to validate Questionnaire of the Childbirth Experience in Polish language.

Methods

The study was conducted at the Department of Obstetrics and Perinatology in University Hospital in Kraków from February 1st, 2024, to December 31st, 2024. All postpartum patients, regardless of delivery mode [vaginal or cesarean section], were invited to complete the QACE questionnaire in both Polish and English versions. Participants were assessed regarding their knowledge and self-reported proficiency in both languages. Individuals were excluded if they declined participation, did not speak Polish, or reported insufficient language proficiency. Additionally, patients younger than 18 years of age and those who did not fully complete the questionnaire were excluded from the study. Demographic and medical data was collected from electronic medical documentation. In addition to completing the Questionnaire of Assessment of the Childbirth Experience [QACE], participants were asked to complete the Mother-to-Infant Bonding Scale [MIBS]. The inclusion of the MIBS was intended to provide additional information on the quality of early maternal-infant bonding and to explore its relationship with women's childbirth experiences. Although the MIBS measures a construct distinct from childbirth experience itself, the

quality of the birth experience has been shown to influence early maternal emotional adaptation and the development of mother–infant bonding. The MIBS is a brief, validated instrument designed to assess maternal emotional bonding with the newborn during the early postpartum period and has been widely used in both clinical practice and research. The combined use of the QACE and MIBS enables a more comprehensive assessment of the psychological consequences of childbirth by evaluating both women's perceptions of childbirth and their early emotional relationship with their infant.

Translation/adaptation procedure

The adaptation process involved two translators: one with expertise in medical terminology and procedures, and another without such background. The QACE scale was forward - translated independently by both translators, each of whom was a native Polish speaker. Subsequently, the translations were exchanged and subjected to back-translation. Any discrepancies identified during this process were reconciled. The final version of the translation underwent review by a committee of physicians fluent in both Polish and English, all of whom were familiar with the clinical application of the QACE scale and routinely worked in maternity and labor wards. The committee did not identify any objections to the finalized translation.

An additional element introduced into the questionnaires was the patients' evaluation of the translation. The translation process was modeled after Tsung's study [1].

[1. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine,<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5463570/>].

Tool description

QACE is a self-reporting questionnaire to assess the childbirth experiences [Carquillat P, Vendittelli F, Perneger T, Guittier MJ. Development of a questionnaire for assessing the childbirth experience [QACE]. BMC Pregnancy Childbirth. 2017 Aug 30;17[1]:279. doi: 10.1186/s12884-017-1462-x.]. The full version contains 26 items and the answer format is to choose one of the four-point Likert scale as follows: 1 [totally], 2 [in part], 3 [not so much], and 4 [not at all]. and 3 items are scored between 0 to 10 using a visual analogue scale [VAS].

The questionnaire generally covers four domains:

- the emotional status [Emotion],
- relationship with staff [Staff],
- the vital first bonding moments with newborn [FirstMom]
- feelings in postpartum period [Feelings].

The QACE is a multidimensional questionnaire that was developed to identify women with negative experiences. Higher scores indicate a more positive childbirth experience. The Polish and English version of questionnaire is in Supplemental File 1 and 2.

The study was approved by the Bioethics Committee of the Jagiellonian University No 1072.6120.203.2021. All patients give a written consent for participation into the study. All data was anonymized.

Statistical analysis

Analyses were conducted in R and Python, with descriptive statistics summarizing sample characteristics and item distributions, and ceiling/floor effects evaluated against the COSMIN 15% threshold [Prinsen et al., 2018)]. Structural validity was assessed by confirmatory factor analysis of the original four-factor model [Carquillat et al., 2017] using WLSMV estimation on polychoric correlations [Li, 2016], with fit judged by χ^2 , CFI, TLI, RMSEA [90% CI], and SRMR [Hu & Bentler, 1999; McNeish, 2023], and construct-level convergent validity examined via standardized loadings, composite reliability [≥ 0.70], and average variance extracted [≥ 0.50][Fornell & Larcker, 1981]; a complementary exploratory factor analysis [minimum-residual extraction, Promax rotation, factor number determined by parallel analysis [Horn, 1965]] was based on Pearson correlations after the polychoric solution failed to converge. Internal consistency was estimated with Cronbach's α and McDonald's ω [Dunn et al., 2014)], supplemented by corrected item-total correlations, alpha-if-item-deleted, and mean inter-item correlation [Clark & Watson, 1995]. Known-groups validity was tested with Mann–Whitney U tests [Cohen's d effect sizes[Cohen, 2013]] across delivery mode and NRS satisfaction groups, with item-level discrimination assessed by Fisher's exact test; convergent, concurrent, and clinical-variable associations were examined with Spearman correlations, and discriminant validity with the heterotrait–monotrait ratio [HTMT < 0.85][Henseler et al., 2015)]. Cross-language equivalence in the bilingual subsample was assessed using intraclass correlation coefficients [Koo & Li, 2016], quadratic weighted kappa [Landis & Koch, 1977], exact agreement rates, the Wilcoxon signed-rank test, and regression-based differential item functioning analysis [Zumbo, 1999], with Bonferroni correction applied. Measurement invariance across delivery mode was tested by multi-group CFA [configural, metric, scalar models] using the MLR estimator, judged primarily by Δ CFI [< 0.01] [Cheung & Rensvold, 2002)]. A two-sided significance level of .05 was applied throughout.

Results

Descriptive Statistics

398 eligible women completed the study questionnaires between February, 01, 2024 and December, 31, 2024. The final sample included 190 women who gave birth vaginally and 208 who delivered by cesarean section. Of these, 257 [64.6%] completed the QACE in both Polish and English: 130 vaginal [68.4% of vaginal birth] and 127 cesarean [61.1% of cesarean birth].

The mean age of participants was 32.5 years [SD = 4.7, range 18–48, N = 398] Sociodemographic, clinical and birth characteristics are presented in Table 1.

Table 1
Sociodemographic and clinical characteristics of the study sample

Characteristic	Vaginal (n = 190)	Cesarean (n = 208)	Total (N = 398)
PATIENT CHARACTERISTICS			
Age (years), M (SD) [range]	32.0 (4.4) [21–43]	33.0 (4.9) [18–48]	32.5 (4.7) [18–48]
BMI, M (SD)	27.9 (3.9)	30.1 (5.4)	29.1 (4.9)
Gestational age (weeks), M (SD)	39.1 (1.5)	38.1 (2.0)	38.6 (1.9)
Primiparous, n (%)	99 (52.1%)	111(53.4%)	210 (52.8%)
IVF, n (%)	3 (1.6%)	9 (4.3%)	12 (3.0%)
DELIVERY CHARACTERISTICS			
Planned cesarean, n (%)	N/A	92 (44.2%)	92 (44.2%)
Accelerated cesarean, n (%)	N/A	82 (39.4%)	79 (39.4%)
Emergency cesarean, n (%)	N/A	34 (16.3%)	34 (16.3%)
Type of anaesthesia, n (%)	Epidural: 115 (61.5%); Entonox: 2 (1.1%); TENS: 1 (0.5%); Remifentanyl: 1 (0.5%)	Spinal: 191 (91.8%); General: 15 (7.2%); Epidural: 2 (1.0%)	Spinal: 191 (48.5%); Epidural: 117 (29.6%); General: 15 (3.8%); Entonox: 2 (0.5%); Remifentanyl: 1 (0.3%); TENS: 1 (0.3%)
NEONATAL OUTCOMES			
Twin pregnancy, n (%)	1 (0.5%)	10 (4.8%)	11 (2.8%)
Apgar 5 min, M (SD)	9.87 (0.4)	9.66 (0.8)	9.76 (0.6)
Birth weight (g), M (SD)	3324 (473)	3134 (691)	3223 (606)
Birth length (cm), M (SD)	53.5 (4.3)	52.2 (4.3)	52.8 (4.4)
POST-DELIVERY			
Note. Apgar score, birth weight, and birth length are reported at the child level (total N = 409); in multiple pregnancies each child was counted separately.			

Characteristic	Vaginal (n = 190)	Cesarean (n = 208)	Total (N = 398)
<i>PATIENT CHARACTERISTICS</i>			
Day of discharge, M (SD)	4.0 (1.8)	4.7 (2.4)	4.3 (2.2)
Bilingual (PL + EN), n (%)	130 (68.4%)	127 (61.1%)	257 (64.6%)
Note. Apgar score, birth weight, and birth length are reported at the child level (total N = 409); in multiple pregnancies each child was counted separately.			

The mean NRS score [item 26 – rating overall birth experience] was 7.17 [SD = 2.55, Mdn = 7.5]; 199 participants [50.0%] scored 0–7 and 199 [50.0%] scored 8–10. Items descriptive statistics are in Table 2.

Table 2
QACE Items descriptive statistics (N = 398)

Item	Item text (EN)	Subscale	M	SD	Ceiling%^a	Floor%^b	Flag
1	I felt worried	Emotion_rev	2.46	0.97	19.6%	15.3%	***
2	I felt secure	Emotion	1.48	0.63	58.8%	0.3%	***
3	I felt strange sensations	—	2.70	0.92	25.9%	5.8%	***
4	I felt confident	Emotion	2.05	0.90	30.4%	7.8%	***
5	The staff understood and fulfilled my wishes	Staff	1.25	0.50	78.4%	0.3%	***
6	I felt emotionally supported by the staff	Staff	1.24	0.50	79.1%	0.5%	***
7	The staff kept me informed of what was happening	Staff	1.17	0.42	84.9%	0.0%	***
8	I felt I could express myself and give my opinion	Staff	1.33	0.63	74.1%	1.3%	***
9	I am satisfied with the way the events unfolded	—	1.39	0.71	71.1%	2.8%	***
17	I was able to see my baby after birth	FirstMom	1.38	0.78	76.6%	4.3%	***
18	I held my baby for the first time shortly after birth	FirstMom	1.72	1.10	63.3%	14.8%	***
19	My first contact with my baby met my expectations	FirstMom	1.72	1.08	63.3%	12.8%	***
20	I was immediately able to take care of my baby	—	1.23	0.50	79.9%	0.8%	***
21	I am proud of myself	Feelings	1.29	0.58	76.1%	0.8%	***
22	I feel that I missed something important	Feelings_rev	3.58	0.79	74.4%	2.3%	***

Note. Rev = reversed scoring. Ceiling% = proportion at best possible score (score 1 for positive items; score 4 for negative items). Floor% = proportion at worst possible score. *** = ceiling or floor effect exceeds the 15% COSMIN threshold. All N = 398.

Item	Item text (EN)	Subscale	M	SD	Ceiling%^a	Floor%^b	Flag
23	I am upset about the conditions of birth	Feelings_rev	3.72	0.67	82.9%	2.0%	***
24	The thought of a future delivery frightens me	—	2.75	1.06	31.4%	15.3%	***
<i>Note.</i> Rev = reversed scoring. Ceiling% = proportion at best possible score (score 1 for positive items; score 4 for negative items). Floor% = proportion at worst possible score. *** = ceiling or floor effect exceeds the 15% COSMIN threshold. All N = 398.							

Abbreviations: Emotion - the emotional status , Emotion_rev; Feelings - feelings in postpartum period, Feelings_rev, FirstMom - the vital first bonding moments with newborn, Staff - relationship with staff

All 17 items showed ceiling effects exceeding 15% [range 19.6%–84.9%]. Staff items showed the highest ceiling rates; item 7 reached 84.9%. At the subscale level, the Staff subscale exhibited the most pronounced ceiling effects [items 5–8: 74.1%–84.9%], followed by FirstMom [63.3%–76.6%], Feelings [74.4%–82.9%], and Emotion [19.6%–58.8%], indicating that positive birth experience was the norm in this sample and that the Staff and Feelings subscales in particular may have limited capacity to detect further improvement in already-satisfied women. Floor effects exceeded 15% only for items 1 and 24 [15.3% each]. No missing data were observed for any QACE item.

Translation Quality Assessment

Among the 257 bilingual participants, mean translation quality was 4.68 [SD = 0.57, Mdn = 5]. The Polish translation was rated good or very good [4–5] by 247 participants [96.1%]; only 10 [3.9%] gave lower ratings [n = 8 rated 3; n = 2 rated 2].

Structural Validity

Confirmatory Factor Analysis

Following COSMIN guidelines for cross-cultural adaptations, the primary analysis tested the original four-factor model [Carquillat et al., 2017] via CFA on the full sample [N = 398] using WLSMV estimation on polychoric correlations - the recommended approach for four-point ordinal items [Li, 2016]. Fit was excellent: $\chi^2[59] = 89.88$, CFI = 0.997, TLI = 0.997, RMSEA = 0.036 [90% CI: 0.020, 0.051], SRMR = 0.063. The χ^2/df ratio and GFI are not reported [not appropriate for WLSMV]. The standardized CFA path diagram, including factor loadings and correlations between the four latent factors, is presented in Fig. 1. The excellent fit indices should be interpreted with caution given the ceiling effects observed across most items [74– 85% for Staff items], which restrict variance in the polychoric correlation matrix and may inflate WLSMV-based fit statistics.

Standardized loadings [Table 3] ranged from 0.711 to 0.949. Composite reliability exceeded 0.70 for all subscales [Staff: 0.930; Emotion: 0.834; FirstMom: 0.953; Feelings: 0.895]. AVE exceeded 0.50 for all subscales [0.630–0.870], indicating adequate convergent validity. Four items [items 3, 9, 20, and 24] are present in Table 2 but were not assigned to any subscale in the CFA model or reliability analyses: items 3 [“strange sensations”], 9 [“satisfied with the way events unfolded”], and 24 [“a future delivery frightens me”] each yielded maximum EFA loadings below 0.40. Item 20 [“immediately able to care for baby”] loaded at –0.449 on the Feelings factor in EFA but was not included in the original Carquillat short-form subscales and showed no clear conceptual alignment with its primary factor. All four items are therefore treated as single-item indicators outside the four-subscale scoring model.

Table 3. CFA: Standardized Loadings, CR, and AVE (N = 398)

Factor	Item	Item text (EN)	λ	SE	CR	AVE	p
Staff	5	The staff understood and fulfilled my wishes	0.925	0.024	0.930	0.769	< .001
	6	I felt emotionally supported by the staff	0.904	0.028			< .001
	7	The staff kept me informed	0.865	0.033			< .001
	8	I felt I could express myself	0.810	0.035			< .001
Emotion	1_rev	I felt worried (reversed)	0.711	0.039	0.834	0.630	< .001
	2	I felt secure	0.913	0.032			< .001
	4	I felt confident	0.742	0.039			< .001
FirstMom	17	I was able to see my baby after birth	0.916	0.021	0.953	0.870	< .001
	18	I held my baby shortly after birth	0.933	0.016			< .001
	19	First contact with baby met expectations	0.949	0.017			< .001
Feelings	21	I am proud of myself	0.767	0.040	0.895	0.740	< .001
	22_rev	I feel I missed something important (reversed)	0.928	0.030			< .001
	23_rev	I am upset about birth conditions (reversed)	0.878	0.029			< .001

Note. λ = standardized loading (WLSMV; polychoric correlations). All $p < .001$. CR > 0.70 = adequate; AVE > 0.50 = adequate. Fit: $\chi^2(59) = 89.88$, CFI = 0.997, TLI = 0.997, RMSEA = 0.036 [0.020, 0.051], SRMR = 0.063, rev = item reverse-scored.

Exploratory Factor Analysis

An EFA using minimum-residual extraction and Promax rotation was conducted on all 17 full-version items [KMO = 0.864; Bartlett's test $p < .001$]. Polychoric correlation estimation failed to converge and Pearson correlations were used instead. Parallel analysis suggested 4 factors.

The four-factor solution [Table 4] accounted for 53.7% of total variance, closely replicating the original structure [Carquillat et al., 2017]. Items 3, 9, and 24 had maximum loadings below 0.40. Factor labels corresponded to Staff [MR2], First Moments [MR3], Feelings [MR1], and Emotion [MR4].

Table 4. *EFA Factor loadings: Promax Rotation, 4-factor solution (N = 398)*

Item	Item text (EN)	MR2 (Staff)	MR3 (FirstMom)	MR1 (Feelings)	MR4 (Emotion)	Factor
5	The staff understood and fulfilled my wishes	0.789				Staff
6	I felt emotionally supported by the staff	0.871				Staff
7	The staff kept me informed	0.773				Staff
8	I felt I could express myself	0.705				Staff
9	I am satisfied with the way events unfolded	0.302		-0.361		—
17	I was able to see my baby after birth		0.801			FirstMom
18	I held my baby shortly after birth		0.967			FirstMom
19	First contact with baby met expectations		0.826			FirstMom
20	I was immediately able to take care of baby			-0.449		—
21	I am proud of myself			-0.563		Feelings
22	I feel I missed something (neg)			0.753		Feelings
23	I am upset about birth conditions (neg)			0.974		Feelings
1	I felt worried (neg)				-0.709	Emotion
2	I felt secure				0.573	Emotion
3	I felt strange sensations (neg)					—
4	I felt confident				0.854	Emotion
24	A future delivery frightens me (neg)				-0.362	—
	McDonald's ω	0.843	0.892	0.800	0.739	
	Variance explained (%)	16.1%	13.9%	12.9%	10.8%	53.7% total

Note. Minimum-residual extraction; Pearson correlations (polychoric did not converge). Loadings < |0.30| suppressed. Bold = primary factor assignment. Items 3, 9, 24: max loading < 0.40. neg = negatively worded. EFA conducted on raw (non-reversed) items; negative loadings for positively worded items (1, 2, 4, 21) reflect expected direction relative to negatively worded items that dominate their respective factors. Total variance = 53.7% (Rodríguez Coll et al., 2021: 52.63%).

Abbreviations: Emotion - the emotional status; Feelings - feelings in postpartum period; FirstMom - the vital first bonding moments with newborn; Staff - relationship with staff

Reliability

Internal consistency

Internal consistency of the QACE is presented in Table 5. All subscale values met or exceeded established benchmarks. Overall McDonald’s omega for the 13-item version was 0.920. Corrected item-total correlations ranged from 0.516 to 0.836 and no item deletion substantially improved subscale reliability. Mean inter-item correlation was 0.321 [range: 0.029–0.795]; while the mean fell within the recommended 0.15–0.50 range, the extremes exceeded these bounds, with the lowest value [0.029] suggesting negligible shared variance between some item pairs across subscales and the highest [0.795] suggesting potential redundancy within certain subscales.

For the MIBS, pre-birth reliability was adequate [$\alpha = 0.697$, $\omega = 0.684$]. Post-birth reliability was below the 0.70 threshold [$\alpha = 0.563$, $\omega = 0.614$]. The items Urażona/Obrażona [Hurt/Offended] and Agresywna [Aggressive] showed consistently low item-total correlations at both time points, and may be poorly suited to capture bonding emotions in a general obstetric population.

Table 5. Internal Consistency of QACE Subscales (N = 398)

Subscale	N items	Cronbach α	McDonald ω	α (Carquillat)	ω (Rodríguez)	r_it range	α -drop range
Relationship with Staff	4	0.831	0.843	0.810	0.849	0.62–0.71	0.763–0.821
Emotional Status	3	0.732	0.751	0.700	— $\times$	0.56–0.60	0.594–0.672
First Moments with Newborn	3	0.882	0.892	0.840	— $\times$	0.73–0.84	0.776–0.886
Feelings	3	0.770	0.789	0.730	— $\times$	0.52–0.72	0.564–0.784
Overall (13 items)	13	0.849	0.920	—	0.818 $\times$	IIC: 0.321	—

Note. r_{it} = corrected item-total correlation range. IIC = mean inter-item correlation (13-item version). Reference values: Carquillat et al. (2017) α ; Rodríguez Coll et al. (2021) ω . ω Rodríguez Coll et al. (2021) used different subscale compositions (Intrapartum Care: 7 items; Positive/Negative Childbirth Feelings: 5 items each), precluding direct ω comparison for these subscales. ω Rodríguez Coll overall $\omega = 0.818$ was computed on their 20-item version, not the 13-item Carquillat short form used here.

Validity

Known-groups validity

Results presented in Table 6 show known-groups validity. Women delivering by cesarean section showed higher [worse] scores on all four QACE subscales compared to vaginal-birth women. The largest effect was for First Moments with the Newborn [$d = -0.86$], consistent with delayed skin-to-skin contact following cesarean section [Moore et al., 2016]. The NRS did not differ significantly between delivery groups [$p = .350$], suggesting that overall satisfaction is similarly distributed but the specific birth experience domains differ.

Table 6. *Known-groups validity (N = 398)*

Outcome	Group A, M (SD)	Group B, M (SD)	nA	nB	p	Cohen's d
<i>QACE subscales – Vaginal vs. Cesarean delivery</i>						
Relationship with Staff	1.20 (0.40)	1.29 (0.43)	190	208	0.015	–0.20
Emotional Status	1.93 (0.64)	2.11 (0.71)	190	208	0.003	–0.27
First Moments with Newborn	1.24 (0.59)	1.95 (0.99)	190	208	< .001	–0.86
Feelings	1.27 (0.54)	1.39 (0.59)	190	208	0.007	–0.21
NRS (item 26)	7.29 (2.50)	7.06 (2.59)	190	208	0.350	+0.09
MIBS Pre-birth total	1.47 (1.94)	1.65 (2.41)	190	208	0.628	–0.08
MIBS Post-birth total	0.86 (1.28)	1.28 (1.92)	190	208	0.189	–0.25
<i>QACE subscales – NRS 0–7 vs. NRS 8–10</i>						
Relationship with Staff	1.31	1.18	199	199	< .001	+0.32
Emotional Status	2.27	1.77	199	199	< .001	+0.78
First Moments with Newborn	1.81	1.41	199	199	< .001	+0.45
Feelings	1.51	1.15	199	199	< .001	+0.68

Note. All QACE subscales: lower = better experience. Mann-Whitney U (two-tailed). QACE NRS groups: Group A = NRS 0–7 (n = 199), Group B = NRS 8–10 (n = 199). MIBS = Mother-to-Infant Bonding Scale total.

Fisher's exact test [Carquillat et al., 2017 method] showed significant discrimination between NRS 0–7 and 8–10 groups for 16 of 17 items [all $p < .05$]; only item 8 did not discriminate [$p = .067$]. All four subscale scores differed significantly between NRS groups [all $p < .001$, d range: 0.32–0.78].

Convergent and concurrent validity

All four QACE subscales correlated significantly with the NRS [Table 7], with Spearman correlations ranging from $\rho = -0.277$ [Staff] to $\rho = -0.390$ [Emotion; all $p < .001$]. The negative direction is expected: higher subscale scores indicate a worse experience, whereas higher NRS scores indicate a better experience. The MIBS post-birth total was weakly but significantly correlated with the NRS [$\rho = -0.241$, $p < .001$] and all QACE subscales [ρ range: 0.284–0.356], reflecting concurrent validity with a related but conceptually distinct construct. These correlations may underestimate the true association given the

modest internal consistency of the MIBS post-birth total in this sample [$\alpha = 0.563$], which can suppresses observed correlations.

Inter-subscale Spearman correlations [Table 7, rows 1–4] were moderate, ranging from 0.322 [Staff–Feelings] to 0.468 [Emotion–Feelings], all $p < .001$. These values indicate meaningful variation among subscales while remaining well below 1.0, consistent with the four-factor structure confirmed by CFA.

Table 7. *Correlation matrix: QACE subscales, NRS, and MIBS post-birth (Spearman ρ , $N = 398$)*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
(1) Relationship with Staff	—					
(2) Emotional Status	0.346***	—				
(3) First Moments	0.348***	0.357***	—			
(4) Feelings	0.322***	0.468***	0.445***	—		
(5) NRS (item 26)	–0.277***	–0.390***	–0.317***	–0.386***	—	
(6) MIBS Post-birth	0.309***	0.284***	0.327***	0.356***	–0.241***	—

Note. All p values are Spearman correlations. *** $p < .001$. NRS = item 26 (0–10, higher = better). QACE subscales coded so higher = worse experience.

Discriminant validity

Discriminant validity was evaluated using the heterotrait-monotrait ratio of correlations (HTMT). HTMT values below 0.85 indicate adequate discriminant validity. All between subscale HTMT ratios were below this threshold [Table 7b; range: 0.350–0.633]. The highest value was Emotion–Feelings [0.633], which is theoretically expected given the conceptual overlap between emotional experience during birth and feelings. No pair exceeded 0.85, confirming satisfactory discriminant validity across all subscale pairs.

Table 7b. *HTMT Discriminant validity matrix*

Subscale	Staff	Emotion	FirstMom	Feelings
Staff	1.000	0.461	0.350	0.371
Emotion	0.461	1.000	0.469	0.633
FirstMom	0.350	0.469	1.000	0.482
Feelings	0.371	0.633	0.482	1.000

Note. HTMT = heterotrait-monotrait ratio of correlations. Values < 0.85 indicate adequate discriminant validity. Computed from Pearson correlation matrix of item-level scores.

Correlations with clinical variables

Age, BMI, parity and IVF status were not significantly correlated with any QACE outcome [all $p > .05$]. Gestational age showed significant negative correlations with Emotional Status [$\rho = -0.161$, $p = .001$] and First Moments with Newborn [$\rho = -0.308$, $p < .001$], likely reflecting the association between earlier delivery, increased operative intervention, and disrupted early mother–infant contact. Apgar score at 5 minutes was negatively correlated with Emotional Status [$\rho = -0.157$, $p = .002$], First Moments with Newborn [$\rho = -0.381$, $p < .001$], and Feelings at One Month [$\rho = -0.114$, $p = .023$], reflecting the impact of neonatal condition on birth experience. Birth weight was negatively correlated with First Moments with Newborn [$\rho = -0.199$, $p < .001$]. All other clinical associations were non-significant.

Cross-language validation

Agreement between Polish and English versions

Among 257 bilingual respondents, per-item ICC [two-way mixed, absolute agreement, single measures] ranged from 0.833 [item 4] to 0.993 [item 21], with mean ICC = 0.942. All 38 items exceeded the 0.70 adequacy threshold [Table 8]. Quadratic weighted kappa for 17 core items ranged from 0.833 to 0.993 [all 'almost perfect']. Exact agreement rates ranged from 92.2% to 99.6%.

No item showed significant systematic bias between Polish and English responses after Bonferroni correction [all $p_{\text{bonf}} = 1.0$]. Item 4 had the largest uncorrected difference [$p_{\text{uncorrected}} = .033$], not passing correction. DIF regression analysis confirmed no language-related bias for any of the 17 core items [all Bonferroni-corrected $p = 1.0$].

Table 8. *Bilingual Validation: ICC, Weighted Kappa, and Agreement Statistics*

Item	ICC	95% CI	kw	Agree%	M_PL	M_EN	Diff	Wilcoxon p^a	n
1	0.934	[0.917, 0.948]	0.934	93.0%	2.560	2.541	0.019	0.333	257
2	0.954	[0.941, 0.964]	0.954	96.5%	1.455	1.459	-0.004	0.790	257
3	0.914	[0.891, 0.932]	0.913	94.9%	2.599	2.584	0.015	0.565	257
4	0.833	[0.791, 0.867]	0.833	92.2%	1.981	2.051	-0.070	0.033	257
5	0.966	[0.956, 0.973]	0.966	98.4%	1.265	1.249	0.016	0.072	257
6	0.939	[0.922, 0.952]	0.938	97.3%	1.233	1.230	0.003	0.777	257
7	0.895	[0.868, 0.917]	0.895	98.8%	1.167	1.156	0.011	0.414	257
8	0.926	[0.907, 0.942]	0.926	96.5%	1.374	1.370	0.004	1.000	257
9	0.966	[0.956, 0.973]	0.966	97.7%	1.409	1.405	0.004	0.824	257
10_DL	0.956	[0.943, 0.966]	0.955	95.7%	1.213	1.243	-0.030	0.183	257
10_DD	0.950	[0.936, 0.961]	0.950	94.8%	1.398	1.386	0.012	0.666	257
11_DL	0.967	[0.957, 0.974]	0.967	94.8%	1.109	1.130	-0.022	0.212	257
11_DD	0.940	[0.923, 0.953]	0.940	93.7%	1.421	1.397	0.024	0.475	257
12_DL	0.972	[0.963, 0.978]	0.971	96.1%	0.996	1.004	-0.009	0.608	257
12_DD	0.956	[0.944, 0.966]	0.956	93.3%	1.206	1.179	0.028	0.202	257
13_DL	0.970	[0.961, 0.976]	0.969	94.3%	1.330	1.370	-0.039	0.046	257
13_DD	0.942	[0.926, 0.954]	0.941	92.1%	1.460	1.440	0.020	0.436	257
14_DL	0.941	[0.925, 0.954]	0.941	94.8%	1.896	1.887	0.009	0.542	230
14_DD	0.886	[0.856, 0.910]	0.885	90.9%	1.821	1.841	-0.020	0.577	251

15_DL	0.932	[0.913, 0.948]	0.932	96.8%	0.899	0.908	-0.009	1.000	230
15_DD	0.908	[0.883, 0.928]	0.908	93.3%	0.824	0.862	-0.038	0.159	252
16_A	0.977	[0.969, 0.983]	0.990	98.3%	6.208	6.283	-0.075	0.181	230
16_B	0.970	[0.962, 0.976]	0.955	95.7%	4.459	4.521	-0.062	0.304	252
17	0.976	[0.969, 0.981]	0.976	96.9%	1.385	1.377	0.008	0.530	230
18	0.954	[0.941, 0.963]	0.953	96.1%	1.716	1.696	0.020	0.296	252
19	0.947	[0.933, 0.958]	0.947	95.3%	1.704	1.720	-0.016	0.469	230
20	0.936	[0.918, 0.949]	0.935	98.1%	1.226	1.226	0.000	1.000	252
21	0.993	[0.992, 0.995]	0.993	99.6%	1.261	1.265	-0.004	1.000	218
22	0.943	[0.927, 0.955]	0.942	97.3%	3.568	3.560	0.008	0.792	239
23	0.876	[0.844, 0.901]	0.875	96.9%	3.732	3.720	0.012	0.569	173
24	0.957	[0.945, 0.966]	0.957	95.7%	2.825	2.844	-0.019	0.353	257
25_Vag. birth	0.983	[0.978, 0.986]	0.983	96.1%	3.163	3.167	-0.004	0.959	257
25_Spont. labor	0.983	[0.979, 0.987]	0.983	95.3%	3.035	3.054	-0.019	0.266	257
25_No pain	0.948	[0.933, 0.959]	0.947	97.3%	2.630	2.607	0.023	0.394	257
25_Caesarean	0.994	[0.992, 0.995]	0.994	96.9%	4.335	4.331	0.004	0.821	257
25_Prof. choice	0.957	[0.945, 0.966]	0.956	95.3%	3.588	3.584	0.004	0.807	257
25_Sched. deliv.	0.959	[0.948, 0.968]	0.959	93.8%	4.218	4.249	-0.031	0.196	257
26	0.974	[0.966, 0.979]	0.977	96.9%	7.323	7.335	-0.012	0.887	257
Mean/Total	0.942		0.942	96.5%					

Note. ICC = two-way mixed, absolute agreement, single measures. kw = quadratic weighted kappa (items 1–9, 17–24 only). Wilcoxon signed-rank test: only item 4 and item 13_DL reached uncorrected significance ($p = .033$, $p = .046$), but no item was significant after Bonferroni correction.. None of the items showed DIF by linear regression; Items 10–15: DL = during labour, DD = during delivery. Items 16A/16B = NRS pain scales. Item 26 = global birth experience NRS.

Measurement invariance across delivery mode

Multi-group CFA [Table 9] tested invariance of the four-factor structure across vaginal [$n = 190$] and cesarean [$n = 208$] groups. The MLR estimator was used because WLSMV did not converge for multi-group models with ordered variables - a known limitation when both the ordered-variable specification and between-group constraints are combined in lavaan. The configural model CFI [0.927] is notably lower than the full-sample CFA CFI [0.997]; this discrepancy is attributable to two methodological differences: [a] the switch from WLSMV to MLR estimation, which produces lower CFI values for the same model on ordinal data [Li, 2016], and [b] the reduced effective sample size when the full sample is split into two subgroups of $n \approx 200$, which reduces power and increases model sensitivity. The absolute fit of the configural model [CFI = 0.927, RMSEA = 0.086] is therefore evaluated against MLR benchmarks rather than compared directly with the WLSMV-estimated full-sample solution. Configural invariance was supported [CFI = 0.927]; the RMSEA of 0.086 marginally exceeded the conventional 0.08 threshold, though this value is within the range expected for MLR estimation on ordinal data with moderate per-group sample sizes. Metric invariance held [$\Delta CFI = 0.000$, $\Delta\chi^2(9) = 4.29$, $p = .891$]. Scalar invariance was supported by the ΔCFI criterion [$\Delta CFI = 0.007 < 0.01$], though the scaled chi-square difference test was significant ($\Delta\chi^2(9) = 23.89$, $p = .004$), reflecting the sensitivity of chi-square to sample size. Scalar invariance is considered tenable for substantive comparisons.

Table 9. Measurement Invariance Across Delivery Mode (MLR Estimator)

Model	χ^2	df	CFI	RMSEA	ΔCFI	$\Delta\chi^2 (\Delta df)$	Interpretation
Configural	290.5	118	0.927	0.086	—	—	Baseline model
Metric	299.5	127	0.927	0.083	0.000	4.29 ($\Delta df=9$), $p=.891$	HOLDS ($ \Delta CFI < 0.01$)
Scalar	323.7	136	0.920	0.083	0.007	23.89 ($\Delta df=9$), $p=.004$	HOLDS ($ \Delta CFI < 0.01$)*

Note. * Scalar invariance: ΔCFI criterion holds (< 0.01) but $\Delta\chi^2$ is significant ($p = .004$). Given the chi-square sensitivity to sample size, scalar invariance is justified. WLSMV did not converge for multi-group models; MLR was used as fallback.

Discussion

The main goal of the Questionnaire of Assessment of the Childbirth Experience [QACE] validation was to apply a universal tool for assessing the patient's feelings and experiences related to perinatal care.

This study provides comprehensive psychometric evidence supporting the validity of the Polish adaptation of the Questionnaire of Assessment of the Childbirth Experience [QACE], evaluated on a sample of 398 postpartum women. The original four-factor structure - Relationship with Staff, Emotional Status, First Moments with Newborn, and Feelings at One Month, was confirmed via CFA with excellent fit [CFI = 0.997, RMSEA = 0.036], and measurement invariance across delivery mode was demonstrated through scalar-level equivalence, permitting direct subscale comparisons between vaginal and cesarean groups. Internal consistency was adequate to good across all four subscales [α = 0.732–0.882; ω = 0.751–0.892], and cross-language validation in 257 bilingual respondents confirmed high agreement between the Polish and English versions [mean ICC = 0.942], with no evidence of systematic translation bias or differential item functioning.

Known-groups validity was supported by large and theoretically coherent between-group differences: cesarean delivery was associated with substantially worse First Moments with Newborn scores [d = -0.86], reflecting the impact of operative delivery on early skin-to-skin contact, while the effect on overall global satisfaction [NRS] was negligible [d = +0.09], consistent with the multidimensional nature of birth experience. Convergent and concurrent validity were demonstrated through significant correlations between all QACE subscales and both the NRS global satisfaction item and the MIBS post-birth total, and discriminant validity was confirmed via HTMT ratios all falling below 0.85. Together, these findings indicate that the Polish QACE is a psychometrically sound instrument suitable for use in research and clinical evaluation of childbirth experience in Polish-speaking women.

The psychometric properties obtained in the present study are consistent with findings from previous validation studies of the QACE conducted in different cultural and healthcare contexts. Across international adaptations, including studies from Iran, Spain, France, China, and Turkey, the original four-dimensional structure of the instrument has generally been preserved, supporting the theoretical robustness of the construct and its applicability across diverse populations. Despite differences in maternity care organization, cultural expectations regarding childbirth, and levels of medical intervention, the core domains of childbirth experience—particularly those related to interaction with healthcare professionals, emotional responses during birth, and early mother–newborn contact—appear to remain stable and universally relevant.

Similar to the present findings, previous studies have reported good to excellent internal consistency for all QACE subscales, indicating that the instrument maintains reliability across translations and adaptations. Furthermore, confirmatory factor analyses conducted in other language versions have also demonstrated acceptable to very good model fit indices, reinforcing the stability of the original factor structure. These convergent results suggest that QACE is a culturally adaptable instrument that retains its psychometric integrity even when implemented in markedly different healthcare systems.

Cross-cultural comparisons further highlight the importance of contextual factors in shaping childbirth experience scores. For example, studies from countries with higher rates of medicalized childbirth have emphasized the influence of mode of delivery and immediate postnatal practices on women's perceptions of early bonding and satisfaction. In contrast, settings with more continuity of midwifery-led care have reported stronger associations between perceived support from healthcare professionals and overall childbirth experience. These differences underline the necessity of validating such instruments locally rather than assuming direct transferability of psychometric properties across populations.

Importantly, the present study extends this evidence base by confirming measurement invariance across delivery modes and demonstrating strong cross-language agreement between Polish and English versions of the questionnaire. This adds further support to the conceptual equivalence of the QACE construct and indicates that observed differences between clinical groups are likely to reflect true variations in experience rather than measurement artifacts.

Taken together, the consistency of findings across multiple international studies supports the QACE as a robust and versatile tool for assessing childbirth experience. The Polish validation contributes to this growing body of evidence and enables meaningful cross-cultural comparisons in future research, particularly in studies investigating how organizational models of perinatal care influence women's subjective birth experiences.

Strengths and Limitations

The present study has several important strengths. First, it provides the first validation of the Polish version of the QACE, addressing the need for a reliable and culturally adapted instrument for assessing women's childbirth experiences within the Polish healthcare context. The study employed a comprehensive psychometric evaluation, including analyses of the scale structure, reliability, and validity, with confirmatory factor analysis [CFA] performed to assess the underlying factor structure of the questionnaire and provide further evidence supporting its construct validity.

The study included a relatively large sample size of 398 participants, providing a robust basis for the validation process and increasing the reliability of the obtained results. Another strength was the heterogeneity of the study population, which included both primiparous and multiparous women, patients who delivered vaginally and by cesarean section, as well as women representing a wide range of gestational ages [from 27+2 to 41+1 weeks of pregnancy] and maternal ages. This diversity reflects the variety of childbirth experiences encountered in clinical practice and enhances the generalizability of the findings.

Furthermore, data collection was conducted over an extended period, from February 1st to December 31st, 2024, enabling the assessment of women's experiences reported at different times of the year and reducing the potential influence of temporal variability. The study was performed in a tertiary referral hospital, representing the highest level of perinatal care within the Polish healthcare system, which allowed the inclusion of a clinically diverse group of patients treated in a highly specialized setting.

The inclusion of a Polish population enables future comparisons with international studies and contributes to a better understanding of factors influencing childbirth experiences across different healthcare systems and cultural backgrounds. Additionally, participants completed the questionnaire in both Polish and English versions, supporting the evaluation of linguistic adaptation and contributing to the assessment of the potential applicability of the instrument in cross-cultural research. Finally, the availability of a validated Polish-language tool may facilitate the identification of women's needs and support the development of more patient-centred maternity care. Overall, these methodological strengths support the reliability and validity of the Polish version of the QACE and its potential use in both research and clinical practice.

Several limitations should be noted when interpreting these findings. First, test-retest reliability was not assessed in the present study. COSMIN guidelines for cross-cultural adaptations recommend evaluation of temporal stability [Prinsen et al., 2018]; the absence of a second measurement occasion means that the reproducibility of QACE scores over time in a Polish sample remains unknown. Future research should administer the questionnaire at two time points [e.g., 48 hours and six weeks postpartum] to establish intraclass correlation coefficients for test–retest reliability, as this is a prerequisite for evaluating the instrument's responsiveness to change.

Second, the sample was recruited from a single tertiary obstetric centre in Poland, which may limit the generalisability of findings to women delivering in different settings. Ceiling effects - with 74%–85% of respondents marking the most positive response on Staff items - reduce the discriminative capacity of those subscales and suggest that the questionnaire may be less sensitive in populations with generally positive birth experiences. Future studies should examine the QACE in more diverse samples, including women with complicated deliveries or low-resource settings.

Third, the EFA polychoric correlation matrix failed to converge, requiring a fallback to Pearson correlations; this is a methodological limitation that reduces the precision of the exploratory factor solution and its comparability to other studies. Fourth, four items [3, 9, 20, and 24] did not load satisfactorily onto any of the four original factors in either CFA or EFA and were excluded from subscale scoring. Their psychometric status in a Polish-speaking context warrants further investigation, as they may capture distinct clinically relevant dimensions - such as anticipatory fear of future delivery [item 24] or overall event satisfaction [item 9] - not fully represented within the four-factor scoring model. Fifth, the MIBS post-birth internal consistency was below the 0.70 threshold [$\alpha = 0.563$, $\omega = 0.614$], and two items [Hurt/Offended and Aggressive] showed consistently low item-total correlations, suggesting that the MIBS may not fully capture early bonding in populations where negative bonding emotions are rarely endorsed. Sixth, the sample comprised 52% cesarean deliveries, which exceeds the national Polish rate and WHO recommendations - the known-groups results may not generalise to populations with lower operative delivery rates. Seventh, the bilingual cross-language validation was conducted with both Polish and English versions administered in the same session, so the high agreement [mean ICC = 0.942] may partly reflect carryover or memory effects rather than translation equivalence alone, future studies should consider administration with a time interval between language versions.

Conclusions

The results of this study showed that the Polish validation of the QACE is an reliable and significant instrument for the assessment of the postpartum experience in Polish women. These findings are particularly important given the growing recognition of childbirth experience as a key component of maternal health and well-being. Contemporary obstetric care increasingly emphasizes not only maternal and neonatal outcomes but also women's subjective perceptions of labor and delivery, which may influence psychological adjustment, maternal satisfaction, and future reproductive decisions

The availability of a validated Polish version of the QACE addresses an important gap in clinical practice and research. Until now, the assessment of childbirth experience in Poland has been limited by the lack of standardized and culturally adapted instruments. The Polish QACE may therefore facilitate both clinical screening and scientific investigations aimed at identifying factors associated with positive and negative birth experiences. Such assessment may contribute to the development of patient-centered interventions designed to improve the quality of maternity care and support women during the perinatal period.

Abbreviations

QACE - Questionnaire for Assessing the Childbirth Experience

CEQ/CEQ2 – Childbirth Experience Questionnaire

BSS-R - Birth Satisfaction Scale-Revised

MCSRS - Mackey Childbirth Satisfaction Rating Scale

WDEQ-B - Wijma Delivery Experience Questionnaire

MIBS - Mother-to-Infant Bonding Scale

VAS - visual analogue scale

WLSMV - Weighted Least Squares Mean and Variance-adjusted

CFI - Comparative Fit Index

TLI - Tucker-Lewis Index

RMSEA - Root Mean Square Error of Approximation

SRMR - *Standardized Root Mean Square Residual*

NRS - *Numeric Rating Scale*

MLR estimator - Maximum Likelihood estimator with Robust standard errors

BMI - Body Mass Index

IVF – In Vitro fertilisation

COSMIN - COnsensus-based Standards for the selection of health Measurement Instruments

CFA - Confirmatory Factor Analysis

GFI - Goodness-of-Fit Index

AVE - Average Variance Extracted

EFA - Exploratory Factor Analysis

KMO (Kaiser-Meyer-Olkin)

HTMT - heterotrait-monotrait ratio of correlations

ICC - Intraclass Correlation Coefficient

DIF regression - Differential Item Functioning based on logistic regression

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and relevant guidelines and regulations concerning research involving human participants. The study was approved by the Bioethics Committee of the Jagiellonian University Approval no. 1072.6120.203.2021. All participants provided written informed consent to participate in the study. All data was anonymized.

Consent for publication

not applicable

Availability of data and materials

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

Competing interests

The authors declare that they have no competing interests

Funding:

Jagiellonian University Collegium Medicum

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Acknowledgements:

The authors would like to thank Dr Paweł Krawczyk for their valuable assistance and support during the data collection and preparation of this study.

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Figures

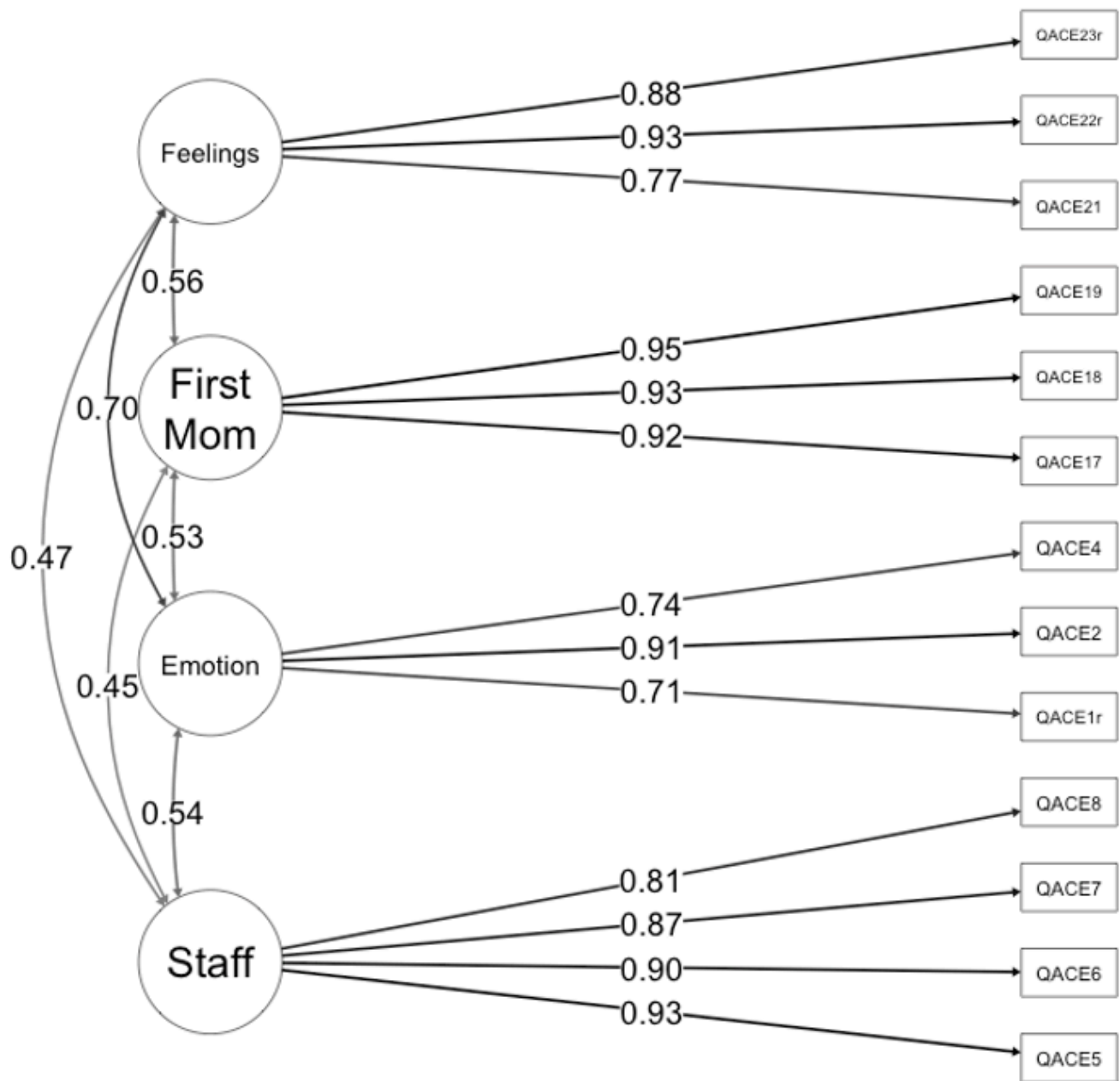


Figure 1

CFA path diagram

Abbreviations: Emotion - the emotional status; Feelings - feelings in postpartum period, FirstMom - the vital first bonding moments with newborn, Staff - relationship with staff

Supplementary Files

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