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# Psychometric evaluation of the early postnatal questionnaire for Swedish population

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## ABSTRACT

**Background:** Previously developed instruments measuring the quality of postnatal care, based on women's experiences and views, are mainly country-specific which makes it important to have studies for specific populations. The aim of this study was to explore validity and reliability evidence of a previously developed postnatal questionnaire for women living in Sweden.

**Method:** A cross-sectional study based on self-report questionnaire. The questionnaire included the *Early Postnatal Questionnaire* (EPQ), and was administered to 1061 women who gave birth in two regional hospitals in Swedish during 2017. Validity evidence of the EPQ was undertaken using principal component analysis. Regarding reliability, Cronbach's alpha was used.

**Results:** The questionnaire was returned by 483 postnatal women. The analysis resulted in three components: Information, Postnatal Environment and Caring Relationship. The Cronbach alpha values of the components ranged from 0.762 to 0.879. Foreign-born women scored higher (more positively) in all three components, compared to women born in Sweden.

**Conclusions:** The results of this study suggest that the instrument EPQ is a psychometrically useful tool, suitable for both research and clinical settings. The three-component structure provides researchers with the opportunity to conduct a more detailed exploration of various aspects of postnatal care to develop postnatal care. Further studies focusing on foreign-born women's experiences of postnatal care are warranted.

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## KEYWORDS

Postnatal care; psychometric evaluation; principal component analysis; midwifery; reliability; validity

## Introduction

The World Health Organization has published updated global recommendations about postnatal care for a positive experience. These recommendations comprise a lot of recommendations, e.g. assessment of physical and emotional health, skills and confidence, information provision, and home visits (WHO recommendations on maternal and newborn care for a positive postnatal experience, 2022). A recent scoping review, based

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on these recommendations, where 62 scientific articles were scrutinised, identified gaps in the validity and quality of studies in postnatal care (Galle et al., 2023).

Several authors have developed instruments aimed at measuring the quality of postnatal care (Leahy-Warren et al., 2019; Peters et al., 2021; Smith, 2011). German researchers (Peters et al., 2021) developed an instrument named Measurement of Midwifery quality postpartum (MMAYpostpartum), that measures the quality of midwifery care, based on women's views. The instrument comprises three subscales: Personal control, Trusting relationship and Orientation and Security. Midwives in Germany mostly provide postpartum care in women's homes, up to nine weeks after birth, a time period much longer than the first week after birth which is the norm in Sweden.

Leahy-Warren et al. (2019) developed the Perinatal Infant Care Social Support (PICSS) instrument that measures postnatal social support. The instrument was tested on 371 first-time mothers in Ireland. The instrument showed two factors: Supporting presence and Practical support. Personal and professional support was extended to include friends, siblings, neighbours, midwife, general practitioners, and community nurses. The wording in the instrument indicates women's reassurance of support in case of needing it, e.g. 'I can get information on infant care', but also directed questions to explore if women actually got specific support and, in that case, from whom.

In 2011 Smith developed and tested a multidimensional maternal satisfaction questionnaire, the Women's Views of Birth Labour Satisfaction Questionnaire (WOMBLSQ). This questionnaire contains 36 items with 12 dimensions of postnatal care, e.g. different aspects of support, care from General Practitioners or health visitors, advice on contraception, continuity and home visits. All these instruments have pros and cons that needs to be taken into account before translating and using them in other care contexts. Swedish postnatal care is usually short, with healthy mothers and babies being discharged within 6–24 hours. During this short stay a lot of information is provided before discharge. The hospital is responsible for postnatal care in the first week after birth, thereafter child health nurses take over, although women have health check-ups with their antenatal midwife after birth. Postnatal home visits are only offered in a few places in Sweden.

Previous studies have highlighted factors important for being satisfied with postnatal care.

Among these are sufficient information and advice (Barimani & Vikstrom, 2015; I. M. Hildingsson & Sandin-Bojo, 2011; Waldenström et al., 2006), the possibilities for the partner to be involved in the care and stay overnight (I. M. Hildingsson, 2007; I. Hildingsson et al., 2009; Johansson, Hildingsson, et al., 2013; Johansson, Rubertsson, et al., 2013; Nilsson et al., 2015), possibilities to stay with the baby at the neonatal ward (Rudman & Waldenstrom, 2007), and physical and emotional health measures (Barimani, 2012; Hildingsson & Sandin-Bojö, 2011). A national longitudinal cohort study conducted in Sweden, with 2686 women assessing their satisfaction with postnatal care, showed that items such as 'insufficient time allocated to hands-on breastfeeding, lack of encouragement from staff, and insufficient time for own questions were associated with less satisfaction with postnatal care (Waldenström et al., 2006).

In a regional Swedish study with 1240 recruited women followed up two months after birth, the most important factors for being satisfied with postnatal care were sufficient check-ups of the baby, support and good treatment by staff, as well as information about

the baby's needs. In addition, primiparas valued information about physical changes and hands-on breastfeeding, while multiparas highlighted the importance of information about the emotional changes after birth, and practical instructions about how to take care of the baby (I. M. Hildingsson & Sandin-Bojo, 2011).

Although previous researchers have developed instruments measuring the quality of postnatal care, based on women's experiences and views, these instruments are mainly country-specific. Differences in the Swedish postnatal context and the variety of professionals providing postnatal care, pose challenges for using these instruments. There are, however, previously developed instruments based on Swedish postnatal women's views. The aim of this study was to explore the underlying structure of a previously developed postnatal questionnaire and to identify components with sufficient items to ensure adequate internal consistency.

## Material and methods

### *Design and setting*

A descriptive cross-sectional study carried out in two Swedish hospitals during 2017. The annual birth rate in the hospitals is around 2500. The larger hospital has a traditional postnatal ward, primarily for women with complicated pregnancies and births, alongside a hotel ward. The hotel ward also hosts surgical patients and is staffed by nurses during daytime, but not midwives. The midwives on the postnatal ward make daily telephone calls to the parents at the hotel ward, and in addition, to all discharged women during the first five days after birth. If the baby needs neonatal care, co-care at the neonatal ward is available. The smaller hospital has a postnatal ward. Partners can usually stay overnight in both hospitals.

### *Recruitment of participants*

After identifying women who gave birth during the first six months of 2017, through the hospitals' electronic databases, and who mastered the Swedish language or the five most common languages in the area (English, Dari, Arabic, Somali and Tigrinya), women were sent a questionnaire with a pre-paid envelope. Exclusion criteria were women speaking other languages or had had a stillbirth. A single reminder was sent to non-responsive women after 4–6 weeks after the initial distribution. Women consented to the study by returning the questionnaire.

### *Questionnaire*

The questionnaire contained information about women's background characteristics (age, marital status, country of birth, level of education and parity). In addition, a 21-item self-administered battery of questions, originally developed in Australia (Brown & Lumley, 1998), adapted to a national cohort of Swedish-speaking women (Waldenström et al., 2006), and previously used in the same hospitals as the present study (xxx; xxxx; xxxxx), assessed the content of postnatal care (information, practical issues, organisational issues, and women's experiences of treatment

by the staff). The instrument was thereafter labelled, the *Early Postnatal Questionnaire* (EPQ). Women responded to the items on Likert scales ranging from 1 to 5 for each item, where 1 represents 'Very dissatisfied' and 5 'Very satisfied'. For some of the detailed questions there was also an option to tick the alternative 'Did not receive information/practical help'. These options were omitted from the analysis.

## Analysis

Descriptive statistics were used to present the data. Percentages and mean (SD) for each of the 21-items were calculated. Thereafter, the 21-item EPQ instrument assessing the content of postnatal care underwent a principal component analysis (PCA) with oblimin rotation, with the purpose to identify underlying components (Pallant, 2020). The Kaiser Meyer Olkin (KMO) measure of sampling adequacy was used to assess data factorability (Kaiser, 1970). A KMO-value exceeding 0.6 is regarded adequate when also Bartlett's test of sphericity is statistically significant (Bartlett, 1954). In this dataset, the KMO value was .868 and Bartlett's test of sphericity reached statistical significance ( $<0.000$ ), which supported the sample factorability and adequacy. The number of components was guided by three rules: Kaiser criterion (Kaiser, 1970), Cattell's scree test and inspection of the scree plot (Cattell, 1966), and Horn's parallel analysis (Horn, 1965; Watkins, 2000). In the parallel analysis the eigenvalues in the present study were compared with a random dataset of similar size (Watkins, 2000). All items in the instrument that had a loading above 0.40 were included. Cronbach's alpha coefficients were calculated for each of the components to assess reliability (Pallant, 2020). Finally, for exploring associations between the components and women's background characteristics, mean scores and standard deviations were calculated using independent t-tests or ANOVA. The Statistical Package of Social Science (SPSS) version 27 (SPSS, Inc., Chicago, U.S.A.) was used to analyse and manage the data. The study was approved by the Regional Ethics committee Dnr 2017-442-31.

## Results

In total 483 of 1061 questionnaires were returned (45.5%). Table 1 shows that most participants was 25–35 years old, living with a partner and born in Sweden. Just more than half had a university education (53%) and a fairly similar proportion had previously given birth (52%).

In Table 2, a detailed presentation of the percentage of scores on the *Early Postnatal Questionnaire* (EPQ) is shown, with the mean value and standard deviation for each item. The highest scores (most satisfied) were treatment from staff, check-ups of the baby, partners' possibilities to stay overnight, support from staff, and encouragement by staff. All these variables showed that more than 50% of the women reported being 'very satisfied'. The items that women were least satisfied with were the visiting options for close friends and relatives (5.3% very dissatisfied), the partner's possibility to stay overnight (4.6% very dissatisfied), information about breastfeeding (4.6%) and hand-on breastfeeding (4.0%).

Table 3 presents the result of the Principal Component Analysis (PCA) of the content of the Early Postnatal Questionnaire (EPQ), with pattern matrix and structure matrix.

**Table 1.** Background of the participants.

	Women in the project n = 483 n (%)
<b>Age (mean,sd)</b>	30.12 (4.66)
<b>Age groups</b>	
17–24 years	53 (11.3)
25–35 years	346 (73.9)
35 years or more	69 (14.7)
<b>Civil status</b>	
Living with a partner	465 (96.3)
Not living with a partner	18 (3.7)
<b>Country of birth</b>	
Sweden	412 (85.3)
Other country	71 (17.1)
<b>Level of education</b>	
High school or lower	220 (46.8)
University education	250 (53.2)
<b>Parity</b>	
Primiparas	231 (47.9)
Multiparas	251 (52.1)

The factorability of the dataset was confirmed with a KMO value of 0.899, Bartlett's test of sphericity was significant ( $p < 0.01$ ). Initially, the PCA revealed four components with eigenvalues more than 1, explaining 55.73% of the variance. Both the screeplot and the parallel analysis, however, only supported a three-component solution to be retained. In all 53.54% of the variance was explained with the three-component solution. Oblimin rotation of the three-component solution showed distinct patterns with most items loading strongly on only one component (see Table 3). The correlations among the components were low to moderate (0.35, 0.42, 0.55), suggesting that the three components should not be combined to form a total score.

The content of the first component contained 9 items and was mainly related to information about health information (physical and emotional), breastfeeding and how to take care of the baby. The second component included 7 items that comprised the postnatal environment (possibilities to rest, the physical environment, visiting hours for family and friends, partner being able to stay overnight and the help with the baby). The third component with 4 items covered caring aspects from the staff (being treated nicely, encouragement and support and check-ups of the baby), (Table 3). The item "Involvement of partner" was omitted due to low loading.

### Components of the Early Postnatal Questionnaire (EPQ)

The three components were labelled *Information* [Mean 28.18, SD 9.69], *Postnatal environment* [Mean 19.62, SD 5.40] and *Caring relationships* [Mean 20.86, SD 3.97]. The first component yielded a Cronbach alpha value of 0.876, the second 0.879 and the third 0.762.

All socio-demographic background variables listed in Table 1 were subjected to an Analysis of Variance (ANOVA), to study women's background characteristics in relation to the components of EPQ. The only sociodemographic background variable that was statistically significant in all three components was being born in a country outside Sweden. Foreign-born women scored higher (more positively), compared to women born in Sweden.

**Table 2.** Percentages and mean values of the 21-items of the Early Postnatal Questionnaire.

Items	Neither satisfied nor dissatisfied			Mean (SD)
	Very dissatisfied	Dissatisfied	Satisfied	
Information about physical changes after birth	1.3	4.8	40.0	2.57 (1.42)
Information about emotional changes after birth	1.9	6.9	32.0	2.95 (1.59)
Information about breastfeeding	4.6	9.4	33.5	2.62 (1.41)
Information about sexual life after birth	1.9	5.2	22.5	3.30 (1.74)
Information about pelvic exercises after birth	2.5	9.8	25.4	3.41 (1.73)
Information about the baby's needs	0.8	2.9	42.6	2.41 (1.34)
Medical check-ups of the woman	2.9	11.1	38.6	2.27 (1.09)
Medical check-ups of the baby	0.8	2.9	31.5	1.53 (0.77)
Practical information about how to take care of the baby	0.4	4.2	33.5	3.13 (1.75)
Hands-on breastfeeding	4.0	7.7	28.6	3.06 (1.76)
Partners' possibilities to be involved in the care	1.7	4.2	37.9	2.24 (1.19)
Partners' possibilities to stay overnight	4.6	6.2	18.5	51.6
Treatment from staff	1.2	3.7	28.0	60.2
Support from staff	2.1	4.6	30.7	51.5
Encouragement	2.7	3.3	29.5	1.75 (0.96)
The postnatal environment	1.0	4.6	49.6	50.8
The food at the postnatal ward/hotel suite	0.2	5.5	36.1	28.5
Help with the baby	2.9	6.3	28.5	2.00 (0.85)
Possibilities to rest and not being disturbed	3.1	5.8	32.8	16.0
Visiting possibilities for partner and the baby's siblings	0.4	2.1	24.0	21.7
Visiting possibilities for close friends and relatives	5.3	4.8	13.9	2.98 (1.75)
				36.2
				2.31 (1.98)
				41.3
				2.66 (1.98)
				10.3
				4.37 (1.90)

**Table 3.** Result of the principal component analysis of the Early Postnatal Questionnaire (EPQ).

Items	Pattern matrix			Structure matrix		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
Information about emotional changes after birth	<b>0.790</b>		0.112	<b>0.747</b>	0.277	-0.300
Information about sexual life after birth	<b>0.762</b>			<b>0.737</b>	0.287	-0.318
Practical information about how to take care of the baby	<b>0.755</b>			<b>0.750</b>	-0.303	-0.355
Information about the baby's needs	<b>0.706</b>		-0.153	<b>0.768</b>	0.279	-0.490
Information about pelvic exercises after birth	<b>0.670</b>			<b>0.629</b>	0.204	-0.256
Information about physical changes after birth	<b>0.663</b>	-0.117	-0.117	<b>0.679</b>	0.173	-0.400
Information about breastfeeding	<b>0.617</b>		-173	<b>0.705</b>	0.301	-484
Hands-on breastfeeding	<b>0.552</b>		-209	<b>0.633</b>	0.327	
Medical check-ups of the woman	<b>0.446</b>	0.350		<b>0.590</b>	0.322	-0.492
Partners' possibilities to stay overnight		<b>0.755</b>		0.165	<b>0.695</b>	-0.200
Visiting possibilities for partner and the baby's siblings		<b>0.680</b>		0.234	<b>0.693</b>	-0.334
Visiting possibilities for close friends and relatives		<b>0.647</b>		0.184	<b>0.620</b>	-0.219
Possibilities to rest and not being disturbed	0.115	<b>0.562</b>	-0.191	0.415	<b>0.684</b>	-0.485
The environment on the postnatal ward/hotel suite		<b>0.548</b>	-0.323	0.312	<b>0.666</b>	-0.529
The food at the postnatal ward/hotel suite	0.244	<b>0.442</b>		0.366	<b>0.498</b>	-0.231
Help with the baby	0.278	<b>0.413</b>	-0.310	0.583	<b>0.644</b>	-0.623
Partners' possibilities to be involved in the care	0.268	0.343	-0.277	0.532	0.557	-0.556
Treatment from staff			<b>0.864</b>	0.427	0.387	-0.868
Support from staff			<b>0.862</b>	0.524	0.437	-0.920
Encouragement			<b>0.853</b>	0.491	0.462	-0.907
Medical check-ups of the baby			<b>0.639</b>	0.367	0.260	-0.655
Chronbach alpha values	<b>0.876</b>	<b>0.762</b>	<b>0.879</b>			

Note: Bold values indicate major loadings.

## Discussion

The focus of this study was to psychometrically test the *Early Postnatal Questionnaire* (EPQ) and identify underlying components in the instrument. The analyses resulted in three distinct components. The Cronbach's alpha values for the components of the EPQ were 0.876, 0.879 and 0.762, suggesting good internal consistency and reliability. The correlation between the three components was moderate, and the recommendations suggesting they should not be combined to form a total score, was followed (Pallant, 2020). The selection of items to be retained for rotation, was guided using a parallel analysis (Horn, 1965). This method has been identified as one of the most reliable indicators of robust factors or components (Choi et al., 2001; Stober, 1998) compared to other approaches, such as Kaiser's criterion and Cattell's scree test which tend to over-estimate the number of components (Zwick & Velicer, 1986).

The first component *Information* mirrors the content of all the information midwives usually provide during the short postnatal stay, and also hands-on breastfeeding. Information provision is one of the major aspects recommended by the WHO for having a positive postnatal experience (Who, 2022), and also found important in various studies (Barimani & Vikstrom, 2015; I. M. Hildingsson & Sandin-Bojo, 2011; Waldenström et al., 2006).

The second component, *Postnatal environment* comprised aspects such as visiting possibilities, the food and the environment of the postnatal ward, as well as being able to rest and get help with the baby. Similar aspects have been acknowledged by women and their partners, as being important for being satisfied with postnatal care



(I. M. Hildingsson, 2007; I. Hildingsson et al., 2009; Johansson, Rubertsson, et al., 2013; Nilsson et al., 2015; Waldenström et al., 2006).

Finally, the third component *Caring Relationship* covered items related to the treatment from the staff, encouragement, and support. These aspects were also those that generated the highest satisfaction scores, when the items were analysed one by one, with more than 50% scored being 'very satisfied' with these aspects. A previous study in one of the hospitals in the present study, conducted in 2004 with 294 women and 280 partners, showed that many parents were dissatisfied with postnatal care, 28% with the medical aspects of care, 50% with the emotional aspects of care and 34% with the overall assessment of postnatal care (I. M. Hildingsson, 2007). Of major importance to explain the overall dissatisfaction were if staff perceived as being unhelpful and unfriendly, and dissatisfaction with support from staff. During that period, there were limited opportunities for new fathers to stay overnight, so there has been improvement in postnatal care since then (I. M. Hildingsson, 2007). The staff levels also improved, with the majority of midwives currently rotating between the labour ward and the postnatal ward. In other countries it has been reported that if the staff-patient ratios have been inadequate, midwives have reported higher levels of stress (Forster et al., 2006).

The only background characteristic that differed in mean scores, for all three components, was being born in a country outside Sweden, where foreign-born women scored more positively in all three components. This is in contrast to the large national Swedish survey, where it was found that foreign-born women were more likely to be dissatisfied with postnatal care (Waldenström et al., 2006). In the national survey, however, the questionnaires were directed to women who mastered the Swedish language, and it was not translated to any other language. It is well known that foreign-born women living in Sweden are exposed to adverse birth outcome (Behboudi-Gandevani et al., 2022; Ekéus et al., 2011; Essén et al., 2000), and previous studies have shown that they are often dissatisfied with postnatal care (Rudman & Waldenström, 2007). We do not know if staff on the postnatal wards under study had undergone specific education or were culturally sensitive, or what impact the translation of the questionnaire had on the response rate from foreign-born women. The translated questionnaire was sent out to 184 foreign-born women and returned by 71 (38.6%). There were no returned questionnaires from Somali-speaking women. Given these findings it is important to carry out cross cultural studies, as postnatal care is certainly a phenomenon that is extremely dependent on the social and cultural characteristics of each country.

This study is limited by the observational design and the self-reported nature of the instrument which restricts the generalisability. Another limitation is the lack of evidence of convergent validity. Even if another measure of postnatal care was not used in the present study, the content of the components has been identified in several previous studies (I. M. Hildingsson, 2007; I. M. Hildingsson & Sandin-Bojo, 2011; I. Hildingsson et al., 2009). Another limitation is the relatively low response rate of 45.5% even after a single reminder, is another limitation. Although the proportion of foreign-born women was less than 20%, despite the efforts to include women with different languages, this might have caused an underrepresentation of women foreign-born women (Behboudi-Gandevani et al., 2022; Chen et al., 2023). Nevertheless, it is important to focus more in-depth in this group, as being born in another country than Sweden was the only background characteristic associated with postnatal satisfaction. It is also important to remember that

other circumstances, such as the birth outcome or the birth experience are factors associated with satisfaction with postnatal care. This will be at focus in a coming paper.

## Conclusion

The results of this study suggest that the instrument EPQ is a psychometrically useful tool, suitable for both research and clinical settings. The three-component structure provides researchers with the opportunity to conduct a more detailed exploration of various aspects of postnatal care in order to develop postnatal care. Further studies focusing on foreign-born women's experiences of postnatal care are warranted.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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