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Clusters of Experiences of Childbirth Postnatal Women: A Study in a Japanese Population

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Abstract

Background: The Japanese version of the Multidimensional Assessment of Women's Experiences of Childbirth (MAWEC) can be used to evaluate childbirth experiences in all modes of delivery. Identifying clusters of postnatal women based on their perceived childbirth experiences is clinically relevant. **Objective:** To determine clusters of experiences of postnatal women using the MAWEC. **Methods:** The MAWEC was distributed to women (n = 759) undergoing obstetric examination in the first month after delivery. A two-step cluster analysis was performed using the scores on the four MAWEC subscales. The validity of these clusters was examined in association with other clinical variables. **Results:** Two clusters were identified: good and poor childbirth experiences. The latter group had higher rates of Caesarean section, non-rooming-in, and non-breastfeeding than the former group. With the cutoff of the MAWEC total score, the sensitivity and specificity were 0.85 and 0.86, respectively. **Conclusion:** This study identified a cluster of postnatal women with poorly perceived childbirth experiences who may require professional attention and care.

Keywords

Childbirth Experience, Cluster Analysis, Multidimensional Assessment of Women's Experiences of Childbirth

1. Introduction

It is important for women to experience childbirth positively. Childbirth experiences affect mothers' self-esteem [1], mother-infant interactions [2] [3], mother-infant wellbeing, maternal perceptions of early infant temperament [4], and postpartum depression [5]. Additionally, it influences subsequent mother-child bonding [6] and hopes for the next pregnancy [7] [8]. Therefore, positive childbirth experiences are important health issues for mothers. The World Health Organization [9] announced delivery period care for positive childbirth experiences, aim-

ing at caring for women to have a positive childbirth experience.

Women's Childbirth Experience

Women who gave birth recapture their childbirth experience by reflecting on it with a family member or others (e.g., a midwife). This includes a childbirth review. The factors that influence the childbirth experience depend on the individual values each woman places on what she values of the childbirth experience in her own way. Therefore, perinatal health professionals should ask women about their experiences and understand their perceptions. Although many self-rating measures evaluate perceived childbirth experiences, most are limited by the delivery state. For example, the rate of Caesarean sections in Japan is 23% [10]. Therefore, a self-assessment scale for childbirth experiences in all delivery modalities is necessary for clinical use. One candidate for such a measure is the Multidimensional Assessment of Women's Experience of Childbirth (MAWEC) [11], which has been translated into Japanese [12]. A previous study identified a four-factor structure. This scale helps nurses assess how mothers perceive and feel about their childbirth experience and quickly understand the care required for them.

Identifying a group of postnatal women with poor childbirth experiences is of clinical interest so that perinatal health professionals can recognize the target of women who need prompt nursing intervention. This study aimed to identify clusters of postnatal women with poor childbirth experience and examine the cutoffs of the MAWEC Japanese version as a screening instrument.

2. Materials and Methods

2.1. Study Procedures

This study was conducted between October 2019 and August 2020. In total, 298 regional perinatal maternal and childcare centers in Japan were invited to participate in this study. A total of 990 questionnaires were distributed to women who underwent an obstetric examination in the first month after childbirth.

The inclusion criteria were women who had given birth in the previous month. Women aged <18 years, those with severe mental disorders, or those with stillbirths were excluded from this study. Of the women approached, 841 (85%) voluntarily completed and returned the questionnaires. Questionnaires with missing MAWEC items were excluded using a listwise approach, resulting in 759 (77%) valid responses. The mean (standard deviation [SD] and range) age of the women was 31.9 (5.3, 18 - 46) years. In terms of parity, 353 (47%) were primiparous, 384 (51%) were multiparous, and 22 (3%) were of unknown parity. With respect to the educational level attained, 227 (30%) had graduated from high school; vocational school or junior college (296 [39%]); university or college (188 [25%]); graduate school (21 [3%]); and other education or no response (27 [4%]). Of these, 469 (62%) were employed (including those on maternity leave), 289 (38%) were unemployed, and 1 had an unknown occupation. Of the participants, 455 (60%) had vaginal delivery, 69 (9%) had vacuum evacuation, 85 (11%) had emergency

Caesarean sections, 149 (20%) had planned Caesarean sections, and 1 had an unknown delivery style.

2.2. Measurements

The MAWEC is a measure of the perceived experience of childbirth [11] [13]. The question starts with the question "How do you feel about your childbirth?" Followed by a questionnaire statement, which required responses using 20 adjectives rated on a 7-point Likert scale (e.g., disappointed = 1, not disappointed = 7). The position of positive and negative extremes (left or right) was randomized for each item. Scores for each item were reversed so that higher scores indicated a more positive feeling. The total score was calculated by subtracting 20, resulting in a score range of 0 to 120. Higher scores indicate a more positive perception of the childbirth experience. The Japanese version of the MAWEC revealed four factors: positive emotion, positive coping, negative emotion, and negative coping. Positive emotions include joy and happiness, whereas negative emotions include disappointment and depression. Coping factors include perceived mastery of the environment, self-esteem, confidence, energy, and perceptions. The MAWEC scale can be used as a tool for postpartum reviews, as it objectively clarifies which aspects of the childbirth experience a woman values most.

2.3. Demographic and Clinical Information

The participants' age, partners' age, educational level, and employment status were recorded. Obstetric, neonatal, and feeding information of the participants was extracted for this study. The feeding method was measured using the following options (1 = exclusively breastfed, 2 = primarily breastfed, 3 = breastfed and formula-fed, 4 = primarily formula-fed, 5 = fully formula-fed). Whether the birth was as expected ("how did the birth compared with what you thought it would be?") was also asked using the following options (1 = same, 2 = almost the same, 3 = somewhat different, 4 = very different).

2.4. Data Analysis

Patients with no missing MAWEC values were included in the statistical analyses. To explore whether the women in the sample could be divided into two or more groups (categories), I performed a two-step cluster analysis with the scores of the four MAWEC sub-scales. If two clusters are found, my interest is to identify the most suitable cutoff point using the total MAWEC score. The silhouette index was used to determine the accuracy of the clusters, and a silhouette index of ≥ 0.5 was considered to have good accuracy.

The clinical validity of the clusters was examined by comparing the scores of the clinical variables between the identified clusters. This was conducted by either the χ^2 test or analysis of variance (ANOVA). The alpha level was set at $p < 0.001$ for multiple comparisons.

Receiver operating characteristic (ROC) curve analysis was used to estimate the screening ability of each MAWEC item in identifying women with fewer positive

childbearing experiences. To confirm the validity of the clusters, ANOVA was performed between the identified clusters in terms of the other variables. To estimate the area under the curve, ROC curves were drawn using the total MAWEC scores of the women at 1 month postpartum. The optimal cutoff was then determined. Using the Yuden Index Score [14], the score that maximized the sum of the sensitivity and specificity was selected as the optimal cutoff score. SPSS version 27 was used for statistical analyses.

2.5. Ethical Considerations

This study was approved by the Institutional Review Board of Iwate University of Health Sciences Nursing Research (approval no. Iwa19-1) and was conducted in accordance with the Declaration of Helsinki. The participants were provided with a leaflet explaining the study, and written consent was obtained by completing and submitting the questionnaire. Participation was voluntary, and the participants were informed that refusal to participate would have no consequences and that they could withdraw from the study at any time. The questionnaires were anonymous to protect the participants' privacy.

3. Results

Two-step cluster analysis resulted in two clusters: one containing 621 (82%) participants and the other containing 138 (18%) participants. The silhouette index was 0.5, which is good for the cluster accuracy. There was a difference between the two clusters in the scores for positive emotion, positive coping, and negative emotion; however, there was no difference in the scores for negative coping. Cluster 2 comprised a small number of 138 (18%) participants. Women in this cluster scored significantly lower on positive emotion, positive coping, and negative emotion. This implies that they perceive their current childbirth more negatively. Notably, the higher the negative emotion score, the *less* negative emotions they experienced. The mean (SD) total MAWEC scores were 87.5 (11.3) and 59.4 (14.7) for the first and second clusters, respectively.

Table 1. The scores of the Multidimensional Assessment of Women's Experiences of Childbirth subscale based on clusters ($n = 759$).

	Total	Cluster 1 ($n = 621$)	Cluster 2 ($n = 138$)	One-way analysis of variance
	Mean (SD)	Mean (SD)	Mean (SD)	F
MAWEC total score	82.4 (16.2)	87.5 (11.3)	59.4 (14.7)	618.97***
Subscale				
Positive emotion	43.0 (8.1)	45.7 (3.2)	31.1 (12.0)	696.37***
Positive coping	31.6 (8.7)	33.0 (8.0)	24.8 (8.7)	115.93***
Negative emotion	19.3 (3.0)	20.3 (1.4)	14.9 (4.0)	716.40***
Negative coping	19.3 (3.0)	8.5 (3.8)	8.6 (4.5)	0.01

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 2. Associations between the clusters of MAWEC (n = 759).

Correlates	Cluster 1 (n = 621)	Cluster 2 (n = 138)	Chi-squared/analysis of variance
Perinatal features			
Parity			
Primipara (n = 353)	285 (80.7%)	68 (19.3%)	1.23
Multipara (n = 384)	322 (83.9%)	62 (16.4%)	
Infertility treatment			
Yes (n = 119)	88 (73.9%)	31 (26.1%)	6.06*
No (n = 639)	533 (83.4%)	106 (16.6%)	
Delivery style			
Vaginal delivery (VD, n = 455)	390 (85.7%)	65 (14.3%)	26.88***
Vacuum extraction (VE, n = 69)	58 (84.1%)	11 (15.9%)	
Planned Caesarean (PC, n = 149)	119 (79.9%)	30 (20.1%)	
Emergency Caesarean (EC, n = 85)	53 (62.4%)	32 (37.6%)	
Pain	1.83 (1.4)	2.31 (2.0)	11.223***
Postnatal laceration/wound pain			
Yes (n = 646)	521 (80.7%)	125 (19.3%)	3.84*
No (n = 112)	99 (88.4%)	13 (11.6%)	
Type of wound			
Perineal laceration pain			
No (n = 533)	429 (80.5%)	104 (19.5%)	2.06
Yes (n = 225)	191 (84.9%)	34 (15.1%)	
Episiotomy pain			
No (n = 509)	412 (80.9%)	97 (19.1%)	0.76
Yes (n = 249)	208 (83.5%)	41 (16.5%)	
Caesarean section pain			
No (n = 536)	457 (85.3%)	79 (14.7%)	14.77***
Yes (n = 222)	163 (73.4%)	59 (26.6%)	
Nipple wound pain			
No (n = 549)	449 (81.8%)	100 (18.2%)	0.00
Yes (n = 209)	171 (81.8%)	38 (18.2%)	
Attended by family			
Yes (n = 355)	296 (83.4%)	59 (16.6%)	1.15
No (n = 397)	319 (80.4%)	78 (19.6%)	
Neonate and feeding features			
Infant weight			
< 2500 g (n = 95)	72 (75.8%)	23 (24.2%)	3.06
≥ 2500 g (n = 662)	547 (82.6%)	115 (17.4%)	
Rooming-in			
Yes (n = 693)	585 (84.4%)	108 (15.6%)	41.00***
No (n = 62)	32 (51.6%)	30 (48.4%)	
Formula feeding			*One-way ANOVA* (F)
	2.25 (1.0)	2.51 (1.0)	7.522**
Consistent with forecasts	2.22 (0.9)	2.7 (1.0)	29.84***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Standard deviations are presented in brackets.

The mean (SD) ages of the participants were 31.7 (5.4) and 33.1 (5.1) years for the first and second clusters, respectively (Table 1).

This was higher in cluster 2 than in cluster 1 ($F = 8.03$, $p < 0.01$). Partner's age and mother's education did not differ between the two clusters. The two clusters did not differ in rates of parity or infertility treatment. However, they significantly differed in terms of the delivery style. Vaginal, vacuum, planned Caesarean, and emergency Caesarean deliveries accounted for 14%, 16%, 20%, and 38%, respectively, among cluster 2 women. The number of women who complained of pain was significantly ($p < 0.001$) higher among cluster 2 women than among cluster 1 women. The proportion of women who complained of postnatal laceration/wound pain did not differ between the two clusters. Nevertheless, differences emerged in the rate of pain complaints for the different types of lacerations/wounds. Thus, the cluster did not differ in terms of the rate of pain related to perineal laceration, episiotomy, and nipple wounds; it was higher among cluster 2 women than among cluster 1 women in terms of Caesarean section (planned and emergency combined) pain. These were 15% and 27% for clusters 1 and 2, respectively. Cluster 2 women were significantly higher in the rate of "rooming-in" and scored significantly higher in formula feeding than cluster 1 women (Table 2).

Because both the rates of postnatal wound pain and emergency Caesarean section were higher among cluster 2 women than among cluster 1 women, we then examined whether there were interactive terms (Table 3).

Table 3. Emergency Caesarean section and laceration/wound pain (n = 758).

Correlates	Cluster 1 ($n = 621$)	Cluster 2 ($n = 138$)	Chi-squared
Postnatal laceration/wound pain			
With pain ($n = 646$)			
No emergency Caesarean ($n = 570$)	474 (83.2%)	96 (16.8%)	20.21***
Emergency Caesarean ($n = 75$)	46 (61.3%)	29 (38.7%)	
Without pain ($n = 112$)			
No emergency Caesarean ($n = 102$)	92 (90.2%)	10 (9.8%)	3.62
Emergency Caesarean ($n = 10$)	7 (70.0%)	3 (30.0%)	

Notably, one woman did not provide information regarding her delivery style. Cluster 2 rates differed only among women with postnatal laceration/wound pain. Therefore, the rate in cluster 2 was significantly higher when women experienced both emergency Caesarean section and postnatal laceration/wound pain.

An ROC curve was generated using the total MAWEC score (Figure 1).

The cutoff point closest to the upper left corner of the ROC curve was selected as the optimal cutoff, which was used as the cutoff point; the area under the curve was 0.934. The highest Youden index value was 0.709, and the total MAWEC score was 75.5. The highest classification score was 75/76. The sensitivity and specificity were 0.847 and 0.862, respectively.

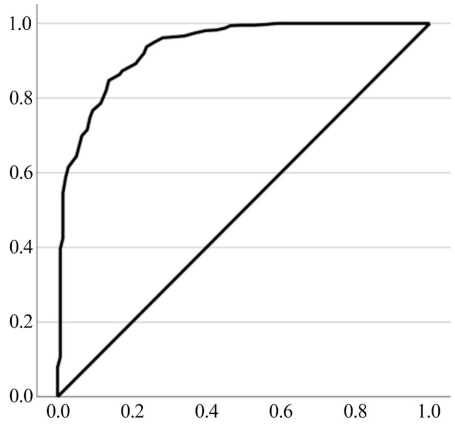

Figure 1. Receiver operating characteristic curve of the total Multidimensional Assessment of Women's Experiences of Childbirth scores (n = 759).

4. Discussion

This study identified two clusters of postpartum women based on their perceived childbirth experiences. Cluster 2 women viewed current delivery more negatively, suggesting that women in this cluster were the target of clinical attention. Although women's perceived childbirth experience may be a distinct group rather than a continuous one, taxometric analysis [15] [16] is required to rigorously examine whether it is a continuous quantity or a group.

Women in these two clusters were compared in terms of clinical correlates. The correlates that were particularly associated with cluster distinction were emergency Caesarean section, perception of pain, lack of rooming-in, and formula feeding, which have also been shown in previous studies [17]-[19].

Although emergency Caesarean section is essential to save the lives of mothers and infants, it is a surgical procedure that mothers undergo without being mentally prepared for the excruciating experience of surgery. Therefore, emergency Caesarean section may lead to post-traumatic stress disorder (PTSD) [20] [21]. Emergency Caesarean sections are also related to postpartum depression symptoms through trauma symptoms [22]. Women who give birth by emergency Caesarean section need specialized support to reduce their fear during childbirth or surgery, so as not to develop PTSD. Therefore, support from individuals such as doulas is essential [23]. In addition, nurses attending Caesarean sections should warmly support the women in labor, for example, by holding their hands or gazing at them with care.

Once an emergency Caesarean section is decided, it is necessary to explain to the pregnant woman what is going to happen and what the current situation is to reduce fear caused by unpredictability. Such women need emotional support, such as a partner or another person they choose to be with during birth, despite it being in reality difficult. However, emergency Caesarean sections are births led by perinatal medical professionals, and only perinatal medical professionals can provide support while prioritizing the lives of mothers and infants. To respond to the situation of an emergency Caesarean section, psychological support is required, such

as empathically explaining to the mother about the current situation and future plans, in addition to showcasing warmth through speech throughout the course of birthing and labor. In addition, it provides opportunities for postpartum visits, skin-to-skin contact, pain control, and breastfeeding. Medical professionals usually decide on the separation of the mother and infant, and this often depends on their discretion. It is preferable for the mother and infant to be managed in the same hospital room without being separated. The presence of primary midwives is extremely important as supporters of women during the perinatal period and delivery, in particular [24].

Among women who underwent Caesarean delivery, the perception of pain was associated with negative childbirth experiences. Hence, pain management after anesthesia is necessary. The reason why the proportion of women who had planned Caesarean sections was lower in the second cluster may be that they were prepared for pain based on their previous experience with Caesarean sections or that they were able to ask medical professionals to prescribe painkillers. Even if the wounding is the same, women who gave birth by emergency Caesarean section more often reported negative childbirth experiences than did those who planned for a Caesarean section. Painful wounds in women who give birth by emergency Caesarean section may have both physical and psychological effects. In addition to pain control, care for psychological anguish derived from pain is necessary. Given the unique culture of Japan, a view of childbirth that assigns high value to the pain of childbirth [25], women may feel that they are valuable if they give birth naturally. Nurses and other attendants require techniques for birth review to elicit a feeling of accomplishment after delivery and provide a convincing review.

The rate of "rooming-in" was significantly lower in cluster 2 women than in cluster 1 women. Skin-to-skin contact between the mother and infant enhances the mother's attachment and reduces anxiety about the infant [26]. In addition, it is the parents' motivation to assume the parent's role [27] and build the foundation for a good mother–infant relationship [28]. Parents of premature infants can help improve their abilities and self-confidence in their parental roles through kangaroo care [29].

Although it is desirable for mothers and infants to be together, this is not always easy because the mother is postoperative (Caesarean section) or the infant requires incubator management. Given that mothers are unable to walk independently, medical professionals are required to assist them in approaching their infants. Medical professionals should create an environment in which there is no separation of parents from the infants, and the infants and their families can be together immediately after the operation or at the earliest. Since postpartum rooming-in was found to influence how mothers evaluate their childbirth experience, women's childbirth experiences may encompass not only the birth itself but also the postpartum period. Perinatal care, such as postoperative pain relief and rooming-in of mother-infant, which allows mothers and their infants to spend time together, may influence postoperative coping and positive emotions and make women's

childbirth experiences more positive. An alternative explanation for this is that women with negative perception of childbirth are more likely to decline rooming-in [30]. However, this needs to be clarified in future studies.

Formula feeding was more prevalent in cluster 2 women than in cluster 1 women. Appropriate assistance from medical professionals is essential for breastfeeding. Medical professionals' perception that breast milk is essential for the mother and infant and their support of the mother based on this perception are factors that influence the mother's ability to establish breastfeeding [31]. In addition, one of the factors most strongly associated with breastfeeding for at least 6 months is daily co-sleeping [32]. In particular, women who have infants hospitalized in the neonatal intensive care unit need breastfeeding support because they cannot assume a breastfeeding position. It is difficult for mothers to breastfeed their infants in a suitable posture or cannot have sufficient opportunity if they are separated from their infants once placed in incubators. The continuous care provided by medical professionals is essential.

Classification points 75/76 obtained from the ROC curve were useful for screening the second cluster in need of clinical support. This will ensure that postpartum mothers receive appropriate support, including immediate postpartum follow-up. We hope that the care needs of postpartum women will be more visible and addressed by perinatal care workers.

5. Conclusions

This study identified a cluster of postnatal women with poorly perceived childbirth experience. This study clarified that the suitable cutoff point for the Japanese version is 75/76. Women in the second cluster are more likely to undergo Caesarean section, non-rooming-in, and non-breastfeeding than women in the first cluster. Women in the second cluster require professional attention and care.

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Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of the Iwate University of Health and Medical Sciences (19-1, date of approval: July 26, 2019).

Informed Consent Statement: Informed consent was obtained from all the participants involved in the study. Participation was voluntary, and the participants provided consent to use non-personally identifiable data in reports and publications. The survey was anonymous, and no personally identifiable data were collected.

Data Availability Statement: The dataset used and analyzed in the present study are available from the corresponding author upon reasonable request.

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Conflicts of Interest

The author declares no conflict of interest. There are no interests or disputes in this article. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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