

Designing a Scale to Assess Breastfeeding Support among Public Health Nurses in Japan

Noriko Toyama^{1,2}, Kayoko Kurihara¹, Mineko Muranaka³, Kokoro Shirai⁴, Kiyoko Kamibeppu¹

¹Department of Family Nursing, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

²Department of Global Health, Graduate School of Health Sciences, University of the Ryukyus, Okinawa, Japan

³Japanese Nursing Association, Tokyo, Japan

⁴Department of Human Sciences, Faculty of Law and Letters, University of the Ryukyus, Okinawa, Japan

Email: norikotoyama@nifty.com

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Abstract

Background: Promoting breastfeeding support by public health nurses (PHN) requires first that the support which they currently provide to be assessed. However, there is no assessment tool for this purpose. The aim of this study was therefore to develop a scale to assess breastfeeding support currently provided by PHN. **Methods:** We developed the Practice of Breastfeeding Support Scale (PBSS) for PHN based on the results of a previous study. The content validity of the PBSS was established through discussion with three other researchers. A pilot study was conducted to confirm face validity. To confirm reliability and validity, an anonymous, self-reported questionnaire was sent to PHN working in municipal offices. The statistical analyses included the Kaiser-Meyer-Olkin (KMO), Bartlett's Test of Sphericity, exploratory factor analysis (EFA), Cronbach's alpha and correlation coefficient. **Results:** 768 PHN participated in this study. Cronbach's alpha of PBSS was 0.85. The KMO measure was 0.892, and Bartlett's Test of Sphericity was $p < 0.01$. Three factors together accounted for 59.3% of the variance in EFA. Construct validity was confirmed through comparison with categories from a previous study. The correlation coefficient of PBSS and Self-efficacy of Breastfeeding Support Scale were $r = 0.56$ ($p < 0.01$). PBSS comprised 15 questions and three factors including "Collecting information and assessment," "Direct and individual support," and "Support for group and community." **Conclusion:** The reliability and validity of PBSS were confirmed. These findings suggested that the PBSS has the potential to help promote breastfeeding support by PHN by clarifying their current breastfeeding support practices and related factors.

Keywords

Public Health Nurse, Breastfeeding Support, Designing Scale

1. Introduction

A meta-analysis recently indicated that breastfeeding conferred protection against childhood infections and malocclusion, increased intelligence, and probably reduced overweight and diabetes [1]. For nursing women, breastfeeding conferred protection against breast cancer, improved birth spacing, and possibly also conferred protection against ovarian cancer and type 2 diabetes. WHO and UNICEF jointly developed the Global Strategy for Infant and Young Child Feeding with the aim of improving the nutritional status, growth, development, health, and thus the very survival, of infants and young children [2]. This strategy promoted improving access to skilled support for initiating and sustaining exclusive breastfeeding for six months.

The breastfeeding rate for 1- to 2-month-old babies was 70.5% in 1960, but dropped to 31.7% in 1970 and had remained low ever since in Japan [3]. However, after breastfeeding began to be promoted from 2000 in a national campaign dubbed, “Healthy Parents and Children 21” and the *Guide for Feeding and Weaning Infants and Young Children* were published in 2007 [4]; the breastfeeding rate for 1-month-old babies increased by 51.3% in 2015 [5]. This result also showed that 96% of mothers surveyed before childbirth were favorably disposed to breastfeeding while 77.8% of mothers experienced some uncertainty concerning breastfeeding after the birth of their child, especially in not knowing whether their breastmilk was sufficient for their babies.

Several studies showed that mothers were worried about breastfeeding after childbirth [6] [7] and that the breastfeeding rate decreased at one month after childbirth [8] [9]. These findings suggested that follow up was necessary after the mothers were discharged from the childbirth facility [10] [11] [12]. Previous studies reported that support from health workers positively influenced breastfeeding behavior [13] [14] [15]. On the other hand, other studies reported that mothers became nervous or felt ill at ease on receiving authoritarian instructions on breastfeeding from supporters or on observing their negative reaction to mothers who did not make an effort to breastfeed their child [16] [17]. Needless to say, health workers should show sensitivity to mothers when interacting with them in the capacity of a supporter.

Breastfeeding support in Japan is provided at health care facilities and municipalities where mothers receive antenatal checkups, group or individual health education, and undergo delivery. Breastfeeding support is also provided by health workers at the mothers’ home or at peer support group activities. Public health nurses (PHN), who work at municipal offices, are among the health workers providing breastfeeding support through group or individual health education and home visits. The PHN’s activities reportedly have both positive and negative influences on breastfeeding [18] [19]. Previous studies have shown that the role of the PHN in encouraging/facilitating breastfeeding fell into four categories including “Collecting information”, “Assessment”, “Direct and individual support”, and “Support for group and community”, which were further divided into fifteen subcategories including “Infant’s condition”, “Mother’s con-

dition”, “Mother-infant relationship”, “Child rearing environment”, “Mother’s state-of-mind”, “Identifying necessary support”, “Psychological support”, “Concrete support”, “Breastfeeding on demand”, “Necessary information”, “Advice to supporters”, “Introducing services”, “Breastfeeding-friendly environment”, “Breastfeeding support groups”, and “Cooperation with relevant organization” [20]. These categories were carefully vetted by a panel of experts who based their assessments on the relevant announcements of the Ministry of Health, Labour and Welfare of Japan [21] and research in public health nursing [22].

Promoting breastfeeding support by PHN requires first that the support they currently provide be accurately assessed. However, there is as yet no tool for this purpose. The aim of this study was, therefore, to develop a scale to assess current breastfeeding support by PHN.

2. Method

2.1. Study Design

We developed a Practice of Breastfeeding Support Scale (PBSS) questionnaire for PHN based on the results of a previous study [20]. The PBSS questionnaire comprised fifteen questions with four categories including “Collecting information”, “Assessment”, “Direct and individual support”, and “Support for group and community.” A likert scale ranging from 1 (never do) to 5 (always do) was chosen for its ease of use not only for the assessors but also for the respondents. The content validity of PBSS was established through discussion with three other researchers, two of whom provided family health nursing and one of whom had more than ten years’ experience as a municipal PHN. A pilot study was conducted to confirm face validity.

To confirm reliability and validity, an anonymous self-reported questionnaire, a letter explaining the study, the instructions, and a return envelope were sent to the directors of maternal and child health (MCH) divisions in all municipalities throughout Japan, who were requested to select one PHN as a respondent. The PHNs then returned the completed questionnaires to the researchers.

2.2. Participants

PHN working at municipal offices participated in this study. Though PHNs work at several divisions in municipal office, for example MCH, health promotion, mental health and long term care for elderly, only PHN working for MCH services were selected because breastfeeding support should be provided from them. To control for potential confounders, PHN without midwife qualifications and those who had five to 15 years of working experience were included. If no PHN in a given municipality met these conditions, a PHN with comparable working experience was recruited.

2.3. Data Analysis

SPSS version 23 for Windows was used. The Kaiser-Meyer-Olkin (KMO) measure was used for sampling adequacy (using a cut-off of 0.5), and Barlett’s Test of

Sphericity (using a cut-off $P < 0.01$) was used to ensure the appropriateness of the data set for exploratory factor analysis. To find the factor structure, factor analysis (principal factor method, promax rotation) was conducted. Cronbach's alpha was calculated to examine the reliability of the scale. Spearman's correlation coefficient was calculated for the PBSS and the Self-efficacy of Breastfeeding Support Scale (SBSS) total scores to confirm criterion-related validity [23]. The statistics for each variable were calculated to delineate more clearly the current breastfeeding support practices provided by PHN.

2.4. Ethical Approval

Ethical approval was obtained from the ethical review board of the Faculty of Medicine of The University of Tokyo (Clearance No. 3035).

3. Results

3.1. Characteristics of the Participants

Of the 1750 questionnaires sent, 831 were returned (response rate: 47.5%). Sixty-three were excluded from analysis due to missing data. Therefore the valid response rate was 43.9% (768). **Table 1** shows that 99.7% of the respondents were female, and that the average age was 35.5 years (SD = 6.2, range: 22 - 62). The average length of work experience was 10.7 years (SD = 5.5, range: 0 - 33). Educational background consisted of vocational school (52.1%), junior college (17.1%), university (29.8%), and graduate School (1.0%). Participants with personal childbirth experience constituted 65% of the respondents. Participants

Table 1. Characteristics of participants ($n = 768$).

	Category	n (%)	Average \pm SD	(Range)
Sex	Male	2 (0.3)		
	Femal	766 (99.7)		
Age			35.5 \pm 6.2	(22 - 62)
Working experience			10.7 \pm 5.5	(0 - 33)
Final educational	Vocatinoal school	400 (52.1)		
	Junior college	131 (17.1)		
	University	229 (29.8)		
	Graduate School	8 (1.0)		
Childbirth experience (respondent or their partner)	Yes	499 (65.0)		
	No	269 (35.0)		
Breastfeeding experience (respondent or their partner)	Yes	496 (64.6)		
	No	272 (35.4)		
Impression of your own breastfeeding experience among person who had breastfeeding experience	Good	416 (83.9)		
	Can not say either	67 (13.5)		
	Not good	10 (2.0)		
	No answer	3 (0.6)		

with personal breastfeeding experience constituted 64.6% of the respondents and included those with partners who participated in some aspect of breastfeeding activity. Of the person who had breastfeeding experience, 83.9% of participants had good impression of their own breastfeeding experience.

3.2. Factor Analysis of Breastfeeding Support Practices

The KMO measure was 0.892, indicating sampling adequacy. Sufficient variability in the data, confirmed by Barlett's Test of Sphericity ($P < 0.01$), demonstrated the validity of the data for exploratory factor analysis.

Three factors together accounted for 59.3% of the variance. No items were excluded because of low loadings (below 0.3). Analysis produced three factors including 15 items (Table 2).

Latent variables were labeled as follows: Factor 1) Collecting Information and Assessment (7 items); Factor 2) Direct and individual support (4 items); and Factor 3) Support for group and community (4 items). The factor contribution was 5.68 for Factor 1, 2.10 for Factor 2 and 1.11 for Factor 3.

Table 2. Factor analysis on practice of breastfeeding support scale (Cronbach $\alpha = 0.85$) ($n = 768$).

	1	2	3
Factor 1: Collecting Information and Assessment ($\alpha = 0.86$)			
1) Infant's condition	0.93	-0.28	-0.01
2) Mother's condition	0.93	-0.16	0.02
4) Child rearing environment	0.80	-0.03	0.01
5) Mother's state-of-mind	0.60	0.25	0.01
6) Identifying necessary support	0.56	0.29	0.01
7) Psychological support	0.75	0.09	0.03
8) Concrete support	0.62	0.28	-0.11
Factor 2: Direct and individual support ($\alpha = 0.74$)			
3) Mother-infant relationship	0.28	0.34	0.10
9) Breastfeeding on demand	0.06	0.79	-0.14
10) Necessary information	-0.02	0.84	-0.03
11) Advice to supporters	-0.19	0.83	0.10
Factor 3: Support for group and community ($\alpha = 0.70$)			
12) Introducing services	0.12	0.31	0.35
13) Breastfeeding-friendly environment	-0.09	0.04	0.78
14) Breastfeeding support groups	0.00	-0.01	0.84
15) Cooperation with relevant organization	0.07	-0.09	0.75
Factor contribution	5.68	2.10	1.11
Cumulative contribution ratio (%)	37.9%	51.9%	59.3%

Principal factor method, promax rotation.

3.3. Reliability and Validity of the PBSS

3.3.1. Internal Consistency

Cronbach's alpha was calculated to verify the reliability of PBSS. The reliability of PBSS was 0.86 for Factor 1, 0.74 for Factor 2, 0.70 for Factor 3, and 0.85 overall.

3.3.2. Face Validity

The participants in the pilot study were 22 PHNs. The results of the pilot study showed that there were no data missing from the questionnaire and no complaints about difficulties in answering the questions.

3.3.3. Construct Validity

The three factors resulting from factor analysis were compared with four categories from a previous study on breastfeeding support by PHN: Category 1) Collecting information; Category 2) Assessment; Category 3) Direct and individual support; and Category 4) Support for group and community [20]. Factor 1 included most of the items in Categories 1 and 2, Factor 2 included most of the items in Category 3, and Factor 3 included the items in Category 4. The exceptions were one item from Category 1, "Mother-infant relationship" included in Factor 2; two items from Category 3, "Psychological support" and "Concrete support" included in Factor 1; and 1 item from Category 3, "Introducing services" included in Factor 3.

3.3.4. Criterion-Related Validity

Criterion-related validity was assessed by calculating Spearman's correlation coefficient between the PBSS total score and the SBSS total score (Table 3). A significant positive correlation was observed between the PBSS and SBSS ($r = 0.56$, $p < 0.01$).

3.4. Practice of Breastfeeding Support

The mean of the total PBSS was 4.1 (SD \pm 0.4; see Table 4). The mean was 4.6 (SD \pm 0.4) for Factor 1, 4.0 (\pm 0.7) for Factor 2, and 3.2 (\pm 0.7) for Factor 3. "Infant's condition" had the highest mean among all the items (M 4.9, SD \pm 0.4), and "Breastfeeding-friendly environment" had the lowest mean (M 2.6, SD \pm 1.0).

4. Discussion

4.1. Reliability of the PBSS

Cronbach's alpha indicated that all factors exceeded the reference value, thereby ensuring the reliability of the scale.

Table 3. The correlation coefficient between the PBSS total score and the SBSS total score ($n = 768$).

	r	p
Spearman's correlation	0.56	<0.01

Table 4. Practice of breastfeeding support scale for public health nurse ($n = 768$).

	Mean	±SD	(Range)
Factor 1: Collecting information and assessment	4.6	±0.4	(2 - 5)
1) Infant's condition	4.9	±0.4	(2 - 5)
2) Mother's condition	4.8	±0.4	(2 - 5)
4) Child rearing environment	4.6	±0.6	(2 - 5)
5) Mother's state-of-mind	4.4	±0.7	(2 - 5)
6) Identify necessary support	4.3	±0.7	(2 - 5)
7) Psychological support	4.7	±0.5	(2 - 5)
8) Concrete support	4.6	±0.7	(2 - 5)
Factor 2: Direct and individual support	4.0	±0.7	(2 - 5)
3) Mother-infant relationship	4.3	±0.8	(1 - 5)
9) Breastfeeding on demand	4.2	±0.8	(1 - 5)
10) Necessary information	4.1	±0.8	(1 - 5)
11) Advice to supporters	3.6	±1.0	(1 - 5)
Factor 3: Support for group and community	3.2	±0.7	(1 - 5)
12) Introduce services	4.0	±0.9	(1 - 5)
13) Breastfeeding-friendly environment	2.6	±1.0	(1 - 5)
14) Breastfeeding support groups	3.1	±1.0	(1 - 5)
15) Cooperation with relevant organization	3.1	±1.1	(1 - 5)
Average	4.1	±0.4	(2 - 5)

4.2. Validity of the PBSS

The validity of the PBSS was assessed in terms of content validity, face validity, construct validity, and criterion-related validity.

4.2.1. Content Validity of the PBSS

The PBSS was based on a previous study on breastfeeding support by PHN in Japan, and was revised following a discussion of the pilot study by a panel of experts to ensure content validity.

4.2.2. Construct Validity of the PBSS

The construct validity was assessed through a comparison with the categories used in the aforementioned study and the results of exploratory factor analysis. The three factors extracted were almost identical to those of the previous study and indicated construct validity. All items except two including “Mother-infant relationship” and “Introducing services” showed higher factor loadings than the other factors at greater than 0.5.

The factor loadings for “Mother-infant relationship” were 0.34 for Factor 2 and 0.28 for Factor 1. The factor loadings for “Introducing services” were 0.35 for Factor 3 and 0.31 for Factor 2. These results indicated that the items had a high likelihood of being related to “Direct and individual support” and “Support

for group and community”, respectively. On the other hand, a relationship with other factors was possible; hence the manner in which some of these questions were framed should be reconsidered.

“Psychological support” and “Concrete support” were included in Factor 1. These two factors were categorized into “Direct and individual support” in the previous study although they were closely related to “Collecting information and assessment”. Further investigation is necessary to clarify this relationship.

4.2.3. Criterion-Related Validity.

A significant positive correlation was observed between the PBSS total score and the SBSS total score demonstrating criterion-related validity for the PBSS.

4.3. Utilization of PBSS

The results of the PBSS showed that the score for “Collecting information and assessment” was higher than for other factors. However, the score for “Direct and individual support” was lower than the latter, while the score for “Support for group and community” was lowest among all the factors. In particular, the score for “Breastfeeding-friendly environment” was extremely low, indicating that the PHN did not provide satisfactory support.

A previous study which measured the self-efficacy of breastfeeding support also showed that items related to a breastfeeding-friendly environment, which required policy planning, resource mobilization, and intersectional collaboration to create, had lower average scores than other items [23]. Michibayashi suggested that long work experience as a PHN and post-graduate education were required for competent policy planning including creating projects and mobilizing resources [24]. The results of the present study might be explained by the fact that the participants were relatively young and lack the types of training or experience mentioned above.

5. Limitations

One of the limitations of this study lay in the possibility that some of the items may have been related to other factors. Therefore the manner in which some of the questions were framed should be reconsidered for future studies. Also, test-retest reliability was not confirmed in this study. Therefore further study is expected to improve the scale of practice of breastfeeding support for PHN.

6. Conclusions

The reliability and validity of the PBSS were confirmed by the results of our analyses. The PBSS comprised 15 questions and three factors including “Collecting information and assessment”, “Direct and individual support”, and “Support for group and community.” The score for “Collecting information and assessment” was higher than for the other factors; on the other hand, the score for “Support for group and community” was lowest among all the factors.

The findings of this study strongly suggested the likelihood that the PBSS

would be effective in promoting breastfeeding support by PHN by clarifying current breastfeeding support provided by PHN and the factors related to this practice.

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Conflict of Interest

We declare no conflict of interest.

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Contributions

Noriko Toyama: study design, data collection, data input, data analysis, discussion, and finalized the manuscript.

Mineko Muranaka: study design, data collection, discussion, and reviewing of the paper.

Kayoko Kurihara: study design, data analysis, discussion, and reviewing of the paper.

Kokoro Shirai: data analysis, discussion, and reviewing of the paper.

Kiyoko Kamibeppu: supervised all the processes involved in this study.

All authors read and approved the final manuscript.

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