

Psychometric Properties of Maternal Self-Efficacy Questionnaire in a Population of Iranian Mothers

Mojgan Mirghafourvand¹ · Sakineh Mohammad-Alizadeh-Charandabi^{1,2} ·
Mohammad Asghari Jafarabadi³ · Fahimeh Fathi⁴

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Abstract Self-efficacy is an important indicator of a woman's successful transition to her maternal role and an important predictor of a mother's infant care behavior. This study aimed to evaluate the validity of the maternal self-efficacy scale in Iranian mothers. This cross-sectional study was conducted on 437 newly delivered mothers who were referred to health care centers in Bonab, Iran. A simple random sampling was performed. The research instrument included maternal self-efficacy. Translation validity was performed using the forward and backward translation method. Content validity was determined in qualitative (assessment of experts' opinions) and quantitative areas using the content validity ratio (CVR) and Content Validity Index (CVI). Face validity was determined on 30 newly delivered mothers. To determine the construct validity, exploratory factor analysis was used. The reliability was determined in terms of reproducibility via Intra-class correlation coefficient (ICC) by test–retest and internal consistency (Cronbach's alpha). CVI and CVR were 0.91 and 0.94 respectively. Further, the reliability was approved both in terms of reproducibility (ICC = 0.98) and internal consistency ($\alpha = 0.89$).

Construct validity was confirmed using exploratory factor analysis (KMO = 0.90, Bartlett's test $p < 0.001$) for the scale. The findings supported the validity and reliability of the research instrument. Therefore, it is recommended that the instrument can be used in both clinical practice and research.

Keywords Validity · Reliability · Maternal self-efficacy questionnaire

Introduction

Self-efficacy is defined as an individual's belief in her/his abilities for certain levels of a specific performance (Bandura 1982). It is also defined as an individual's perception of her/his abilities when facing a particular situation and planning for a successful performance (Duprez et al. 2016). Self-efficacy is the main determinant of human behavior, affecting an individual's expectations, choices, hope, level of effort, persistence, resistance to hardships and problems, and vulnerability to depression (Sculd et al. 2015). Maternal self-efficacy refers to a mother's belief in her own abilities as an efficient mother, and is greatly influenced by her maternal sense and level of self-confidence as well as her own perception of her competence (Teti and Gelfand 1991).

The postpartum period is a transition period in which a new milestone is created by introducing a new member to the family. During this period, the mother adapts herself to postpartum changes and the new system in the family (Mortazavi et al. 2014). Self-efficacy is an important indicator of a woman's successful transition to her maternal role and an important predictor of a mother's behavior (Shorey et al., 2015). High self-

✉ Fahimeh Fathi
f.fathi1833@gmail.com

¹ Nursing and Midwifery Faculty, Midwifery Department, Tabriz University of Medical Sciences, Tabriz, Iran
² Nursing and Midwifery Faculty, Research Center of Social Determinants of Health, Tabriz University of Medical Sciences, Tabriz, Iran
³ Road Traffic Injury Research Center, Faculty of Health, Tabriz University of Medical Sciences, Tabriz, Iran
⁴ Student's Research Committee, Nursing and Midwifery Faculty, Tabriz University of Medical Sciences, Tabriz, Iran

efficacy in the mother acts as a buffer against tensions in the family including postpartum depression and infant care (Eaton 2007). Mothers with high self-efficacy are more capable of responding to different expectations of family members, and can better adapt themselves to their roles as mothers and wives (Shorey et al. 2015). Moreover, the mother's high self-efficacy has a very positive effect on children's quality of life (Kohlhoff and Barnett 2013).

Quantitative tools have been designed to evaluate maternal self-efficacy in early parenthood. Maternal self-efficacy questionnaire (MSQ) is a tool designed to measure a mother's ability to care for her infants (Teti and Gelfand 1991). This scale was developed by Teti and Gelfand and has been used in many studies (Anzman-Frasca et al. 2013; Eaton 2007). Despite the importance of maternal self-efficacy and its positive effect on the life of mothers and infants, the reliability and validity of maternal self-efficacy scale have not yet been evaluated in Iranian women's populations. Therefore, this study was aimed to validate the MSQ on the Iranian population.

Method

Participants

This methodological cross-sectional study aimed to evaluate the validity of the maternal self-efficacy scale. The scale applies a special method to measure maternal self-efficacy and mostly focuses on a mother's infant care responsibilities. The scale consists of 10 items (9 items about the mother's activity and one general item). Based on the Likert scale, each item has 4 options (1 = Much Worse, 2 = Somewhat Worse, 3 = As Good, and 4 = Better than others). Higher score indicates higher maternal self-efficacy (Teti and Gelfand 1991).

This cross-sectional study was conducted on 437 newly delivered mothers visiting the medical and healthcare centers of Bonab, Iran. Having Iranian nationality, passing 8 weeks from childbirth, no abnormal neonate, no still-birth experience, and having willingness to participate in the study were inclusion criteria. The exclusion criteria were the history of psychological diseases, and depression in pre- and during pregnancy, physical illness affecting the self-efficacy as multiple sclerosis and experience of stressful events during pregnancy and after childbirth like loss, divorce and preterm childbirth.

Sample size was estimated 437 based on the study by Khorramirad et al. and considering $d = 0.05$ around the mean postpartum depression ($m = 10.2$), and $SD = 3.82$, $\alpha = 0.05$ and $\beta = 0.1$ (Khorramirad et al. 2010).

Procedure

In this study, random sampling was performed after gaining the ethics code (5/4/9929) from the Ethics Committee of Tabriz University of Medical Sciences. Bonab is a city in East Azerbaijan Province in Iran with 3 healthcare centers and 3 health bases. The appropriate sample size was calculated proportional to the population of each health center and base, using proportional to size sampling (437). Then, mothers who were under the coverage of the centers in the first 8–10 weeks after childbirth were enlisted by referring to their health records. Those with no health record were identified through the vaccination schedule card of their infants. The cases were sorted by number. The samples were selected in random based on the quota of each center, using computer-generated random numbers (www.random.org). The researchers, then, called the cases and provided them with adequate explanations about the study and invited them to participate. They were asked to attend on a certain day and time at the respective health center. Those interested in the study but no eager to attend the centers were met face-to-face at their home by the researcher. Information about the study, methodology and confidentiality matters was provided to participants by researcher. Then, they were voluntarily included in the study after obtaining their informed consent. Data was collected through interview.

Measures

English to Persian translation (direct translation) and reverse translation of MSQ: It was initially communicated with the MSQ developer, Professor Gelfand, to achieve her consent on translating the instrument. Then, MSQ was translated into Persian through the process of Forward and Backward Translation. The inventory items were translated into Persian by two experts in both English and Persian languages. After comparison and incorporation of initial translations, it was produced a final version by two experts. Later, it was again translated into the original language by third party translator, and checked with the original MSQ, which led its translation validity to be approved.

After matching the English translation and original English version of the questionnaire and ensuring its accuracy, its content validity was determined by 10 professors, and their corrective comments were taken in relation to the rules of grammar, using the right words and placing the items. Later, Content Validity Index (CVI) was calculated relative to three indices of simplicity, relevancy and clarity, while content validity ratio (CVR) was set based on the item necessity. So if CVR of an item was less than 0.62, it would be omitted. Cases in which CVI was less than 0.79, required modifications were implemented to

correct the result and some items were also corrected and improved by applying the quantitative opinions of a panel of experts.

The initial Persian version of MSQ was tested on a sample of 30 newly delivered mothers, and its face validity and concept of the items perceived by the respondents were determined. Then, it was applied the necessary modifications to obtain the final version. The final version was completed by 30 newly delivered mothers, and the reliability was set both in terms of reproducibility via Intra-class Correlation Coefficient (ICC) by test–retest with an interval of 2-weeks and internal consistency (Cronbach's alpha).

Data Analyses

SPSS 21 software package was employed to analyze the results. To assess the questionnaire resolution, ceiling and floor effects were examined to determine the percentage of mothers who received the possible maximum and minimum scores.

Further, exploratory factor analysis was used to assess the construct validity. The 10 items approved through the process of content validity and face validity were analyzed in the factor analysis equation. In this case, the Principal Axis Factoring was applied to extract the factors, while the Varimax Rotation Method (with Kaiser Normalization) was used for rotation of the components. Kaiser-Meyer-Olkin (KMO) index, the percentage of explained variation, and Bartlett's test were employed to assess the adequacy of the model.

Results

The mean (SD) age of the studied mothers and their spouses were 28.9 (5.8) and 33.4 (5.7), respectively. About one-third of mothers and their spouses (29.7 and 30.2 %, respectively) had diploma and 56.1 % of mothers were multiparous. Infants' age were between 8 and 10 weeks. About half of the mothers (51 %) had cesarean section. More than three-fourth of participants (83.3 %) were housekeepers and about half of their spouses (53.8 %) were self-employed. According to 53.5 % of the mothers, their household income almost compensates for the household expenditures. In addition, the majority of mothers (89.7 %) and their spouses (92 %) were pleased with their infant gender and 21.5 % of pregnancies were unwanted. Half of the studied mothers (50.8 %) lived in their own house and about 50 % of them (51.3 %) had help at home. The majority of infants (97.3 %) were singleton and more than three-fourth of mothers (79.3 %) had received postpartum

care. About half of the latter group (46.7 %) had referred to public centers to receive postpartum care. (Table 1).

Written feedback of experts and professionals was obtained to qualitatively assess the instrument on the MSQ clarity and content relevance associated with the Iranian culture. Generally, the overall content of the questionnaire was confirmed through this stage. It is also worth noting that some items were also corrected and improved by applying the quantitative opinions of a panel of experts. Scores of relevance, clarity, simplicity, CVI and CVR is given in Table 2 for MSQ.

Cronbach's alpha for this scale was $\alpha = 0.89$, which assesses the internal consistency. In addition, the ICC (with confidence interval of 95 %) was calculated 0.98 (0.97–0.99), which proves if the test is repeated, it would provide same results.

To evaluate the validation of the construct, the results of exploratory factor analysis (EFA) are presented for the MSQ. In this analysis, Kaiser–Meyer–Olkin (KMO) index was calculated 0.90, which proves that it is applicable for MSQ. The results of Bartlett's test of sphericity ($p < 0.001$) are in line with KMOs. The total variance (%) for this scale was 44.92 %. All items with a minimum and maximum factor loading of 0.55 and 0.76 are placed at the right factor (Table 3).

The mean (SD) score of the maternal self-efficacy was 32.1 (4.1) (range 10–40). The results obtained from calculating the percentage of those who gained the minimum and maximum scores showed that 39 mothers (8.9 %) gained the maximum score and all mothers gained scores above the minimum.

Discussion

This study was conducted to evaluate the reliability and validity of the MSQ within the framework of newly delivered mothers in Iran. The scale consists of 9 items about infant care and one general item. The findings of this study showed that the Persian version of MSQ was an appropriate tool for measuring Iranian mothers' self-efficacy in infant care.

Content validity should be addressed as one of the most important parts in validation of an instrument. It is aimed to answer the question, "Whether the content adequately measures the defined objectives?" (Dianat et al. 2014; Karran et al. 2015). In this study to determine the content validity, it is taken the feedbacks by a panel of experts in the corresponding field. In this case, it is presented a checklist of relevance, simplicity and clarity of each item, as well as their necessity, and asked the panel to provide their opinions.

Table 1 Socio-demographic characterize of newly delivered mother's

Variable	Number	Percent	Variable	Number	Percent
Mother's age			Spouse's age		
≤25	130	29.7	≤25	33	7.6
26–35	240	54.9	26–35	249	57
≥36	67	15.4	≥36	155	35.5
Type of delivery			Parity		
Vaginal	211	48.3	Nulliparous	192	43.9
Caesarean	226	51.7	Multipara	254	56.1
Occupation			Mother's education		
Housewife	336	83.8	Elementary school	76	17.2
Employee	71	16.2	Secondary school	65	14.9
Spouse's occupation			High school	39	8.9
Worker*	68	15.8	Diploma	130	29.7
Employee	109	24.9	University	127	29.1
Shopkeeper	24	5.5	Spouse's education		
Private sector	235	53.8	Elementary school	74	16.9
Sufficiency of income for expenses			Secondary school	70	16
Completely	125	28.6	High school	40	9.2
To some extent	234	53.5	Diploma	132	30.2
Absolutely not	78	17.8	University	121	27.7
Lodging			Wanted pregnancy		
Private house	222	50.8	Yes	343	78.5
Rental home	135	30.9	No	94	21.5
Parents home [†]	80	18.3	Father's interest in fetal sex		
Mother's interest in fetal sex			Yes	402	92
Yes	392	89.7	No	35	8
No	45	10.3	Number of newborn		
Having help for childcare			Single	425	97.3
Yes	224	51.3	Twin	12	2.7
No	213	48.7	Postpartum care center		
Receiving of postpartum care			Public sector	240	46.7
Yes	348	79.6	Private sector [‡]	60	13.7
No	89	20.4	Both sectors	84	19.2

* 3 people were unemployed

[†] 2 cases lived her parents' housed and one case lived in home-governmental organization

[‡] 45 mother visited by obstetricians and 10 mother visited by midwifery and 5 mother visited by general physician

In general, the content validity of the MSQ questionnaire was examined in two qualitative and quantitative parts respectively by evaluating the experts' opinions, and calculating of Content Validity Ratio (CVR) and Content Validity Index (CVI). The original version of this tool avoids expressing the CVR and CVI values respectively for simplicity, relevance and clarity, and the content validity ratio (Teti and Gelfand 1991). Additionally, it hasn't been reported the values in other similar studies. So there is no credible source to compare the results with the present study.

The reliability is the extent to which an experiment, test, or measuring procedure yields the same results on repeated trials without measurement errors (Karran et al. 2015). In this study, the reliability was approved both in terms of reproducibility and internal consistency, which approves the internal correlation of the MSQ scale. It is worth noting that $\alpha > 0.7$ are accepted for the instrument reliability (Kobayashi 2011). Cronbach's alpha coefficients obtained from this study are consistent with previous reports of similar study on the American mothers (Teti and Gelfand

Table 2 The scores of relevancy, clarity, simplicity, CVI and CVR for MSQ

Item	Content	CVI			CVI	CVR
		Relevancy	Clarity	Simplicity		
1.	Comparison to other mothers in general, how good are you at soothing your baby when he/she is upset or distressed?	1	1	1	1	1
2.	In comparison to other mothers in general, how good are you in understanding what your baby wants or needs?	1	0.88	0.77	0.88	1
3.	In comparison to other mothers in general, how good are you at getting your baby to show-off for visitors?	0.66	0.88	0.88	0.80	0.66
4.	Compared to other mothers, how good a mother do feel you are?	0.88	0.88	0.88	0.88	1
5.	Compared to other mothers in general, how good are you at knowing what activities your baby enjoys?	1	1	1	1	1
6.	In comparison to other mothers in general, how good are you at finding things for your baby to do while doing housework?	1	1	1	1	1
7.	Compared to other mothers in general, how good are you at feeding, changing, and bathing your baby?	1	1	1	1	1
8.	Compared to other mothers in general, how good are you at making your baby understands what you want him to do?	0.66	0.77	0.77	0.73	0.88
9.	Compared to other mothers in general, how good are you at getting and keeping your baby's attention?	1	1	1	1	1
10.	In comparison to other mothers in general, how good are you at getting your baby to have fun with you?	0.77	0.88	1	0.88	0.88
	Total	0.89	0.92	0.93	0.91	0.94

CVI Content Validity Index, CVR content validity ratio

Table 3 Exploratory factor loadings for MSQ

Item	Content	Item loading
1	Comparison to other mothers in general, how good are you at soothing your baby when he/she is upset or distressed?	0.557
2	In comparison to other mothers in general, how good are you in understanding what your baby wants or needs?	0.659
3	In comparison to other mothers in general, how good are you at getting your baby to show-off for visitors?	0.654
4	Compared to other mothers, how good a mother do feel you are?	0.602
5	Compared to other mothers in general, how good are you at knowing what activities your baby enjoys?	0.708
6	In comparison to other mothers in general, how good are you at finding things for your baby to do while doing housework?	0.690
7	Compared to other mothers in general, how good are you at feeding, changing, and bathing your baby?	0.616
8	Compared to other mothers in general, how good are you at making your baby understands what you want him to do?	0.766
9	Compared to other mothers in general, how good are you at getting and keeping your baby's attention?	0.740
10	In comparison to other mothers in general, how good are you at getting your baby to have fun with you?	0.656

1991). Also, the value of ICC in this study represents the stability of the results in the event of repeating the test.

The construct validity pays whether the structure is able to measure target or not. And also to check domains and sub-domains can be used factor analysis which calculates the inter-correlations of items (Kobayashi 2011). The factor analysis indicates if these 10 items are correctly categorized. Note that Battler's test and KMO index are to assess the correlation of items before the factor analysis.

In this study, the SPSS software package was utilized to apply the exploratory factor analysis for construct validity. The output of this test shows an acceptable value of KMO and a significant level for Bartlett's test. Note that KMO index shouldn't be less than 0.5 (otherwise, it is unacceptable and negligible) (Kreif et al. 2013). The results indicate that KMO index of MSQ questionnaire represents a good factor analysis.

In Bartlett's test, the null hypothesis is total independence (sphericity) of criteria (Kreif et al. 2013). For MSQ questionnaire, the null hypothesis of data sphericity was rejected ($p < 0.05$), and the KMO was confirmed. So in general, exploratory factor analysis had the best fit to the data, and confirmed the construct validity.

The MSQ scale was used for 437 newly delivered mothers at 8–10 weeks after childbirth in Bonab, Iran in order to evaluate their self-efficacy in infant care. In order for this tool to be an acceptable and useful tool for other populations or for Iranian mothers at other times during postpartum period, and it is necessary to conduct further future assessment on different groups or at other times. In this study, the twins' infants haven't been considered as exclusion criteria and it is a limitations of this study. Thus, given that the twins' infants are a quite different challenge for maternal self-efficacy, it is suggested that future assessment be conducted in singleton and twins infants separately.

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