Research Article

Psychometric Properties of the Iranian Version of the Inventory of Functional Status after Childbirth (IFSAC)

Mojgan Mirghafourvand,[1] Sakineh Mohammad-Alizadeh-Charandabi,[2] Mohammad Asghari

Jafarabadi,[3] Azam Mohammadi,[4] and Sedigheh Soltanpour[5,*]

[1]Department of Midwifery, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, IR Iran
[2]Nursing and Midwifery Faculty, Research Center of Social Determinants of Health, Tabriz University of Medical Sciences, Tabriz, IR Iran
[3]Road Traffic Injury Research Center, Faculty of Health, Tabriz University of Medical Sciences, Tabriz, IR Iran
[4]Department of Midwifery, Faculty of Nursing and Midwifery, Saveh University of Medical Sciences, Saveh, IR Iran
[5]Department of Midwifery, Students' Research Committee, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, IR Iran

Corresponding author: Sedigheh Soltanpour, Department of Midwifery, Students' Research Committee, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, IR Iran. E-mail: sedigheh.soltanpour@yahoo.com

Abstract

Background: The functional status questionnaire is aimed as a self-administered functional assessment of the mothers' performance in the postpartum period based on five different areas, including baby care, personal care, household, social and community, and occupational activities.

Objectives: The aim of this study was to evaluate the psychometric properties of the functional status questionnaire for assessing Iranian women in the postpartum period.

Methods: In this cross-sectional, methodological study, 200 Iranian women were selected randomly via a two-stage cluster sampling method at the end of the postpartum 6th week from healthcare centers in six areas of Tehran (the capital of Iran). The translation validity of the questionnaire was confirmed by forward and backward translation. Content-related validity was determined in two qualitative and quantitative sections, respectively, by evaluating the experts' opinions and calculating of content validity ratio (CVR) and content validity index (CVI), while the face validity was evaluated by a sample of 30 mothers in the postpartum period. To determine the construct validity, exploratory factor analysis was used. The reliability was determined in terms of reproducibility via the intra-class correlation coefficient (ICC) by test-retest and internal consistency (Cronbach's alpha).

Results: The CVI and CVR as the indices for content validity were 0.88 and 0.82, respectively. Further, the reliability was good, both in terms of reproducibility (ICC = 0.96) and internal consistency (α = 0.73). The construct validity was also supported by the exploratory factor analysis for all four areas of functional status. The Kaiser-Meyer-Olkin (KMO) index of household, social and community, baby care, and personal care activities subscales was calculated as 0.85, 0.85, 0.56, and 0.50, respectively. The total variance (%) for household activities, social and community, baby care, and personal care was 56.86, 53.94, 38.07, and 43.39. All items with a minimum and maximum factor loading of 0.2 and 0.96 are placed at the right factor.

Conclusions: The findings support the instrument's validity and reliability. Therefore, it is recommended to be used for both clinical and research purposes.

Keywords: Inventory of Functional Status after Childbirth questionnaire, Postpartum, Validity, Reliability, Iran

1. Background

The postpartum period is the 6-week period after childbirth when the functional status of mothers returns to its pre-pregnancy condition (1). The functional status of mothers during the postpartum period is a multidimensional concept (2-5) that is measured on the basis of experience and testing (6). This multidimensional concept involves measuring women's ability and willingness to achieve appropriate baby care and personal care and to participate in housekeeping and social and occupational activities (7).

Postpartum recovery may involve physical and psychological aspects (8). It is important to achieve optimal performance during the postpartum period for both mothers and babies to regain and maintain optimal health (7, 9). Healthcare professionals perceive implications and changes in the functional status of mothers during the postpartum period as natural recovery and often overlook them (8, 10-12). The factors that may affect the functional status of mothers during the postpartum period include parity, social support, infant mood and night waking, type of delivery, and maternal and neonatal complications (13-16). The complete recovery of functional status often takes $\geq$ 6 months (17, 18). The results of a study by center and Gjerdingen (2003) on primiparas showed that 47% - 57%

and 76% of mothers regained their pre-pregnancy levels of performance within 6 and 12 weeks, respectively ([17]).

At present, the Inventory of functional status after childbirth (IFSAC) is the only questionnaire that specifically assesses the functional status of mothers during the postpartum period. This questionnaire was developed by professor Fawcett and his colleagues (1988) ([19]) and was further extended and tested by Tulman (1991) ([20]).

A review by Aktan (2007) emphasized the need to improve the functional status of mothers in the postpartum period and to develop tools such as IFSAC for measuring it ([21]). This review suggested that the functional status of mothers after childbirth is a very important nursing and midwifery concept and emphasized the need for further studies.

At present, the routine assessment of the functional status of women after childbirth is recommended for women who are referred to midwives, physicians, and other healthcare workers. Despite these recommendations, only a few researchers have examined the functional status of mothers after childbirth and even fewer have attempted to determine the reliability and validity of known instruments such as IFSAC, particularly in non-US populations ([6]). Recent studies have investigated the validity and reliability of IFSAC in Australian (2003) ([6]) and Turkish (2007) ([22]) women. In the study conducted in Australia, data were obtained from a culturally diverse group of 173 women residing in a regional city in New South Wales. The reliability of the IFSAC and its 5 scales was assessed using Cronbach's coefficient and its validity was determined using item-total correlation matrices. While 3 IFSAC scales performed efficiently, 2 could not be used in this Australian population ([6]). The other study assessed the reliability of IFSAC by using Cronbach's coefficient in 191 Turkish women belonging to 3 socioeconomic levels and residing in different localities associated with Denizli Health Department. In this study, all IFSAC scales performed efficiently ([22]).

Despite its importance, no study has determined the validity and reliability of IFSAC in Iranian women to date.

2. Objectives

Therefore, the aim of present study was to determine the psychometric properties of the IFSAC in Iranian women. The results of this study could be used to assess the functional status of Iranian women in the postpartum period.

3. Methods

3.1. Type of Study and Participants

This cross-sectional, methodological study validated the efficiency of the IFSAC. The ISFAC is a self-reporting questionnaire containing 36 items that assesses the ability of mothers to assume new responsibilities based on 5 areas, namely, baby care, personal care, household, social and community, and occupational activities ([6], [8-10]). Items in the personal care and occupational activities subscales are rated on a 4-point scale, with 1 = never, 2 = sometimes, 3 = most of the time, and 4 = all the time. In the other subscales, the items are rated on a 4-point scale, with 1 = never, 2 = limited, 3 = partially, and 4 = completely ([2]).

The inclusion criteria of this study were as follows: women aged 35 - 18 years, Iranian nationality, available contact information, willingness to participate in the study, and being at the end of the 6th postpartum week. Women with medical complications during pregnancy or during the postpartum period were excluded from this study ([Figure 1]).

A sample size that was 5 times the number of items in the questionnaire was used for factor analysis ([23]). Thus, because ISFAC had 36 items, a sample size of 200 was used.

3.2. Sampling

Two-stage cluster sampling was performed for selecting pregnant women from the healthcare centers present in six areas of Tehran, the capital of Iran. These healthcare centers were public, government, and first-level referral facilities and had the highest number of postpartum women in Tehran, Iran. Moreover, these centers were covered by the Tehran University of Medical Sciences and Iran University of Medical Sciences.

In all, 25 out of 38 health centers were randomly selected. The number of women in the postpartum period selected from each healthcare center was stratified according to the sample size to be included in the study. The names of eligible women were listed, and they were numbered. The final participants to be included in the study were randomly selected based on a random number generator via the website of www.random.org for each health center. Later, the researcher contacted the participants using the contact information provided in their profile. The women were provided with a brief explanation about the objectives and procedure of the study and were evaluated with respect to the eligibility criteria of the study. Women who met the eligibility criteria and who agreed to participate in the study were asked to visit the healthcare center on a certain date and time for completing the IFSAC inventory. The women were given a comprehensive insight on the research objectives, benefits, results, and procedure
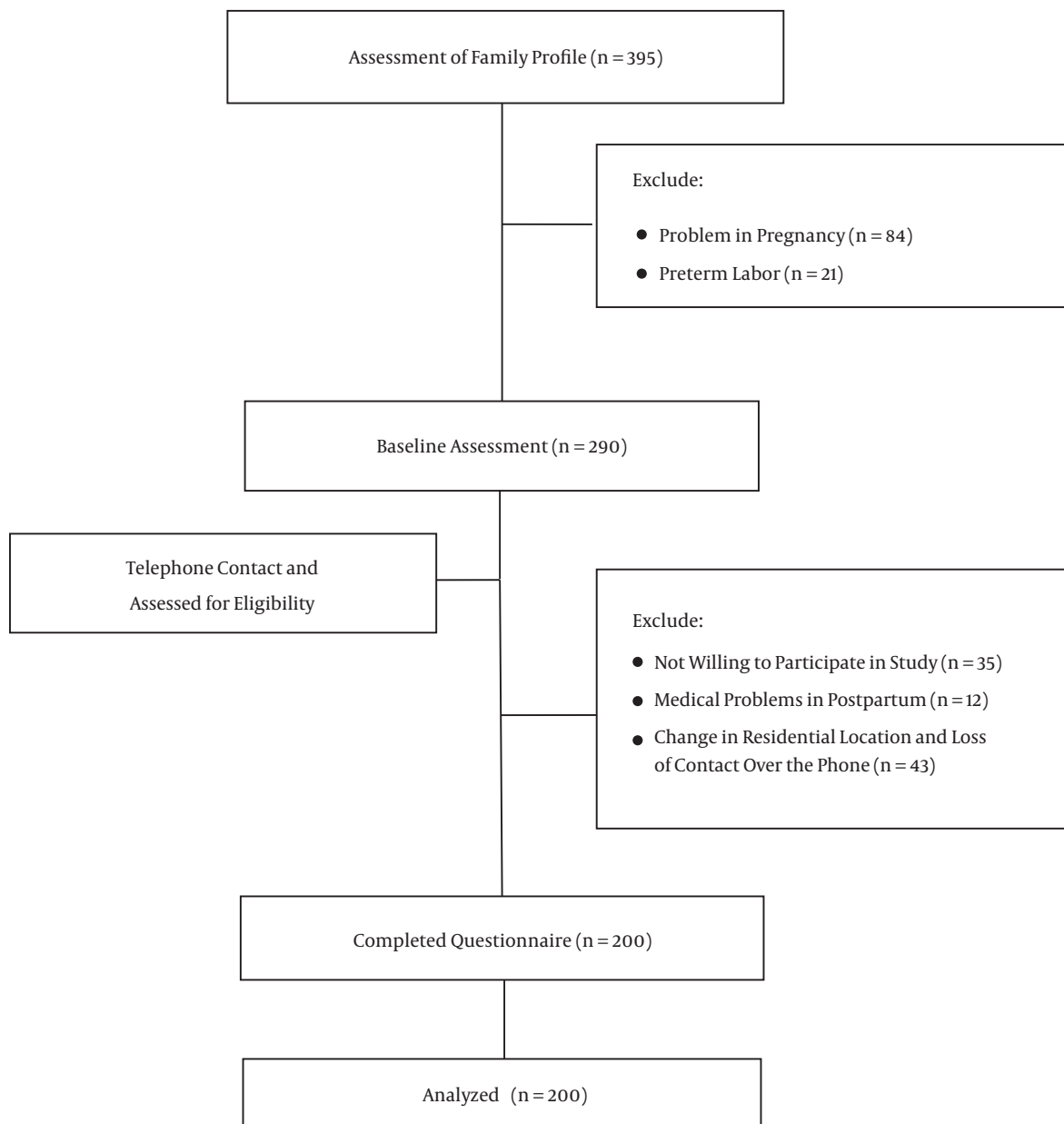
Figure 1. Flowchart of the Study

and were assured that their details would be kept confidential. The women were asked to complete the IFSAC questionnaire only after providing informed consent.

This study enrolled 290 mothers, of which 200 completed the questionnaire. In all, 35, 12, and 43 women were excluded from the study because of their unwillingness to participate in the study, medical problems in the postpartum period, and change in their residential location and loss of contact over the phone, respectively (Figure 1).

3.3. IFSAC English to Persian Translation (Direct Translation) and Reverse Translation

Informed consent was obtained from professor Fawcett, the developer of the IFSAC, before translating the instrument. The IFSAC was translated into Persian by performing forward and backward word translation. The inventory items were translated into Persian by 2 experts in both English and Persian languages. The final version of the translated instrument was obtained by comparing

and incorporating the initial translations by 2 experts. Later, the instrument was again translated into its original language by a third-party translator and was compared with the original instrument for validation.

3.4. Reliability and Validity of the IFSAC

After matching the English translation and original English version of the questionnaire and after ensuring its accuracy, its content was validated by 10 professors. Their corrective comments on grammar and the use of correct words and their placement were incorporated in the translated version. The content validity index (CVI) was calculated relative to 3 indices, namely, simplicity, relevance, and transparency, while the content validity ratio (CVR) was calculated based on item relevancy. Thus, an item with a CVR of < 0.62 was omitted. Cases with a CVI of < 0.79 required modifications to correct their results. The initial Persian version of the IFSAC was tested on 30 mothers in the postpartum period, and its face validity and concept of items perceived by the respondents were determined. The necessary modifications were incorporated in the Persian version of the IFSAC to obtain the final version.

The final version was completed by 30 women in the postpartum period, and its reliability was determined in terms of reproducibility (based on the intra-class correlation coefficient (ICC) by performing test-retest) and internal consistency (Cronbach's alpha). The SPSS 19 software package was used to analyze results.

The questionnaire resolution was assessed by examining the ceiling and floor effects to determine the percentage of women who obtained the possible maximum and minimum scores. Exploratory factor analysis (EFA) was performed to assess the construct validity (24).

Next, 29 items approved based on their content and face validity were analyzed in 4 subscales using factor analysis equation. Principal axis factoring was applied to extract factors and the varimax rotation method (with Kaiser Normalization) was used for the rotation of components. The Kaiser-Meyer-Olkin (KMO) index, the percentage of explained variation, and Bartlett's test were employed to assess the adequacy of the model.

3.5. Statistical Analysis

Statistical analysis was performed using SPSS 13.0 (SPSS Inc., Chicago, IL) and LISREL 8.80 (Scientific software international Inc., 2007). P-values of less than 0.05 were considered significant.

4. Results

4.1. Sample Characteristics

In all, 200 Iranian primiparas completed the questionnaire at the end of the 6th postpartum week. The mean (SD) age of the participants was 26 (3.4) years (range, 18 - 35 years). In all, 27.9% of the respondents had higher education, 47.3% had a diploma, and 24.8% had no diploma. In all, 17% of the participants lived in households with > 2 people. Approximately 91% of the mothers were housewives. Furthermore, 85% of the mothers had breastfeeding, and more than half of the mothers (54%) had a body mass index within the normal range (18.5 - 24.99). Employed mothers were on post-pregnancy leave during the study period. In all, 72.1% participants lived in rented houses or with family members. More than one-quarter of participants (27.9%) owned a house, and only 17% of participants were satisfied with their monthly income for living expenses (Table 1).

4.2. Content Validity

The quality of the instrument's content was assessed based on written feedback obtained from experts and professors on the clarity and relevancy of the content associated with Iranian culture. In addition, some items were corrected and improved by applying the qualitative opinions of the expert panel. Scores of the relevancy, clarity, simplicity, CVI, and CVR of the IFSAC are listed in Table 2.

4.3. Reliability

Cronbach's alpha, which assesses internal correlation, was 0.73. In addition, the ICC (with 95% confidence interval) was 0.96 (0.91 - 0.99), indicating the reproducibility of the test.

4.4. Construct Validity

To evaluate the construct validity, the EFA results were used for the IFSAC subscales (Table 3).

4.5. Exploratory Factor Analysis (EFA)

The KMO index for the household activities subscale was 0.85, indicating its applicability for this subscale. The results of Bartlett's test of sphericity (P < 0.001) were in line with the KMO index, and the total variance (%) for this scale was 56.86%.

The KMO index for the social and community activities subscale was 0.85, indicating its applicability for this subscale. The results of Bartlett's test of sphericity (P < 0.001) were in line with the KMO index, and the total variance (%) for this scale was 53.94%.

Table 1. Socio-Demographic Characteristics of Primiparous Women at 6 Weeks Postpartum (N = 200)

Characteristics	No. (%)
Family number	
Two people	166 (83.0)
More than 2 people	34 (17.0)
Sufficiency of income for expenses	
Completely	34 (17.0)
To some extent	140 (70.0)
Absolutely not	26 (13.0)
Infant feeding	
Breast feeding	170 (84.8)
Bottle feeding Mixed (bottle and breastfeeding)	30 (15.2)
Body mass index, kg/m²	
18.5 >	18 (9.1)
18.5 - 24.99	124 (61.8)
25 - 29.99	40 (20.0)
$\geq$ 30	18 (9.1)
mean (SD)	24.1 (3.5)
Age, y	
18 - 25	102 (50.9)
26 - 35	98 (49.1)
mean (SD)	26.0 (4.0)
Home status	
Private	56 (27.9)
Rental	122 (60.6)
Family home	22 (11.5)
Job (employed)	
Housewife	182 (90.9)
Working at home or outside the home	18 (9.1)
Education	
Elementary	12 (6.1)
Secondary school	28 (13.9)
High school or diploma	104 (52.1)
University	56 (27.9)

The KMO index for the baby care activities subscale was 0.56, indicating its applicability for this subscale. The results of Bartlett's test of sphericity (P < 0.001) were in line with the KMO index, and the total variance (%) for this scale was 38.07%.

The KMO index for the personal care activities subscale was 0.50, indicating its applicability for this subscale. The

results of Bartlett's test of sphericity (P < 0.001) were in line with the KMO index, and the total variance (%) for this scale was 43.39% (Table 3).

All items with a minimum and maximum factor loading of 0.2 and 0.96, respectively, were placed at the right factor (Table 4). The following results were obtained by calculating the mean (SD) of scores for each subscale: social and community activities (1.7 [0.6]), personal care activities (2.0 [0.8]), household activities (3.0 [0.9]), and baby care activities (3.8 [0.4]). These results indicated that the scores of social and community and personal care activities subscales were lower than those of the other subscales (Table 5).

The results obtained by calculating the percentage of women who received ceiling and floor scores (i.e., 4 or 1, respectively) for each subscale indicated that the highest frequency (%) of ceiling scores is for the baby care activities subscale (87.7), while the highest frequency (%) of floor scores is associated with the social and community activities subscale (64.0) (Table 5).

5. Discussion

This study examined the reliability and validity of the IFSAC, which includes 5 (functional) areas of baby care, personal care, household, social and community, and occupational activities, in Iranian women during the postpartum period. The findings showed that the Persian version of the IFSAC could measure the functional status of women in the postpartum period. Because the study included women who were housewives or were on post-pregnancy leave, we validated only 4 subscales and excluded the occupational activities subscale.

Content validity is one of the most important elements for validating an instrument. It can help assess whether content adequately measures the defined objectives (25). In this study, content validity was determined by considering the feedback of a panel of experts in the corresponding field. For this, we presented the expert panel with a checklist on the relevancy, simplicity, and clarity of each item and asked them to provide their opinions.

The content validity of the IFSAC questionnaire was examined qualitatively and quantitatively by evaluating expert opinions and by calculating the CVR and CVI. The original version of this tool does not provide the CVR and CVI values for simplicity, relevancy, transparency, and the CVR (17). Moreover, these values have not been reported in other similar studies. Therefore, no credible source is available to compare the results of the present study.

Reliability is the extent to which an experiment, test, or measuring procedure yields the same results on repeated trials without any measurement errors (25). In this study,

Table 2. Scores of the Relevancy, Clarity, Simplicity, CVI, and CVR of the IFSAC

Item	Item Content	CVI			CVI	CVR
		Relativity	Clarity	Simplicity		
1	Caring for family members	1.00	0.70	0.70	0.80	1.00
2	Cleaning the house	1.00	1.00	1.00	1.00	1.00
3	Tidying the house (making the bed, picking up)	1.00	1.00	1.00	1.00	1.00
4	Laundry	1.00	0.90	1.00	0.97	1.00
5	Doing dishes	1.00	1.00	1.00	1.00	1.00
6	Cooking	1.00	1.00	1.00	1.00	1.00
7	Household business (paying bills, banking)	1.00	1.00	1.00	1.00	0.60
8	Shopping, other than groceries	1.00	0.90	1.00	0.97	0.60
9	Doing errands	1.00	0.80	0.90	0.90	0.60
10	Heavy housework, maintenance work (Paintings)	0.90	0.70	0.80	0.83	0.60
11	Community service organizations	0.80	0.30	0.30	0.47	0.60
12	Professional organizations	0.90	0.40	0.40	0.57	0.60
13	Religious organizations	1.00	0.80	0.80	0.87	1.00
14	Socializing with friends	1.00	1.00	1.00	1.00	1.00
15	Socializing with relatives	1.00	1.00	1.00	1.00	1.00
16	Social clubs	0.90	0.70	0.50	0.70	0.60
17	Daytime feeding	1.00	1.00	1.00	1.00	1.00
18	Night feeding	1.00	1.00	1.00	1.00	1.00
19	Bathing the baby	1.00	1.00	1.00	1.00	1.00
20	Changing diapers	1.00	1.00	1.00	1.00	1.00
21	Changing the baby's clothes	1.00	1.00	1.00	1.00	1.00
22	Playing with the baby	0.90	0.90	0.90	0.90	0.80
23	Spending much of the day lying down	0.90	1.00	1.00	0.97	0.80
24	Sitting during much of the day	0.90	0.90	0.90	0.90	0.60
25	Spending much of the day sleeping or dozing	1.00	1.00	1.00	1.00	0.80
26	Standing for only short periods of time	0.80	0.80	0.80	0.80	0.80
27	Taking walks	1.00	0.90	0.90	0.93	1.00
28	Going up and down stairs	0.90	0.80	0.90	0.87	0.60
29	Walking slowly	0.90	0.90	0.90	0.90	0.80
30	I am accomplishing as much as usual in my job	1.00	1.00	0.90	0.97	0.80
31	I act irritable toward my coworkers	0.70	0.90	0.90	0.83	1.00
32	I am working shorter hours	0.90	0.80	0.70	0.80	0.60
33	I am doing my job as carefully/accurately as usual	0.90	0.80	0.70	0.80	1.00
Total	0.92	0.85	0.85	0.88	0.82	

Abbreviation: CVR, content validity ratio; CVI, content validity index.

Table 3. Exploratory Factor Loadings for the Subscales of the IFSAC

Subscale	% of Variance	KMO	P	df
Household activities	56.86	0.85	> 0.001	45
Social and community activities	53.94	0.51	< 0.001	15
Infant care activities	38.07	0.56	> 0.001	15
Self-care activities	43.39	0.50	> 0.001	15

Abbreviation: KMO, Kaiser-Meyer-Olkin.

reliability was determined both in terms of reproducibility (ICC) and internal consistency. The Cronbach's alpha (α) of reliability was 0.73, which proved the internal correlation of the IFSAC questionnaire, as $\alpha > 0.7$ is acceptable

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Table 4. Exploratory Factor Loadings for the IFSAC

Subscale	Subscale Content	IFSAC
Household activities	Caring for family members	0.85
Household activities	Cleaning the house	0.95
Household activities	Tidying the house (making the bed, picking up)	0.92
Household activities	Laundry	0.88
Household activities	Doing dishes	0.96
Household activities	Cooking	0.90
Household activities	Household business (paying bills, banking)	0.20
Household activities	Shopping, other than groceries	0.28
Household activities	Doing errands	0.36
Household activities	Heavy housework, maintenance work (Paintings)	0.43
Social and community activities	Community services organizations	0.84
Social and community activities	Professional organizations	0.80
Social and community activities	Religious organizations	0.45
Social and community activities	Socializing with friends	0.86
Social and community activities	Socializing with relatives	0.87
Social and community activities	Social clubs	0.36
Infant care activities	Daytime feeding	0.95
Infant care activities	Night feeding	0.96
Infant care activities	Bathing the baby	0.23
Infant care activities	Changing diapers	0.93
Infant care activities	Changing the baby's clothes	0.92
Infant care activities	Playing with the baby	0.70
Self-care activities	Spending much of the day lying down	0.55
Self-care activities	Sitting during much of the day	0.55
Self-care activities	Spending much of the day sleeping or dozing	0.75
Self-care activities	Standing for only short periods of time	0.51
Self-care activities	Taking walks	0.79
Self-care activities	Going up and down stairs	0.54
Self-care activities	Walking slowly	0.72

Table 5. The Mean and SD of the Scores of the IFSAC Subscales and the Percentage of People With the Highest and Lowest Scores in Each Subscale

Subscale of IFSAC	Mean	SD	Maximum Score Percentage	Minimum Score Percentage
Household activities	3.0	0.8	54.3	24.9
Social and community activities	1.7	0.6	11.5	64.0
Infant care activities	3.8	0.4	87.7	2.6
Self-care activities	2.0	0.8	8.1	28.8

for establishing an instrument's reliability (25). The Cronbach's alpha coefficients obtained in this study are consistent with those obtained in a previous study performed in Australian women (13). In addition, the ICC (with a 95% confidence interval) was 0.96 (0.91 - 0.99), indicating the reproducibility of the test.

The 12th item caring for pets and the 29th item spend most of the time in my nightgown/bathrobe in the original version of the IFSAC were confirmed by 2 and 6 experts, respectively, and were omitted. The 9th item shopping, other than groceries and the 10th item Doing errands were combined into one. Thus, the original 36 items were reduced to 33 items.

Construct validity determines whether a structure can meet the study's objectives (25). Because the IFSAC questionnaire covers multiple domains and subdomains, it is possible to apply the analysis factor that calculates intercorrelations among the items (25). Factor analysis indicated whether these 33 items were correctly categorized. It should be noted that Bartlett's test and the KMO index as-

sessed the correlation of items before factor analysis.

This study used the SPSS software package to perform EFA to determine the construct validity. The output of this test provided an acceptable value for the KMO index and a significant level for Bartlett's test. It should be noted that the KMO index should not be < 0.5; a KMO index of < 0.5 is negligible and unacceptable (25). Our results indicated that the KMO index for the social and community, personal care, and baby care activities subscales ranged from 0.5 to 0.7, which provided an intermediate analysis factor. In contrast, the KMO index for the household activities subscale was 0.8, which represented a good analysis factor.

In Bartlett's test, the null hypothesis was the complete independence (sphericity) of criteria (25). For each subdomain of the IFSAC, the null hypothesis of data sphericity was rejected ($P < 0.05$) and the KMO statistic was confirmed. Thus, EFA fitted the data and confirmed the validity of the instrument.

To our knowledge, this is the first study to assess the validity and reliability of the IFSAC for Iranian women. This study included women from Tehran, which is home to women of different ethnicities. However, further studies on women from other cities should be performed to validate the applicability of the IFSAC as an accepted practical instrument for measuring functional status in the Iranian population. Moreover, further studies should be performed on women from different social classes and in different stages after childbirth for more practical use of the IFSAC as an acceptable, useful, and experimental tool in Iranian women. In this study, construct validity was investigated as exploratory in two dimensions of convergent and discriminant validity by exploratory factor analysis; therefore, the authors of this study have suggested confirmatory factor analysis for future studies.

5.1. Conclusions

The present study validated the IFSAC questionnaire for Iranian women. The results of this study indicate a good level of reliability and validity of the Persian version of the IFSAC. The Persian version of the IFSAC is comparable to the English and Australian versions. Thus, it can be concluded that the IFSAC might be a useful and practical tool for assessing the functional status of Iranian women after childbirth. In addition, the IFSAC could be used along with other tests to comprehensively and accurately assess and promote their health.

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