Original Article

Adaptation to Hysterectomy: Design and Psychometric Properties Assessment of Hysterectomy Adaptation Scale

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Abstract

Background: Adaptation to complications of hysterectomy is one of the topics of concern for women and health care providers. There is no instrument for evaluating adaptation to hysterectomy. This study aimed to design the Hysterectomy Adaptation Scale (HAS) and assess its psychometric properties. **Materials and Methods:** This methodological study was conducted from 2018 to 2020 in Mashhad, Iran. To develop the item pool, qualitative data from directed content analysis and data from the review of adaptation and coping instruments were used. The face, content, construct validity, internal consistency, and stability were used to evaluate the psychometric properties of HAS. **Results:** The final version of the HAS consisted of 24 items with a reported content validity index of 0.9. Six factors were extracted from the principal component analysis, which explained 60.3 of the observed variance. Model fit indices in confirmatory factor analysis showed that the model was well fitted. The values of the alpha coefficient and intra-class coefficient were 0.86 and 0.95, respectively. **Conclusions:** The HAS is a valid and reliable scale for evaluating the adaptation level of hysterectomized Iranian women. HAS can distinguish between hysterectomized women who have adapted to hysterectomy and those who have not. It can be used to assess the adaptation of hysterectomized women in research and clinical practice.

Keywords: *Adaptation, hysterectomy, Iran, physiological, psychological, Psychometrics*

Introduction

Hysterectomy is one of the most frequent gynecological surgeries worldwide. Its prevalence is reported 26.2% in the United States, 22% in Australia, 22.2% in Ireland, 8.8% in Taiwan, and 7.5% in Singapore.[1] In addition to being involved in fertility, the uterus is associated with feelings of femininity and sex, so the uterus is the main organ for women.[2] Hysterectomy is a challenging procedure for many women.[3] Removing the female organ, such as the uterus, can be associated with decreased adaptation.[4] The physical and psychological effects of removing the feminine organs, such as the uterus and ovaries, provoke women's negative feelings about themselves.[5] The physical changes caused by the hysterectomy made women feel defective, so women saw their bodies differently than before. Changes in adjustment after a hysterectomy can take the form of psychological reactions. The psychological complications after the hysterectomy were described as mood change and depression, which could lead to irritability and lack of social communication with women.[6]

Today, with the expansion of research in medical and social sciences, many phenomena are studied through tools to quantify the behavior of individuals or society.[7] Researchers have evaluated and measured items such as adjustment, body image, self-confidence, sexual satisfaction, marital adjustment, and social adjustment.[8-10] These studies used general instruments to assess self-esteem, body image, female sexual function, and marital adjustment. The instruments used in these studies are not specific for measuring adaptation to hysterectomy. Therefore, these tools do not provide information about women's experiences in hysterectomy.

In the related literature, there were not any valid tools to evaluate adaptation to hysterectomy. Researchers believe that the tool's content should be obtained directly from the target people of that tool (participants) to ensure that all aspects

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of the subject matter are covered during the design of that tool.[11] Therefore, there is a need for an instrument that is specifically designed to evaluate the adaptation to hysterectomy. Assessment of adaptation after hysterectomy helps optimize the provision of caring, counseling, or referring to competent centers and specialists. Therefore, this study aimed to design the Hysterectomy Adaptation Scale (HAS) and assess its psychometric properties.

Materials and Methods

This article is a part of the mixed method study that describes the design and psychometric properties assessment of the HAS. The current study was conducted in the gynecology clinic of Imam Reza and Ghaem hospitals in Mashhad (Iran) from 2018 to 2020. In designing the HAS, the semi-structured interviews and a review of other related scales (in terms of adaptation to chronic conditions) were used to enrich the pool of items. Semi-structured interviews were conducted with 30 hysterectomized women, 3 gynecologists, and 2 spouses of hysterectomized women. The interviews were analyzed using directed qualitative content analysis based on the Roy adaptation model.[12] To enrich the item pool, a systematic review was performed on adaptation and coping. The electronic databases including Scopus, PubMed, Science Direct, Scientific Information Database, and ProQuest, were searched by using keywords such as adaptation, hysterectomy, copying, adjustment, gynecological, surgery, questioner, scale, tool, instrument, inventory, index, and their combination were searched to 2019. Although the search did not find any tools for "adaptation to hysterectomy," a tool based on the Roy adaptation model was found, which evaluated the well-being of breast cancer.[13] In the search, the items of other tools such as the Psychological Adaptation Scale,[14] Dyadic Adjustment Scale,[15] Emotional Processing Scale,[16] and the Mini-Mental Adjustment to Cancer (Mini-MAC) scale[17] were used to extract the items. These tools have been selected because the overall concept of these tools is compatible with the concept of adaptation to hysterectomy. The concepts of these tools were related to the conceptualization and categorization that emerged in the qualitative phase of the present study. The items pool developed, after the conceptualization, the practical definitions of adaptation to hysterectomy and its domains. In this phase, the item pool contained 129 items. After reviewing the items pool by the research team two times, the homogeneous items were reduced items. Finally, 74 items were entered into the psychometric properties assessment phase.

The tool's validity was evaluated by assessing face, content, and Construct validity. For the qualitative face validity, 10 hysterectomized women were asked to evaluate the items. They assessed the difficulty, relevance, and ambiguity of the statements. Items needed to be modified, revised, and edited. In a quantitative face validity assessment, 10 hysterectomized women determined the importance of each item. The importance of each item was scored based on the Likert scale from "quite important" (score 5) to "not important at all" (score 1). Then, the item impact score of each item was calculated. The item impact score ≥1.5 indicated that this item was appropriate.[18] Content validity was assessed using quantitative and qualitative methods. For the qualitative content validity, the 29 experts in the fields of midwifery, reproductive health, nursing, psychology, gynecologists, and instrument development were selected.[18] They were requested to evaluate the instrument and give their opinion on the grammar, the use of the right words, the placement of the items in the right place, and the proper scoring. They were requested to assess the necessity and relevance of each item. The quantitative content validity was assessed by calculating the Content Validity Ratio (CVR), Content Validity Index (CVI), and modified kappa.[18] The minimal CVR value was determined from Lawshe's table. The items whose CVR value was less than the CVR value recommended in Lawshe's table were deleted.[18] The validity index for each item (I-CVI) was determined. Based on the proposed method of Polit and Yang, the content validity index score higher than 0.78 was considered appropriate, items with a score of 0.70–0.78 needed to be revised, and items with a score below 0.70 were deemed unacceptable. The Scale Content Validity Index (S-CVI/Ave) was calculated based on the average validity index for each item (I-CVI). A value of 0.9 and above was considered appropriate.[19] The research team re-reviewed the items after calculating CVR and CVI. Construct validity was evaluated using principal component and confirmatory factor analysis. The PCA was performed based on the guidance proposed by Williams *et al*. (2010),[20] which consisted of five steps. In the first step of this research, the sample size of 210 women (5 people in each case) was determined. Based on the suggestion of some sources, they consider at least 3/10 samples per item acceptable.[21] However, 252 hysterectomized women were recruited for conducting factor analysis. Sampling adequacy was evaluated using the Kaiser–Meyer–Olkin test. The sampling index and the factorability of data were assessed by Bartlett's test of sphericity. Before the principal component analysis (PCA), the normality of the data was investigated using skewness and kurtosis of data.[22] The PCA was performed using SPSS software version 25. In this study, the Kaiser Criteria, scree plot, and cumulative variance percentage explained by the extracted factors were used simultaneously. Some sources recommend using multiple methods for factor extraction simultaneously.[18] In this study, criteria including having an eigenvalue above the one, being outside the horizon line in the scree plot, and including at least 50% of the variance of the extracted factors were used as selection criteria.[19] Selective rotations were Varimax. After rotation, the extracted factors and the correlation between them were evaluated. The factor loading value ≥0.4 was

considered acceptable, which could lead to generating more appropriate factors.[23] The items that had factor load values below the cut-off point were deleted. Also, the items that were not loaded in any of the extracted factors were removed.[24] Two hundred hysterectomized women completed the final scale for Confirmatory Factor Analysis (CFA) [Table 1]. CFA was conducted using the maximum likelihood method and Lisrel v 8.8 software. Absolute fit (X2, X2/df, GFI, RMSEA), Comparative fit (CFI, IFI, NFI), and parsimonious fit indicators (PNFI, AGFI) were used to check the fitness of the model[18] [Figure 1]. The reliability of the HAS was evaluated using methods of internal consistency and stability. The internal consistency of the scale was evaluated by calculating Cronbach's alpha. The test re-test was used to assess the stability of the scale. Thirty-three hysterectomized women were asked to respond to the scale at a two-week interval. Then intraclass correlation coefficient was calculated to evaluate stability.[18]

Ethical considerations

This study was approved by the ethics committee of Mashhad University of Medical Sciences (Code: IR.MUMS.NURSE.REC.1397.037). Participants received explanations about the study and its purpose. They participated in the study voluntarily. Participants gave Conscious consent for participating in the study. The right to withdraw from participating in this study had been reserved for them. Their information remained confidential.

Table 1: A summary of the characteristics of the participants in the construct validity

Variable	PCS* *n* (%)	CFA** *n* (%)
Education level		
Elementary	140 (55.55)	102 (51.00)
High school	51 (20.23)	46 (23.00)
Diploma	44 (17.46))	37 (18.50)
University	17 (6.74)	15 (7.50)
Job		
Housewife	217 (86.11)	169 (84.50)
Employee	15 (5.95)	13 (6.50)
Freelance	20 (7.93)	18 (9.00)
Cues of hysterectomy		
Benign diseases	163 (64.68)	94 (47.00)
Precancerous lesions and cancer	42 (16.66)	70 (35.00)
Complications child birth	47 (18.65)	36 (18.00)
Menopausal status		
Yes	16 (6.34)	35 (17.50)
No	236 (93.65)	165 (82.00)
Age	Mean (SD) Rang	Mean (SD) Rang
	44.50 (8.30) 20-66	45.30 (7.90) 28-62
Child number	Mean (SD) Rang	Mean (SD) Rang
	3.09 (1.40) 0-9	3.02 (1.60) 0-10

*Principal component analysis **Confirmatory factor analysis

Results

Face and content validities

The initial item pool contained 129 items. Then, the research team conducted two sessions to review and remove overlapping and conceptually similar concepts. Finally, 74 items were identified as suitable for the psychometric phase. After evaluating face and content validity by hysterectomized women and an expert panel, 44 items in the CVR, I-CVI, modified Kappa, and impact item indexes had scores below the acceptable cut-off point that were removed. In the I-CVI Index, four items had scores between 0.7 and 0.78 that were revised. The total scale validity index (S-CVI/Average) was obtained as 0.9.

Construct validity

Prabhu *et al.* (2020)[25] quoting Beck *et al*. (2004) stated that the values of Skewness confirm the normality of the data between +3 to −3 and kurtosis between +7 to −7.

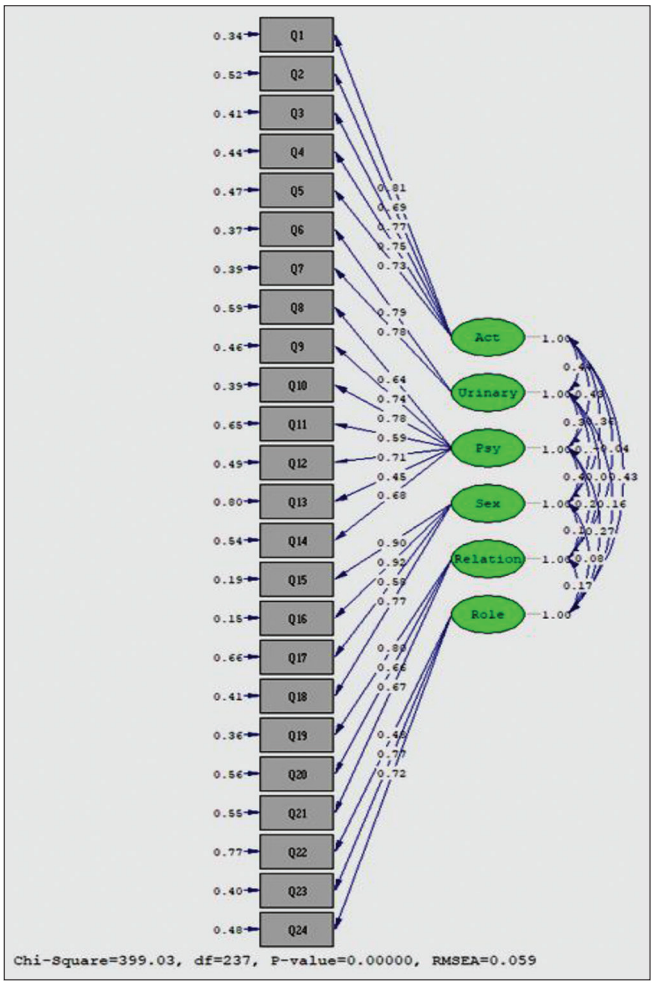

Figure 1: Final Model and results of CFA of Hysterectomy Adaptation scale

In the present study, normality was confirmed with these ranges. No data was lost in this study. In this study, the KMO value was 0.86 which showed that the sample size was sufficient. Bartlett's test of Sphericity was significant ($p < 0.001$) which confirmed the data factorability. In PCA, the eigenvalues of six factors were greater than 1. The position of these six factors in the scree plot was out of the horizontal line. In total, these six factors explained 60.3% of the total variance. There were four items that had a loading factor of less than 0.4. Two were not loaded in any extracted factors, which were removed. Five factors included at least three items. Factor 6 was categorized as comprised of two items whose factor loading was 0.88 and 0.81. Given that these two items had a correlation and a factor load of more than 0.8, they can be trusted [Table 2].[18] Thus, the final scale was developed and consisted of 24 items and six factors [Table 2]. The fit indices in CFA showed that the scale model was appropriate and well-fitted ($\chi2 = 399.30$, $\chi2 = 0.000$, DF = 237, CMIN/DF = 1.68, RMSEA = 0.06, GFI = 0.86, CFI = 0.95, IFI = 0.95, NFI = 0.90, PNFI = 0.77, AGFI = 0.82). [Figure 1].

Reliability

The results of Cronbach's alpha showed that the internal consistency of the whole scale was good ($\alpha = 0.86$). The results of Theta (between 0.6 and 0.85) showed that the correlation of the whole scale with its subscales was good. The result of the interclass correlation coefficient showed that the scale has high stability (0.95) [Table 3].

Qualitative phase

In the qualitative phase of this study, the experiences of 30 hysterectomized women were collected. The mean age of the participants was 45.16 years. The most common cause of hysterectomy was fibroma (33%).Most hysterectomized women were of reproductive age (86%). In the qualitative phase, the participants expressed their experience of the adaptation to hysterectomy and their concerns about physical, sexual, psychological, and relationship issues. The participants described adaptive and non-adaptive behaviors in the four adaptation dimensions introduced by "Roy." After analyzing the data, four dimensions emerged. Table 4 shows the findings of the qualitative phase. More information about the details of the findings of the qualitative phase has been published in other articles.[6,26]

Discussion

This study developed an instrument entitled HAS, which obtained data related to hysterectomy adaptation through a qualitative study guided by the Roy Adaptation model. The HAS was enriched with additional items from other adaptation and coping tools. This could be the strength of this study. This study is the first research

Table 2: PCA* results after Varimax rotation for extracted HAS Factors and their items**

Item	Factor loading					
	1	2	3	4	5	6
1- I feel tired during physical activity.	0.78					
2- My physical activity has decreased.	0.77					
3- I feel physically weak.	0.75					
4-I need more sleep and rest.	0.74					
8- I feel sick and weak.	0.64					
16- It is difficult for me to accept that I do not have a womb.		0.76				
20- After removing the uterus, I feel ashamed and defeated.		0.70				
11-I feel defective after removing the uterus.		0.65				
18-I'm worried about others judging my appearance.		0.63				
17- After removing the uterus, I am not satisfied with myself.		0.62				
22-I miss my period.		0.50				
14-I feel sad and depressed.		0.45				
12-My libido has decreased.			0.87			
13-I feel less pleasure during sex.			0.84			
25-I had a problem with my marital duties.			0.72			
21- I feel that my femininity has decreased.			0.58			
28-My family's emotional support has increased.				0.80		
30-My family has taken more care of me.				0.77		
29-My spouse pays more attention to me.				0.73		
27-I have greater Social activity participation.					0.73	
26-I do better job-related tasks.					0.70	
23-I can pursue my interests despite having a hysterectomy.					0.53	
6-It is difficult for me to hold urine						0.85
5-I have leaking urine when moving objects, coughing, and sneezing.						0.81

*Principal Component Analysis; Hysterectomy Adaptation Scale

Table 3: The evaluation of Internal Consistency and stability of the hysterectomy Adaptation scale and its Subscales

Factor	Factor Name	Number of Item	ICC* (95%CI)	Mean (SD) Test	Mean (SD) Retest	α	Θ
1	Activity/Rest pattern	7	0.92 (0.85-0.96)	14.85(5.40)	15.20(5.30)	0.85	0.85
2	psychological	5	0.94 (0.88-0.97)	27.57(7.80)	28.65(6.36)	0.78	0.79
3	marital relationship	4	0.94 (0.88-0.97)	14.05(4.80)	14.22(5.16)	0.81	0.83
4	emotional Interaction	3	0.92 (0.85-0.96)	10.51(3.70)	10.22(4.02)	0.51	0.74
5	Role function	3	0.95 (0.9-0.97)	5.80(2.30)	5.60(2.21)	0.69	0.6
6	Urinary system	2	0.95 (0.9-0.97)	7.20(2.50)	7.20(2.45)	0.6	0.72
Total	Hysterectomy Adaptation Scale (HAS)	24	0.95 (0.91-0.97)	17.70(8)	17.10(8.11)	0.86	-

* Intra-class Correlation Coefficient

Table 4: Themes and categories of adaptation after hysterectomy

Category	Theme
Optimal progressive changes in oxygenation status	Health-oriented changes in physiological needs
Gradual removal of restrictions on physical and sexual activity and rest	
Change in nutritional needs	
Excretion problems	
Weakened protection system	
Gradual release from the chained body to the pain	
Heterogeneous feelings toward the imaginations of the body	incoherent cognition of self-concept
Changed self-perception	
From the decline to the gradual acquisition of the ability to do personal work	Fluctuations in the improving trend in role function
The limitations and ups and downs of secondary duties	
Evolution of dependence and interaction with important others	Increased interdependence
Enhanced support system	

to design an instrument to assess adaptation with gynecological surgeries. Huang *et al*. (2021)[27] evaluated the psychometric and linguistic features of breast cancer coping tools in Taiwanese women who survive breast cancer (as a Gynecological d disease). This tool was derived from Western culture. It was a Chinese language and was commonly used in various diseases. Therefore, it was not a tool designed for its target group and could not be appropriate for the Taiwanese culture.[27] Researchers believe that the content of instruments should be obtained directly from their target group (participants) to ensure that all aspects of the subject are covered during the design of the instrument.[11] In the current study, this subject has been considered.

This study identified six dimensions of adaptation to hysterectomy: activity/rest, psychological, marital relationships, emotional relationships, role function, and urinary system. Shabani-Asrami *et al*. (2020)[28] designed the Hysterectomy Educational Needs Questionnaire. They found that women who underwent hysterectomies had educational needs in five dimensions: physical, psychological, sexual, care, and other needs. It is approximately consistent with the adaptation dimensions in the present study.

In the literature review, no instrument about adaptation with hysterectomy was found to compare and evaluate the present scale. For designing this scale, in the qualitative phase, the Roy adaptation model as a conceptual framework was used. Studies have utilized instruments based on Roy's adaptation model to assess adaptation in different target groups. Bigdeli Shamloo *et al*. (2023)[29] conducted a study to design and evaluate the validity of the adaptation questionnaire based on the Roy adaptation model. Their study population comprised men whose wives suffered from breast cancer, which was different from the present study. In the dimensions of this questionnaire, some aspects of adaptation defined in the Roy adaptation model, especially the dimension of self-concept, were not considered. Azarmi *et al*. (2021)[30] designed and validated a questionnaire to assess adaptation to lower limb amputation for veterans. Their target population was different from the present study. They used a systematic review to design the pool items. The studies used for designing the items were from different cultures, which could affect the cultural coverage of the instrument. Therefore, in the present study, an attempt was made to collect data directly from the target group in the qualitative phase of the study. In compiling the items, as far as possible, all subscales of adaptation based on the Roy adaptation model were considered.

In this study, the evaluation of psychometric properties started with face and content validity in quantitative and qualitative terms, which are the main stages of instrument psychometrics.[18] The principal component analysis was used to extract factors of adaptation with hysterectomy. The context of the presentation of the Roy adaptation model is culturally different from the context of the present study. Utilizing the PCA in these conditions allowed the researcher to explore different dimensions of adaptation with hysterectomy.[31]

The confirmatory factor analysis showed that this scale provides good fitness for Iranian society. Therefore, the factor structure of this scale can provide accurate testing. The result of internal reliability of the HAS for the whole scale and its subscales showed appropriate internal reliability. In other words, each subscale measures the same issue. The Interclass Correlation Coefficient showed that the scale has acceptable stability. This shows that this scale has good reliability at different times.[18]

The first limitation of the study was that the designing and evaluating of psychometric properties of this scale were performed only in Iran and on Iranian hysterectomized women. Given the characteristics of the people who participated in the designing and psychometrics assessment of the instrument can affect the characteristics of the instrument,[32] the adaptability of HAS in other cultures and contexts is recommended. Due to the lack of an instrument for evaluating adaptation to gynecological diseases, convergent validity was not assessed in this study. Because of the prevalence of COVID-19, some participants refused to attend the clinic and complete the scale. Although the researcher went to their home and completed the scale, some cases were missed. It may affect the outcome of the study.

Conclusion

Given the lack of assessment tools for the adaptation of hysterectomized women in the literature, the HAS can fill this gap. The current study showed that the HAS has good validity and reliability in Iranian women. According to the easiness of answering the scale (Response time of an average of 15 minutes and lack of missing data). It can be used to assess the adaptation of hysterectomized women in research and clinical practice. It can identify women who need help. This scale can help to provide counseling and referral services to these women.

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Conflicts of interest

Nothing to declare.

References

1. Singh SK, K Chauhan K, Tripathi V. Key drivers of hysterectomy among women of reproductive age in three states in India: Comparative evidence from NFHS-4 and NFHS-5. BMC Womens Health 2024;24:107-20.
2. Hsieh CH, Lu YY, Liang SY. The health concerns related to hysterectomy among Taiwanese women with uterine fibroids-A mixed-methods study. Women Health 2021;61:581-90.
3. Alshawish E, Qadous S, Yamani MA. Experience of Palestinian women after hysterectomy using a descriptive phenomenological Study. Open Nurs J 2020;14:74-9.
4. Afiyah RK, Wahyuni CU, Prasetyo B, Dwi Winarno D. Recovery time period and quality of life after hysterectomy. J Public Health Res 2020;91837.
5. Abadi OS, Cheraghi MA, Tirgari B, Nayeri ND, Rayyani M. Feeling an invisible wall: The experience of Iranian women's marital relationship after surgical menopause: A qualitative content analysis study. J Sex Marital Ther 2018;44:627-40.
6. Goudarzi F, Khadivzadeh T, Ebadi A, Babazadeh R. Iranian women's self-concept after hysterectomy: A qualitative study. Iran J Nurs Midwifery Res 2021;26:230.
7. Mohammadbeigi A, Mohammadsalehi N, Aligol M. Validity and reliability of the instruments and types of measurments in health applied researches. J Univ MedSci 2015;13:1153-70. [Persian].
8. Erdoğan E, Demir S, Çalışkan BB, Bayrak NG. Effect of psychological care given to the women who underwent hysterectomy before and after the surgery on depressive symptoms, anxiety and the body image levels. J Obstet Gynaecol 2020;40:981-7.
9. Ahdi Derav B, Narimani M, Abolghasemi A, Eskandari Delfan S, Akbari R, Ghaemi M, *et al*. Effectiveness of group cognitive-behavioral therapy for managing anxiety and depression in women following hysterectomy for uterine cancer. Asian Pac J Cancer Prev 2023:24:4237-42.
10. Verma RK, Ansari S. Anxiety and psychological aspect of hysterectomy patients. NeuroQuantology 2022:20:1492-9.
11. Doward LC, Meads DM, Thorsen H. Requirements for quality of life instruments in clinical research. Value Health 2004;7:6-13.
12. Assarroudi A, Heshmati Nabavi F, Armat MR, Ebadi A, Vaismoradi M. Directed qualitative content analysis: The description and elaboration of its underpinning methods and data analysis process. J Nurs Res 2018;23:42-55.
13. Randhawa RK. Development and impementation of the psychophysiological well-being assessment tool based on Roy's adaptation model for breast cancer patients: A pilot study. Asian J Obstet Gynaecol J Multidimensional Res 2019:8:66-76.
14. Biesecker BB, Erby LH, Woolford S, Adcock JY, Cohen JS, Lamb A, *et al*. Development and validation of the psychological adaptation scale (PAS): Use in six studies of adaptation to a health condition or risk. Patient Educ Couns 2013;93:248-54.
15. Prouty AM, Markowski EM, Barnes HL. Using the dyadic adjustment scale in marital therapy: An exploratory study. Fam J 2000;8:250-7.
16. Baker R, Thomas S, Thomas PW, Owens M. Development of an emotional processing scale. J Psychosom Res 2007;62:167-78.
17. Grassi L, Buda P, Cavana L, Annunziata MA, Torta R, Varetto A. Styles of coping with cancer: The Italian version of the Mini-Mental Adjustment to Cancer (Mini-MAC) scale. Psychosoc Oncol 2005;14:115-24.
18. Streiner DL, Norman GR, Cairney J. Health Measurement Scales: A Practical Guide to their Development and Use. 16th ed. Glasgow, Bell and Bain Ltd. Oxford University Press; 2024.
19. Polit DF, Yang F. Measurement and the Measurement of Change: A Primer for the Health Professions. Philadelphia, PA: Wolters Kluwer; 2016.
20. Williams B, Onsman A, Brown T. Exploratory factor analysis: A five-step guide for novices. Australas J Paramed 2010;8. doi: 10.33151/ajp.8.3.93.
21. Taherdoost H, Sahibuddin S, Jalaliyoon N. Exploratory factor analysis; Concepts and theory. Adv Pure Appl Math 2022;27:375-82.

22. Wing WY HO. Principal component analysis: Development and initial validation of the mirror effects inventory. BMC Psychol 2023;11:363-80.
23. Cabrera-Nguyen P. Author guidelines for reporting scale development and validation results in the Journal of the Society for Social Work and Research. J Soc Soc Work Res 2010;1:99-103.
24. DiIorio CK. Measurement in Health Behavior: Methods for Research and Evaluation. John Wiley and Sons; 2006.
25. Prabhu M, Nambirajan T, Abdullah NN. Analytical review on competitive priorities for operations under manufacturing firms. J Indust Engin Manag 2020;13:38-55.
26. Goudarzi F, Khadivzadeh T, Ebadi A, Babazadeh R. Women's interdependence after hysterectomy: A qualitative study based on Roy adaptation model. BMC Womens Health 2022;22:40.
27. Huang CY, Perng SJ, Chen CI, Lu CY. Psychometric and linguistic evaluation of a coping scale for breast cancer survivors in Taiwan. Cancer Nurs 2021;44:121-30.
28. Shabani-Asrami F, Hamzehgardeshi Z, Danesh M, Moosazadeh M. Design and psychometric properties of the persian version of hysterectomy women's educational needs questionnaire (HWENQ). Avicenna J Nurs Midwifery Care 2020;28:205-15.
29. Bigdeli Shamloo MB, Elahi N, Asadi Zaker M, Zarea K, Zareiyan A. Designing and validating an adaptation questionnaire among the husbands of Iranian Muslim women with breast cancer. Front Public Health 2023;11:1073032.
30. Azarmi S, Zareiyan A, Baniyaghoobi A, Farsi Z, Safshekan S. Psychometric properties of Roy's adaptation questionnaire on veterans with lower limb amputation. Iran J War Public Health 2021;13:97-102.
31. Finney SJ. Book Review: Exploratory and Confirmatory Factor Analysis: Understanding Concepts and Applications: By Bruce Thompson Washington, DC:American Psychological Association,2004,195 Pp,ISBN1-59147-093-5.
32. Rusch T, Lowry PB, Mair P, Treiblmaier H. Breaking free from the limitations of classical test theory: Developing and measuring information systems scales using item response theory. J Inf Manag 2017;54:189-203.