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Investigating the psychometric properties of the Persian version of the Quality of Life Questionnaire for Women Infected with HPV (EQUALI-HPV)

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Abstract

Introduction People with human papilloma virus (HPV) struggle with numerous challenges and needs in physical, and psychological aspects of quality of life related to this virus. Several studies have recommended counseling interventions to improve the quality of life for these individuals. There is also a need for standardized and normalized instruments in Iran to evaluate the effect of educational and therapeutic interventions on the quality of life of these patients. Therefore, this study was conducted in gynecological cancer clinics in Kerman and Mashhad to investigate the psychometric properties of the Persian version of the “Quality of Life Questionnaire for Women Infected with HPV”.

Methods This study cross-sectional study included 580 women infected with HPV referred to Kerman and Mashhad’s gynecologic cancer clinics. The samples were selected using convenience sampling method in 2023. Content validity, face validity, and construct validity were assessed using explanatory factor analysis (EFA) and confirmatory factor analysis (CFA).

Results The results of the content validity assessment, which included the Content Validity Index (CVI) and the Content Validity Ratio (CVR), indicated strong content validity. Additionally, qualitatively confirmed face validity, further supports these findings. The results of the EFA revealed that the Persian version of the EQUALI-HPV questionnaire has a 6-factor structure, with 34 items remaining from the 54 items. These 6 factors accounted for 48.9% of the variance and were confirmed by confirmatory factor analysis and using robust root mean square error of approximation (RMSEA = 0.054), comparative fit index (CFI = 0.928), and Tucker-Lewis index (TLI = 0.920). The content validity results showed that all the items had a good validity ratio and index. Cronbach’s alpha and Raykov’s rho were greater than 0.7 for all dimensions.

Conclusion The results showed that the Persian version of the “Quality of Life Questionnaire for Women Infected with HPV” had acceptable validity and reliability and can be utilized to measure the quality of life of these people and conduct psychological studies.

Keywords Psychometric Properties, Quality of life, HPV, Persian version, Iran

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Introduction

Human papillomavirus is one of the most prevalent sexually transmitted infections in young adults [1]. More than 130 types of this virus have been identified, and are classified as high-risk and low-risk based on their epidemiologic association with cervical cancer. The low-risk types include types 6 and 11, which cause genital warts 90% of the time, and the high-risk types include types 16 and 18, which cause cervical intraepithelial neoplasia (CIN) and cervical cancer [1]. It is estimated that cervical cancer is the fourth most common cancer and the most common neoplasm in women worldwide. Although cervical cancer is preventable, it remains a public health problem in developing countries due to inadequate preventive and controlling programs [2]. More than 570,000 new cases of cervical cancer are diagnosed each year worldwide, most of which are caused by resistant high-risk HPV infection [3]. The prevalence of cervical cancer is 6 times higher in developing countries. It has been shown that 35–65% of women become infected through sexual intercourse with infected men [4]. HPV infection is one of the major health concerns for women in developing countries [5]. Patients with sexually transmitted infections suffer not only from physical problems, but also from psychological problems [6].

Quality of life refers to people's perception of their situation in terms of their goals, expectations, standards, and concerns [7]. Quality of life is a fundamental indicator of health, and it is of great significance since it has several dimensions, such as physical health, psychological well-being, social relations, family life, emotions, physical functions, and professional life [8].

HPV infection affects women's quality of life in ways that include not only physical, but also psychological, environmental, social, sexual, and emotional aspects [7, 9]. Women who receive abnormal pap smear test results experience unwanted psychological distress [10], leading to a decline in their mental health and social functioning [11]. Positive pap smear results cause fear of being judged, weakness, humiliation, and the sexual partner's anger [7]. Other concerns include malignancy, partner betrayal, accusation of betrayal, transmission to the partner, the pain of colposcopy, and infertility [12].

Chronic psychological stress may affect the persistence of HPV clinical symptoms and contribute to the progress of HPV-related cervical cancer. Furthermore, a large number of studies have reported a relationship between psychological stress and the prevalence and progress of this virus in relation to cervical dysplasia and cancer [13, 14].

The psychosocial impact of HPV not only reduces women's quality of life, but also reduces their ability to complete diagnosis and treatment [15]. Stress,

depression, and self-blame strategies are significantly more prevalent in HPV patients, and they use more inconsistent coping mechanisms compared to patients with less stressful events. In fact, helping these individuals to find effective strategies can lead to a more desirable clinical outcome [16, 17].

In their studies, Pour Mohsen, Galeshi, Nick and Gurkan, have referred to the importance of counseling-educational interventions in individuals with HPV [18–21]. Given the adverse effects of HPV, consideration of psychiatric and psychological treatments can be useful in managing patients [18, 19, 22]. Women's negative responses to HPV tests must be identified, and more support should be provided to them [23, 24]. Studies over the past two decades have shown that special attention must be paid to the social and psychological outcomes of patients in order to improve their quality of life [25].

HPV patients struggle with numerous challenges and needs in the physical, psychological, emotional, and sexual aspects of quality of life related to this virus, and several studies have highlighted the importance of identifying psychological responses in these patients. There is also a need for standardized and normalized instruments for psychological evaluation of the effect of psychiatric treatments in these patients in Iran. Therefore, this study was conducted in gynecological cancer clinics in Kerman and Mashhad in 2023 to investigate the psychometric properties of the Persian version of the "Quality of Life Questionnaire for Women Infected with HPV".

Materials and methods

Study setting and participants

This study was a cross-sectional study, and the study population consisted of HPV-positive women referred to gynecological cancer clinics in Kerman and Mashhad in 2023. The next step of the researcher was to visit the corresponding centers after getting permission from the Kerman University of Medical Sciences and Ethics Committee. The researcher then explained the study objectives and the significance of participating and completing the questionnaires to each client. After obtaining their informed consent, they were given the questionnaires and asked to complete them with due attention.

According to Boateng et al. (2008) and Guadagnoli and Velicer (1998), a sample size of more than 300 is required to perform factor analysis in order to have an acceptable analysis and comparison of data patterns. Moreover, according to Nunnally (1978), 10 questionnaires must be collected for each item in the questionnaire. Since there are 54 items in the questionnaire, 580 questionnaires were collected using convenience sampling method over 6 months.

Inclusion criteria were a diagnosis of HPV confirmed by gynecologic oncologists [20], less than 6 months having passed since the test [23], no neurologic disorders [26], sexually active [11], and willingness to participate in the study and fill the informed consent form [20].

Exclusion criteria were having HPV-related cancer [20], and having other types of STDs [20].

Instruments

Demographic profile

The first section is related to demographic information such as age, marital status, education level, occupational status [23, 27, 28].

EQUALI-HPV questionnaire

This questionnaire has been designed to evaluate HPV-positive women's quality of life and consists of 54 items in 6 domains: 1)- Reaction and feelings to diagnosis; 2)- Health center information; 3)- Reaction to clinical examination; 4)- Social, family, and work relations; 5)- Dealing with a life with HPV; and 6)- Social support. The first, second, third, fourth, fifth, and sixth dimensions consist of questions 1–15 and 48, 16–27 and 12, 28–31, 32–34 and 49–51, 52–54 and 35–41, and 42–47, respectively. Each item has a 5-point Likert scale response (Never to Always), and the quality-of-life score is reported quantitatively, with 54 and 270 being the lowest and highest scores, respectively. The higher the score, the better the quality of life. The reliability and validity of the Brazilian version of this instrument were assessed by Natália Maria Vieira Pereira-Caldeira et al. (2020), and the overall Cronbach's alpha was reported to be 0.883 [9]. In the present study, the psychometric properties of this questionnaire in Iran are presented in the results section.

Translation

International Quality of Life Assessment (IQOLA) protocol was used for translation. It included translation steps, translation quality assessment, backward translation, and comparison of the English version with the Persian version of the questionnaire. First, the original designers of the questionnaire were contacted by e-mail and permission to translate the EQUALI-HPV questionnaire was obtained. The original version (English) was translated independently by two translators who were familiar with the lexicology and fluent in both the source and target languages (Forward translation). The translated versions were then compared and the differences and inconsistencies were modified. Finally, the final translated version of the questionnaire was obtained by combining the initial translated versions. In the next step, the final translated version was translated from the target language (Persian) back to the source language (English) (Backward translation). It was then analyzed, and the inconsistencies and differences

were discussed. Finally, after comparison with the original version and application of the necessary modifications, it was ready for psychometric evaluation [29].

Statistical analysis

Content validity

The aim of content validity is the adequacy of the content coverage. If the questions or items are representative of the measured construct, the test has content validity. Content validity is the only validity that emphasizes logical rather than statistical evidence. Qualitative and quantitative methods are used to determine content validity. In the qualitative assessment, 10 experts with knowledge and experience in instrument design, sexual and reproductive health, nursing, psychology, and health education were asked to provide feedback after qualitatively reviewing the instrument for grammar, use of proper words, correct item placement, and appropriate scoring. The necessary corrections were then made based on expert opinions.

The content validity ratio (CVR) and content validity index (CVI) were used for quantitative evaluation. To determine the CVI, the questionnaire was given to at least 10 experts (who are different from those involved in the qualitative assessment), and they were asked to determine which items were necessary, useful but not necessary, or unnecessary.

The Lawshe et al. (1975) table was used to interpret the CVI. To determine, calculate, and evaluate the CVI, the questionnaire was given to 10 experts, and they were asked to determine if the items were relevant or exclusive, simple and fluent, and clear or transparent based on a 4-point Likert scale. Next, content validity was calculated using the CVI formula. Therefore, in addition to necessity, relevance, simplicity, and clarity were also tested [30, 31].

Face validity

The qualitative approach was used to determine the face validity. To this end, the questionnaire was given to 10 experts and some members of the target group, and they were asked to give their opinion on the difficulty, irrelevance, and ambiguity of the items [31, 32].

Construct validity

Construct validity was evaluated using exploratory and confirmatory factor analyses. Internal consistency, Raykov's rho, and Cronbach's alpha were calculated to determine the internal structure of the questionnaire. First, the multivariate normality of the data was checked using the Henze-Zirkler test, and based on that, the appropriate correlation matrix structure was selected for exploratory factor analysis. Given the fact that the data distribution was not normal in this study, Spearman's correlation coefficient matrix was used as input for exploratory factor analysis.

The data was also checked for outliers and it was found that the data did not contain any outliers. Only 17 observations (2.9%) had missing variables, considering that the matrix of Spearman correlation coefficients was used as input to the factor analysis, the pairwise deletion method was used to calculate the correlation coefficients. Oblimin era was used to find the dimensions of the questionnaire and the principal axis factory method was used to extract the factors. Eigenvalues were calculated as the sum of squared factor loadings across all items for each factor. This value represents the proportion of variance in each item that can be explained by the analysis. To determine the percentage of total variance explained by each factor, the eigenvalue is divided by the total number of items [33]. The scree plot with parallel analysis was used to determine the number of factors (Hayton et al. 2004). Factor loadings lower than 0.40 or cross-loadings greater than 0.40 were excluded. Confirmatory factor analysis (CFA) was then conducted based on the factors identified in the exploratory factor analysis. The 6-factor model was analyzed with CFA using robust maximum likelihood (MLR) estimation. To assess the model's goodness of fit, the ratio of chi-square to the degree of freedom ($\chi^2/df < 3.0$), root mean square error of approximation (RMSEA < 0.08), comparative fit index (CFI > 0.90), Tucker-Lewis index (TLI > 0.9), standardized factor loading greater than 0.5, and *p*-value lower than 0.05 were used [34–36].

Statistical analysis of data

In this study, while mean and standard deviation were used to describe quantitative variables, frequency and percentage were used for qualitative variables. Exploratory and confirmatory factor analyses were used to test the construct validity of the research, and Cronbach's alpha and Raykov's rho were used to test reliability. The software used in this study was R 4.1.3, and the significance level was set at 0.05.

Ethical considerations

The aim of the study was explained to the participants, and only those who gave their consent to participate were included. The study was approved by the Ethics Committee of Kerman University of Medical Sciences (code No. IR.KMU.REC.1402.267).

Results

Socio-demographic characteristics

The number of participants in the study was 580. They ranged in age from 16 to 77, and the mean age was 30.6 years with a standard deviation of 8.38. Other demographic details of the participants are shown in (Table 1).

Table 1 Demographic information of participants

Variable	N (%)
Marital status	
single	62 (10.7)
Married	439 (75.7)
Living apart from the spouse	36 (6.2)
Divorced	43 (7.4)
Sex status	
No partner	20 (3.4)
One partner	481 (82.9)
Multi partner	79 (13.6)
Education	
Illiterate	8 (1.4)
High school	124 (21.4)
Diploma	172 (29.7)
Associate Degree	102 (17.6)
Bachelor	130 (22.4)
Senior	35 (6.0)
P.H.D	9 (1.6)
Job status	
Employee	92 (15.9)
Housewife	280 (48.3)
Student	92 (15.9)
Freelance job	114 (19.7)
Retired	1 (2)
Prevention method	
I do not have	173 (29.8)
Condom	211 (36.4)
Other than condoms	195 (33.6)
Duration of positive test	
Less than a month	186 (32.1)
One to three months	229 (39.5)
Four to six months	159 (27.4)
HPV genotype	
High risk	175 (30.2)
Low risk	236 (40.7)
Mix	155 (26.7)
Wart	
No	302 (52.1)
Yes	277 (47.8)
Pap smear test result	
Normal	309 (53.3)
ASCUS	160 (27.6)
LSIL	76 (13.1)
HSIL	14 (2.4)
Mean ± SD	
Age	30.62 ± 8.382

Content validity

CVI and CVR were used to check the content validity. According to Lawshe's (1975) table, with 10 experts, the

minimum CVR must be 0.62 for each item. According to Waltz & Bausell, CVIs higher than 0.79 are also acceptable. The CVR value was greater than 0.79 for all the items, and no item was excluded in this part. The CVR and CVI values are shown in the appendices.

Face validity

The participants of the target group were asked to read the items compiled for the tool and express their understanding of the items to the researcher and think aloud. They were also asked about the level of difficulty, appropriateness and ambiguity of the items, and the need to remove or add the items of the tool. According to the opinions of the experts and the target group, none of the items were removed at this stage.

Construct validity

Factor analysis

The number of factors was determined by parallel analysis. The exploratory factor analysis resulting from the scree plot is shown in (Fig. 1).

Exploratory factor analysis identified 6 factors with a cumulative explained variance of 48.9%. KMO index of sampling adequacy was estimated to be 0.91. Therefore, it can be said that the data are suitable for factor analysis, which confirms the sampling adequacy. In the Bartlett test, the chi-square was 12,342.73 with *p*-value < 0.001, indicating that the correlation matrix has significant correlations at least among some of the variables. After the exploratory factor analysis, the extracted factors were named using the values loading on the questions. Factor loadings communicate the relationship of each variable

to the underlying factors. The variables with large loadings (>0.40) indicate that they are representative of the factor. These 6 factors are as follows: The first dimension: Reaction and feelings to diagnosis (10 items) explained 12.1% of the variance; the second dimension: Dealing with a life with HPV (9 items) explained 11.3% of the variance; the third dimension: Social, family, and work relations (5 items) explained 6.6% of the variance; the fourth dimension: Reaction to clinical examination (4 items) explained 7.8% of the variance; the fifth dimension: Social support (3 items) explained 6.3% of the variance; and the sixth dimension: Health center information (3 items) explained 4.8% of the variance. The diagonal element of the anti-image correlation matrix gives the information about the sampling adequacy of each and every item that was greater than >0.7. For the first dimension of questions (q1-q2-q3-q4-q5-q6-q8-q9-q10-q13), the second dimension of questions (q14-q15-q41-q42-q44-q45-q46-q47-q48), the third dimension of questions (q32-q34-q35-q36-q37), the fourth dimension of questions (q27-q28-q29-q30), the fifth dimension of questions (q52-q53-q54), the sixth dimension of questions (q20-q22-q24) remained. A summary of the information and factor loadings of the exploratory factor analysis is shown in (Table 2).

Confirmatory factor analyses

The 6-factor model was tested with CFA using the MLR estimation method. MLR was used because the data did not follow the multivariate normal. Several indicators showed a good model for the construct, such as: ratio of chi-square to the degree of freedom

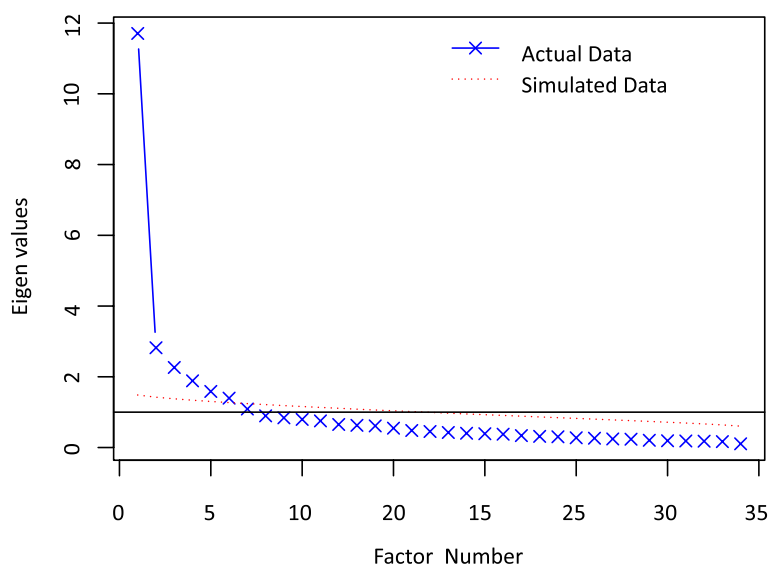


Fig. 1 The scree plot of the factor analysis

Table 2 Rotated factor loadings of the EQUALI-HPV questionnaire items

Question	Item	Factor loadings					
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
q04r	1	0.85	0.05	-0.08	0.01	-0.05	0.04
q02r	2	0.73	-0.05	0.09	-0.04	0.03	-0.04
q06r	3	0.70	0.05	-0.08	0.06	0.09	0.01
q03r	4	0.70	-0.04	0.04	0.10	0.03	0.04
q05r	5	0.64	0.07	-0.04	0.09	0.03	-0.02
q01r	6	0.64	-0.06	0.07	0.05	0.04	-0.08
q08r	7	0.51	0.19	0.14	0.00	-0.01	0.01
q10r	8	0.43	0.11	0.29	-0.02	-0.03	-0.10
q09r	9	0.37	0.11	0.25	-0.09	0.06	-0.10
q13r	10	0.34	0.16	0.31	0.10	0.03	-0.09
q44r	11	-0.08	0.83	-0.06	0.06	0.06	0.02
q48r	12	0.12	0.77	0.01	-0.04	-0.01	-0.04
q45r	13	0.03	0.76	-0.08	0.04	0.00	0.01
q42r	14	-0.06	0.73	0.11	0.03	0.04	-0.01
q41r	15	0.01	0.70	0.05	-0.01	-0.03	-0.02
q47r	16	0.15	0.55	0.14	0.03	-0.02	-0.06
q46r	17	0.10	0.41	0.20	0.13	0.07	-0.03
q14r	18	0.30	0.35	0.04	0.06	-0.10	0.04
q15r	19	0.30	0.34	0.15	-0.04	-0.02	-0.02
q35r	20	-0.01	-0.04	0.76	0.09	-0.02	0.01
q34r	21	-0.09	-0.04	0.70	0.13	-0.03	-0.01
q36r	22	0.11	0.22	0.55	-0.06	0.07	-0.01
q37r	23	0.18	0.22	0.50	-0.05	0.02	0.04
q32r	24	0.19	0.20	0.45	-0.01	0.04	-0.04
q28r	25	0.03	-0.01	-0.05	0.84	-0.06	-0.06
q30r	26	-0.01	-0.02	0.06	0.83	0.06	-0.02
q29r	27	-0.01	0.06	0.08	0.81	0.04	0.04
q27r	28	0.07	0.02	-0.07	0.71	-0.07	0.05
q53	29	0.07	-0.05	-0.03	-0.03	0.92	0.01
q54	30	0.01	0.02	0.05	0.04	0.84	-0.02
q52	31	-0.12	0.10	-0.03	-0.02	0.73	0.02
q22	32	-0.03	0.01	0.03	0.00	0.01	0.82
q20	33	0.03	-0.03	0.04	-0.01	-0.01	0.77
q24	34	0.09	0.03	-0.05	0.00	0.00	0.55
Eigenvalues		4.10	3.85	2.24	2.66	2.16	1.64
Variance ratio (%)		12.1	11.3	6.6	7.8	6.3	4.8

($\chi^2/df=2.42$), root mean square error of approximation (RMSEA=0.054), robust comparative fit index (Robust CFI=0.928), and robust Tucker Lewis index (Robust TLI=0.920). A good relationship between the items and related factors is indicated by the standardized factor loadings greater than 0.5 and *p*-value lower than 0.05, confirming the construct validity. The extracted average variance of these dimensions are respectively 0.49, 0.50, 0.50, 0.64, 0.72, and 0.56, respectively, indicating that the divergent validity is

good. A good final model was obtained using confirmatory analysis, as shown in (Fig. 2).

Reliability

The Cronbach’s alpha for each factor was 0.907, 0.905, 0.834, 0.881, 0.880, and 0.771 for the first, second, third, fourth, fifth, and sixth dimensions, respectively. Moreover, Raykov’s rho was 0.894, 0.871, 0.784, 0.821, 0.883, and 0.782 for the first, second, third, fourth, fifth, and sixth dimensions, respectively.

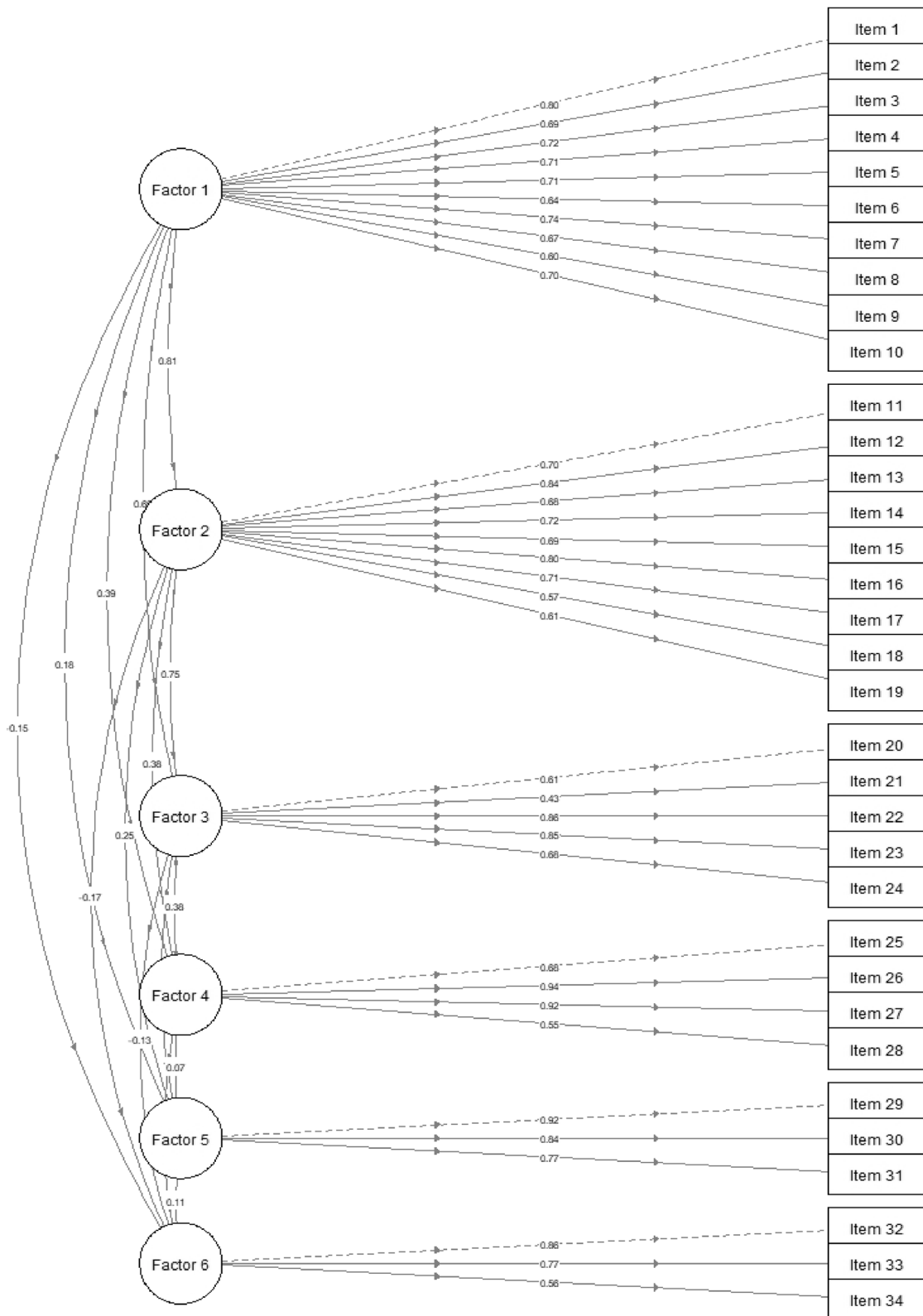


Fig. 2 Models' framework with standardized factor loadings and correlations between the latent factors

Discussion

Quality of life is a fundamental indicator of well-being. Moreover, since quality of life has multiple dimensions, including physical health, mental health, social relations, family life, emotions, physical functions, and people's professional life, paying attention to it is of great importance. Therefore, the present study aimed to investigate the psychometric properties of the Persian version of the "Quality of Life Questionnaire for Women Infected with HPV" in women's cancer clinics of Kerman and Mashhad in 2023. According to the results, the Persian version of the questionnaire, which includes 34 items, has favorable psychometric properties. First, to verify the correctness of the content, the values of the content validity ratio and content validity index were examined. At this stage, no item was removed and the favorability of the items was confirmed. The results of factor analysis indicated that the quality of life questionnaire for women infected with HPV has a six-factor structure, and these factors together explained 48.9% of the variance. These factors included: Factor 1) Reactions and feelings to the diagnosis (10 items); Factor 2) Coping with "living with HPV" (9 items); Factor 3) Social, family, and work relationships (5 items); Factor 4) Reactions to clinical examination (4 items); Factor 5) Social Support (3 items); Factor 6) Information by the Health center (3 items). Natália Maria Vieira Pereira-Caldeira et al. Also found six factors in their study of the psychometric properties of the EQUALI-HPV, which is in line with the results of the present study [9].

In the study conducted by Natália Maria Vieira Pereira-Caldeira et al. (2020), the value of Cronbach's alpha value for the EQUALI-HPV domains ranged from 0.76 to 0.92. This is consistent with the Cronbach's alpha value in the present study, which ranged from 0.77 to 0.90 [9].

Overall, the CFA results for all domains showed that all construct measurement models were suitable. The results of the present study cannot be compared with the psychometric properties of other studies on the quality of life of women with HPV due to insufficient documentation. Based on the assumptions of multivariate analysis, the data for CFA were not normally distributed. Therefore, MLR is the preferred method for fitting the CFA model to overcome the violation of the normality of the multivariate analysis. For the above-mentioned reasons, the MLR estimation was performed using robust (Huber-White) with standard errors and a scaled test statistic that is hypothetically equivalent to the Yuan-Bentler test statistic [37, 38].

Our findings showed a relatively acceptable fit for the questionnaire, and provided confirmatory details for the factor structure for each of the six domains. All fit indices (RMSEA, CFI, TLI, SRMR) were within acceptable limits, supporting the construct validity [37].

Suggestions to other researchers

It is recommended that future studies, evaluate the effect of psychological interventions on the quality of life of these patients in experimental designs and clinical trials using this tool.

Conclusion

Based on the results of the present study, the Persian version of the "Quality of Life Questionnaire for Women Infected with HPV" had acceptable validity and reliability, and accordingly, can be used to evaluate the quality of life and the effect of psychological and therapeutic interventions on the quality of life of these women.

Abbreviations

HPV	Human papilloma virus
RMSEA	Robust Root Mean Square Error of Approximation
CFI	Robust Comparative Fit Index
TLI	Robust Tucker-Lewis Index
CIN	Cervical intraepithelial neoplasia
CVR	Content Validity Ratio
CVI	Content Validity Index
SRMR	Standardized Root Mean Square Residual
KMO	Kaiser-Meyer-Olkin factor adequacy
CFA	Confirmatory analyses
EFA	Explanatory factor analysis

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-024-19954-0>.

Supplementary Material 1.

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Authors' contributions

A.Z.A. and A.A. wrote the main manuscript text and S.H.M. analysed the data and Z.H. and M.I. offered the data and N.M.V.P. was the author of original questionnaire. All authors reviewed the manuscript.

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Availability of data and materials

All data supporting the results of this study are not publicly available due to participant confidentiality, but are available from the corresponding author upon reasonable request.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

All methods in the present study were performed in accordance with relevant guidelines and regulations. Ethical approval for the study was obtained from the Ethics Committee of Kerman University of Medical Sciences in Iran (Ethics approval code: IR.KMU.REC.1402.267). First, the aim of the study was explained to the participants. They were then ensured that their information would remain confidential. They were also informed that participation was completely voluntary and that they had the right to leave at any time. Finally, the informed consent form was signed by each participant.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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