

Investigating the psychometric properties of the Persian version of the quality of life of women infected with HPV questionnaire (EQUALI-HPV)

Azam Zare Arashlouei

Kerman University of Medical Sciences

Saiedeh Haji Maghsoudi

Kerman University of Medical Sciences

Morvarid Irani

Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh

Zahra Honarvar

Kerman University of Medical Sciences

Atefeh Ahmadi (✉ atefeahmadi59@gmail.com)

Kerman University of Medical Sciences Kerman

Natália Maria Vieira Pereira-Caldeira

Federal University of Juiz de Fora - UFJF

Research Article

Keywords: Psychometric properties, quality of life, HPV, Persian version

Posted Date: December 28th, 2023

DOI: <https://doi.org/10.21203/rs.3.rs-3755027/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Introduction

People with human papilloma virus (HPV) struggle with numerous challenges and needs in physical, psychological aspects of quality of life in relation to this virus. Various studies have recommended counseling interventions to improve these people's quality of life. Also, there is a need for standardized and normalized instruments in Iran to evaluate the effect of educational and therapeutic interventions on these patients' quality of life. Therefore, this study was conducted in gynecologic cancer clinics in Kerman to investigate the psychometric properties of the Persian version of the "quality of life of women infected with HPV questionnaire".

Methods

This study was a cross-sectional study including 580 women infected with HPV referred to Kerman's gynecologic cancer clinics. The samples were selected using convenience sampling in 2023. The content validity, face validity, and construct validity using explanatory factor analysis (EFA) and confirmatory factor analysis (CFA) were evaluated.

Results

The results of the content validity assessment, which included the Content Validity Index (CVI) and Content Validity Ratio (CVR), indicated strong content validity. Additionally, face validity, confirmed qualitatively, further supports these findings. The results of the EFA revealed that the Persian version of the quality of life questionnaire, with 34 items remaining from the 54 items, has a 6-factor structure. These 6 factors showed a 56.7% variance and were confirmed using confirmatory factor analysis 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. The Cronbach's alpha and Raykov's rho were above 0.7 for all the dimensions.

Conclusion

The findings depicted that the Persian version of the "quality of life of women infected with HPV questionnaire" had acceptable validity and reliability and can be utilized to measure these people's quality of life and conduct psychological studies.

1. Introduction

Human papillomavirus is among the most prevalent sexually transmitted infections in young adults (1). More than 130 types of this virus have been identified, which 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 causing genital warts 90% of the time, and the high-risk types include types 16 and 18 causing cervical intraepithelial neoplasia (CIN) and cervical cancer (1). The general prevalence of HPV and its high-risk genotypes (types 16 and 18), which lead to cervical cancer, is high among Iranian women (2). It is estimated that cervical cancer is the fourth cancer and the most common neoplasm in women worldwide. Although cervical cancer can be prevented, it remains a public health issue in developing countries due to poor preventive and control plans (3). Over 570,000 new cervical cancer cases are diagnosed throughout the world every year, most of which are caused by resistant high-risk HPV infection (4). The prevalence of cervical cancer is 6 times higher in developing countries. It has been shown that 35–65% of women are infected due to sexual intercourse with infected men (5).

Quality of life is people's perception of their situation in terms of their goals, expectations, standards, and concerns (6). Quality of life is a fundamental indicator of health, and it is of great significance since it has different dimensions such as physical health, psychological well-being, social relations, familial life, emotions, physical functions, and professional life (7).

HPV infection affects women's quality of life in a way that encompasses not only physical but also psychological, environmental, social, sexual, and emotional aspects (6, 8). Anxiety and concerns about the results and cancer (4), a decline in well-being and quality of life in terms of health (9, 10), decreased sexual satisfaction, sexual depression, lower femininity, and disruptions in sexual relationships (11, 12), lower sexual well-being (13), and negative psycho-social impacts (14, 15). are some of the complications. Women who get abnormal pap smear test results experience an undesirable psychological burden (16), leading to a decline in their psychological health and social functions (17).

Positive pap smear results create a fear of being judged, weakness, humiliation, and the sexual partner's anger (6). Moreover, there are other concerns such as malignancy, partner's betrayal, being accused of betrayal, transmission to the partner, the pain of colonoscopy, and infertility (18).

Chronic psychological stress can affect the durability of HPV clinical symptoms and contribute to the progress of HPV-related cervical cancer. Furthermore, a large number of studies have reported that there is a relationship between psychological stress and the prevalence and progress of this virus in relation to cervical dysplasia and cancer (19, 20). People with a positive high-risk HPV test have been shown to have significantly higher cortisol levels compared with those with a negative test, and chronic stress and daily cortisol are associated with HPV infection. Therefore, they can contribute to the progress of the lesions toward cervical cancer (19, 20). Stress can increase the severity and duration of infectious diseases and reactivate latent viruses (21).

Self-blame strategies are significantly more prominent in HPV patients, and they use more inconsistent coping mechanisms compared with patients with less stressful events. In fact, helping these people to find effective strategies can lead to a more desirable clinical outcome (21). Interventions based on stress management significantly decrease cervical neoplasia (22). Also, women infected with HPV need more psycho-social support (23). Due to the undesirable effects of HPV, considering psychiatric and

psychological treatments can be useful in managing patients (24–26). Women’s negative responses to HPV tests must be identified, and more support should be provided to them (27). Many HPV-positive patients need more information about the transmission methods, causes, and consequences of the virus. They also have concerns and incorrect perceptions such as believing that positive results equal cancer (28). Counseling strategies to establish a connection between healthcare providers and women enable them to gain more awareness about HPV and cervical cancer (29–31). It can also lead to the improvement of health and quality of life in them (32).

HPV patients struggle with numerous challenges and needs in physical, psychological, emotional, and sexual aspects of quality of life in relation to this virus, and various studies have recommended counseling interventions to improve these people’s quality of life. Also, there is a need for standardized and normalized instruments in Iran to evaluate the effect of educational and therapeutic interventions on these patients’ quality of life. Therefore, this study was conducted in gynecologic cancer clinics in Kerman in 2023 to investigate the psychometric properties of the Persian version of the “quality of life of women infected with HPV questionnaire”.

2. Materials and methods

2.1 Study setting and participants

This study was a cross-sectional study, and the study population consisted of HPV-positive women referred to gynecologic cancer clinics in Kerman in 2023. The researcher’s next step was to visit the corresponding centers after receiving permission from the Kerman University of Medical Sciences and the ethics committee. Afterward, the researcher provided explanations about the study objectives and significance to each client in relation to their participation and the questionnaires. After gaining their informed consent, the questionnaires were given to them, and they were asked to complete them with due attention.

According to Boateng et al (2008) and Guadagnoli and Velicer (1998), to perform a factor analysis, a sample size of higher than 300 is needed 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. Therefore, since there are 54 items in the questionnaire, 580 questionnaires were collected using convenience sampling over 6 months.

The inclusion criteria were having been diagnosed with HPV confirmed by gynecologic oncologists (33), less than 6 months having passed since the test (27), not having neurological disorders (34), being sexually active (17), and willingness to participate in the study and fill the informed consent form (33).

The exclusion criteria were having HPV-related cancer (33), and having other types of STDs (33).

2.2 Instruments

2.2.1 Demographic profile questionnaire

The first section is related to demographic information such as age, marital status, education, occupational status (22, 27, 35).

2.2.2 EQUALI-HPV questionnaire

This questionnaire is designed to evaluate HPV-positive women's quality of life and consists of 54 items in 6 domains: 1- reaction and feelings toward diagnosis, 2-health center information, 3-reaction to clinical examination, 4-social, familial, 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 in a way that 54 and 270 are the lowest and highest scores, respectively. A higher score represents a better 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 (8). In the present study, the psychometric properties of this questionnaire in Iran are presented in the results section.

2.3 Translation

First, the original version (English) was translated independently by two translators who were familiar with the lexicology and proficient in both the origin and target languages. Subsequently, the translated versions were compared and the differences and inconsistencies were modified. Eventually, 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 original language (English). It was then analyzed, and the inconsistencies and differences were discussed. Finally, after comparing it to the original version and applying the required modifications, it was ready for psychometric evaluation.

2.4 Statistical analysis

2.4.1 Content validity

The aim of content validity is the adequacy of content coverage. If questions or items are representatives of the measured construct, the test has content validity. Content validity is the only validity emphasizing logical rather than statistical evidence. To determine content validity, qualitative and quantitative methods are employed. In the qualitative assessment, 10 experts with knowledge and experience regarding instrument design, sexual and reproductive health, nursing, psychology, and health education were asked to give their feedback after qualitatively checking the instrument in terms of grammar, use of proper words, correct placement of the items, and appropriate scoring. Afterward, the necessary corrections were made based on experts' opinions.

In the quantitative assessment, content validity ratio (CVR) and content validity index (CVI) were used. To determine the CVI, the questionnaire was provided to a minimum of 10 experts (these experts are different from those involved in the qualitative assessment), and they were asked to determine which items are necessary, useful but not necessary, or unnecessary.

To interpret the CVI, Lawshe et al (1975) table was used. To determine, calculate, and evaluate CVI, the questionnaire was provided 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, using the CVI formula, the content validity was calculated. Therefore, relevance, simplicity, and clarity were tested in addition to necessity (36, 37).

2.4.2 Face validity

The qualitative approach was taken to determine the face validity. To this end, the questionnaire was provided to 10 experts, and they were asked to express their opinions on the difficulty, irrelevance, and ambiguity of the items (37, 38).

2.4.3 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. Exploratory factor analysis was performed based on the Spearman correlation coefficient using oblimin rotation. 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 crossloadings higher than 0.40 were excluded. Afterward, confirmatory factor analysis (CFA) was performed based on the factors determined 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 higher than 0.5, and p-value lower than 0.05 were used (39–41).

2.4.4 Statistical analysis of data

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

2.5 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).

3. Results

Socio-Demographic Characteristics:

The number of participants in the study was 580. They were 16–77 years old, and the mean age was 30.6 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)

Variable	N (%)
Marital status	
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. Also, according to Waltz & Bausell, CVIs higher than 0.79 are acceptable. The CVR value was higher than 0.79 for all the items, and no item was excluded in this part. The CVR and CVI values are presented in the appendices.

Factor analysis:

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

The exploratory factor analysis led to the identification of 6 factors with a cumulative explained variance of 56.7%. The sampling adequacy index KMO was estimated to be 0.91. Therefore, it can be said that the data are suitable for factor analysis, confirming sampling adequacy. In the Bartlett test, chi-square was 12342.73 with p-value < 0.001. After the exploratory factor analysis, the extracted factors were named using the values loading on the questions. These 6 factors are as follows: The first dimension: reaction and feelings toward diagnosis (10 items), the second dimension: dealing with a life with HPV (9 items), the third dimension: social, familial, and work relations (5 items), the fourth dimension: reaction to clinical examination (4 items), the fifth dimension: social support (3 items), and the sixth dimension: health center information (3 items). A summary of the information and factor loadings of the exploratory factor analysis is presented in (Table 2).

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

Question	Item	Factor loadings					
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
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
Explained variance (%)		25.70	24.40	15.20	14.60	11.40	8.70

Confirmatory analyses:

The 6-factor model was tested with CFA using the MLR estimation method. MLR was used since 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 ($\chi^2/df = 2.42$), root mean square error of approximation (RMSEA = 0.054), robust comparative fit index (Robust CFI = 0.928), robust Tucker Lewis index (Robust TLI = 0.920). A good relationship between the items and related factors is shown by the standardized factor loading higher than 0.5 and p-value lower than 0.05, confirming the construct validity. The results of the confirmatory analysis are provided in (Table 3). A good final model was obtained using confirmatory analysis, which is presented in (Fig. 2).

Table 3
Results of CFA of the EQUALI-HPV questionnaire.

Factors		Estimate	SE	Standardized factor loading	P-value
Factor 1					
Item 1	q4r	1.00		0.80	
Item 2	q2r	0.84	0.04	0.69	< 0.001
Item 3	q6r	0.98	0.04	0.72	< 0.001
Item 4	q3r	0.82	0.03	0.71	< 0.001
Item 5	q5r	0.91	0.04	0.71	< 0.001
Item 6	q1r	0.72	0.04	0.64	< 0.001
Item 7	q8r	0.81	0.04	0.74	< 0.001
Item 8	q10r	0.80	0.05	0.67	< 0.001
Item 9	q9r	0.70	0.05	0.60	< 0.001
Item 10	q13r	0.86	0.05	0.70	< 0.001
Factor 2					
Item 11	q44r	1.00		0.70	
Item 12	q48r	1.24	0.06	0.84	< 0.001
Item 13	q45r	1.02	0.04	0.68	< 0.001
Item 14	q42r	1.06	0.06	0.72	< 0.001
Item 15	q41r	0.99	0.06	0.69	< 0.001
Item 16	q47r	1.14	0.06	0.80	< 0.001
Item 17	q46r	1.03	0.06	0.71	< 0.001
Item 18	q14r	0.74	0.06	0.57	< 0.001
Item 19	q15r	0.82	0.06	0.61	< 0.001
Factor 3					
Item 20	q35r	1.00		0.61	
Item 21	q34r	0.73	0.07	0.43	< 0.001
Item 22	q36r	1.42	0.09	0.86	< 0.001
Item 23	q37r	1.48	0.10	0.85	< 0.001
Item 24	q32r	1.25	0.10	0.68	< 0.001

Factors		Estimate	SE	Standardized factor loading	P-value
Factor 4					
Item 25	q28r	1.00		0.68	
Item 26	q30r	1.45	0.08	0.94	< 0.001
Item 27	q29r	1.40	0.09	0.92	< 0.001
Item 28	q27r	0.77	0.05	0.55	< 0.001
Factor 5					
Item 29	q53	1.00		0.92	
Item 30	q54	0.95	0.04	0.85	< 0.001
Item 31	q52	0.86	0.04	0.77	< 0.001
Factor 6					
Item 32	q22	1.00		0.86	
Item 33	q20	0.90	0.07	0.77	< 0.001
Item 34	q24	0.63	0.06	0.57	< 0.001

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. Also, 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.

4. Discussion

Quality of life is a fundamental indicator of well-being. Moreover, since quality of life has various 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 of women infected with HPV questionnaire" in Kerman's women's cancer clinics 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 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 of women infected with HPV questionnaire has a six-factor structure, and these factors together explained % 56.7 of the variance. These factors included: Factor 1: Reactions and feelings towards 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. in their study on the psychometric properties of the EQUALI-HPV also found six factors, which is in line with the results of the present study (8).

In the study conducted by Natália Maria Vieira Pereira-Caldeira et al. (2020), the value of Cronbach's alpha for EQUALI-HPV domains ranged from 0.76 to 0.92. This was in accordance with the value of Cronbach's alpha in the present study which ranged from 0.77 to 0.90 (8).

Overall, the CFA results of all the domains showed that all construct measurement models are suitable. The findings 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 documents. Based on the assumptions of multivariate analysis, the data were not normally distributed for CFA. Therefore, MLR is the preferred method for fitting the CFA model to turn over the violation of the normality of the multivariate analysis. Due to the above-mentioned reasons, the MLR estimation was done using robust (Huber-White) with standard errors and a scaled test statistic that is hypothetically in accordance with the Yuan-Bentler test statistics (42, 43).

Our findings showed a relatively acceptable fit for the questionnaire, providing confirmatory details for the factor structure for each of the six domains. All the fit indices (RMSEA, CFI, TLI, SRMR) were within acceptable values and therefore supported the construct validity (42).

Strengths and Limitations:

One of the limitations of the present study was geographical limitation. This study was only conducted on women with HPV in Kerman and therefore caution should be exercised when generalizing these results to other cities. As previously mentioned, this is the first Confirmatory factor analysis of the EQUALI-HPV in Iran; consequently, comparison with other studies is impossible.

Suggestions to other researchers:

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

5. Conclusion

The results of the present study indicated that the Persian version of the “quality of life of women infected with HPV questionnaire ” has 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 people.

Abbreviations

HPV

Human papiloma 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.

Declarations

Acknowledgments

The authors would like to express their gratitude to all the HPV-positive women participating in the research.

Authors' contributions

AZA, SH, MI, ZH,AA and NM contributed to the study's design.AA coordinated the project. AZA,MI,ZH supervised the data collection. AZA, SH were responsible for the analysis of the data. AZA wrote the initial draft of the manuscript. SH, AA revised the draft manuscript. All authors have read and approved the final manuscript.

Funding

Not applicable

Availability of data and materials

All data supporting this study's findings are not publicly available due to participants' confidentiality; however, they are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

All methods in the present study were carried out in accordance with relevant guidelines and regulations. Ethical approval for the study was obtained from the ethics committee of the Kerman University of Medical Sciences in Iran (Ethics approval code: IR.KMU.REC.1402.267). Initially, the aim of the study was explained to the participants. Then, they were ensured that their information would remain confidential. They were also informed that participation is totally voluntary and that they have the right to leave whenever they want. Finally, the informed consent form was signed by each participant.

Consent for publication

Not applicable

Conflict of interest

The authors assert that there are no conflicts of interest in this study.

Author details

¹ Student Research Committee, Razi Faculty of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran. ² Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran. ³ Department of Midwifery, School of Nursing and Midwifery, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran. ⁴ Department of Obstetrics and Gynecology, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran. ^{5*} Reproductive Health, Family and Population Research Center, Kerman University of Medical Sciences Kerman, Iran. ⁶ Faculty of Nursing, Maternal-Child and Public Health Department, Federal University of Juiz de Fora - UFJF, Brazil.

References

1. Buenconsejo L, Kothari-Talwar S, Yee K, Kulkarni A, Lara N, Roset M, et al. Estimating the burden of illness related to genital warts in the Philippines: a nationally representative cross-sectional study. *Infect Agents Cancer*. 2019;14:1–19.
2. Malary M, Moosazadeh M, Hamzehgardeshi Z, Afshari M, Moghaddasifar I, Afsharimoghaddam A. The prevalence of cervical human papillomavirus infection and the most at-risk genotypes among Iranian healthy women: A systematic review and meta-analysis. *Int J Prev Med*. 2016;7.
3. Urrea Cosme Y, Córdoba Sánchez V, Sánchez GI, Baena A, Ruiz Osorio MA, Rodríguez Zabala D, et al. Health-related quality of life of women after HPV testing as triage strategy for an abnormal Pap

- smear: a nested randomized pragmatic trial in a middle-income country. *Qual Life Res.* 2020;29:2999–3008.
4. McBride E, Tatar O, Rosberger Z, Rockliffe L, Marlow LA, Moss-Morris R, et al. Emotional response to testing positive for human papillomavirus at cervical cancer screening: a mixed method systematic review with meta-analysis. *Health Psychol Rev.* 2021;15(3):395–429.
 5. Galeshi M, Shirafkan H, Yazdani S, Motaghi Z. Reproductive health needs of Human papillomavirus (HPV) positive women: A systematic review. *PLoS ONE.* 2022;17(9):e0266819.
 6. Pereira-Caldeira NMV, Góes FGB, Almeida-Cruz MCMd, Caliari JS, Pereira-Ávila FMV, Gir E. Quality of life for women with human papillomavirus-induced lesions. *Revista Brasileira de Ginecologia e Obstetrícia.* 2020;42:211–7.
 7. Safari A, Bozorghkhoo Z, Asgharnejad Farid A. Predicting the happiness based on self-efficacy and quality of life by mediating of psychological well-being. *Payesh (Health Monitor).* 2022;21(1):47–57.
 8. Pereira-Caldeira NMV, Santos CBD, Pereira-Ávila FMV, Quintana SM, Gir E. Scale for assessing the quality of life of women with Human Papillomavirus infection. *Rev Bras Enferm.* 2021;74(6):e20200698.
 9. Parkpinyo N, Chayachinda C, Thamkhantho M. Factors associated with sexual dysfunction in women experiencing anogenital warts at Siriraj hospital. *J Med Assoc Thail.* 2020;103(4):359–64.
 10. Salah E. Impact of multiple extragenital warts on quality of life in immune-competent Egyptian adults: a comparative cross-sectional study. *Clinical, cosmetic and investigational dermatology.* 2018:289 – 95.
 11. Bennett KF, Waller J, Ryan M, Bailey JV, Marlow LA. The psychosexual impact of testing positive for high-risk cervical human papillomavirus (HPV): a systematic review. *Psycho-oncology.* 2019;28(10):1959–70.
 12. Caruso S, Bruno MT, Cianci S, Di Pasqua S, Minona P, Cianci A. Sexual behavior of women with diagnosed HPV. *J Sex Marital Ther.* 2019;45(7):569–73.
 13. Foster LR, Byers ES. Predictors of the sexual well-being of individuals diagnosed with herpes and human papillomavirus. *Arch Sex Behav.* 2016;45:403–14.
 14. Khopkar US, Rajagopalan M, Chauhan AR, Kothari-Talwar S, Singhal PK, Yee K, et al. Prevalence and burden related to genital warts in India. *Viral Immunol.* 2018;31(5):346–51.
 15. Lee TS, Kothari-Talwar S, Singhal PK, Yee K, Kulkarni A, Lara N, et al. Cross-sectional study estimating the psychosocial impact of genital warts and other anogenital diseases in South Korea. *BMJ open.* 2019;9(3):e025035.
 16. McBride E, Marlow LA, Bennett KF, Stearns S, Waller J. Exploring reasons for variations in anxiety after testing positive for human papillomavirus with normal cytology: a comparative qualitative study. *Psycho-oncology.* 2021;30(1):84–92.
 17. Nahidi M, Nahidi Y, Saghebi A, Kardan G, Jarahi L, Aminzadeh B, et al. Evaluation of psychopathology and quality of life in patients with anogenital wart compared to control group. *Iran J Med Sci.* 2018;43(1):65.

18. Chadwick V, Bennett KF, McCaffery KJ, Brotherton JM, Dodd RH. Psychosocial impact of testing human papillomavirus positive in Australia's human papillomavirus-based cervical screening program: A cross-sectional survey. *Psycho-Oncology*. 2022;31(7):1110–9.
19. Kuebler U, Fischer S, Mernone L, Breymann C, Abbruzzese E, Ehlert U. Is stress related to the presence and persistence of oncogenic human papillomavirus infection in young women? *BMC Cancer*. 2021;21(1):1–10.
20. Lugović-Mihić L, Cvitanović H, Djaković I, Kuna M, Šešerko A. The influence of psychological stress on HPV infection manifestations and carcinogenesis. *Cell Physiol Biochem*. 2021;55(S2):71–88.
21. Cvitanovic H, Šitum M, Meštrović-Štefekov J, Lugović-Mihić L. Stress and coping in patients with clinical manifestation of Human papillomavirus. *Acta Dermatovenerol Croat*. 2017;25(1):32.
22. Cvitanović H, Milošević M, Bukvić-Bešlić I, Lugović-Mihić L. Determination of psychological stress, serum immune parameters, and cortisol levels in patients with human papilloma virus. *Clin Ther*. 2020;42(5):783–99.
23. Garcés-Palacio IC, Sanchez GI, Baena Zapata A, Cordoba Sanchez V, Urrea Cosme Y, Rodriguez Zabala D, et al. Psychosocial impact of inclusion of HPV test on the management of women with atypical squamous cells of undetermined significance: A study within a randomised pragmatic trial in a middle-income country. *Psychol Health*. 2020;35(6):750–69.
24. Nahidi M, Nahidi Y, Kardan G, Jarahi L, Aminzadeh B, Shojaei P, et al. Evaluation of sexual life and marital satisfaction in patients with anogenital wart. *Actas Dermo-Sifiliográficas (English Edition)*. 2019;110(7):521–5.
25. Pourmohsen M, Simbar M, Nahidi F, Fakor F, Majd HA. Women's experiences of infection with human papillomavirus in the face of disease symptoms: a qualitative study. *Int J Womens Health Reprod Sci*. 2020;8(1):37–45.
26. Galeshi M, Shirafkan H, Yazdani S, Motaghi Z. Challenges and Needs of HPV-Positive Women. *INQUIRY: The Journal of Health Care Organization Provision and Financing*. 2023;60:00469580221150094.
27. Qaderi K, Mirmolaei ST, Geranmayeh M, Sheikh Hasani S, Farnam F. Iranian women's psychological responses to positive HPV test result: a qualitative study. *BMC Womens Health*. 2021;21(1):1–11.
28. Sanchez Antelo V, Szwarc L, Paolino M, Saimovici D, Massaccesi S, Viswanath K, et al. A counseling mobile app to reduce the psychosocial impact of human papillomavirus testing: formative research using a user-centered design approach in a low-middle-income setting in Argentina. *JMIR Formative Research*. 2022;6(1):e32610.
29. Arrossi S, Almonte M, Herrero R, Gago J, Antelo VS, Szwarc L, et al. Psycho-social impact of positive human papillomavirus testing in Jujuy, Argentina results from the Psycho-Estampa study. *Prev Med Rep*. 2020;18:101070.
30. Mojarad FA, Khani S, Aliabadian A, Purbarar F, Yaghoubi T. The exploration of life experience of married people with genital warts: A qualitative study. *J Nurs Midwifery Sci*. 2022;9(2):96.

31. GÜRKAN N, GÜRBÜZ T. The Relationship between Human Papillomavirus and Anxiety, Depression, and Sexual Dysfunction in Women. *J Experimental Clin Med*. 2022;39(4):999–1003.
32. Ginieri-Coccosis M, Triantafillou E, Papanikolaou N, Baker R, Antoniou C, Skevington S et al. Quality of life and depression in chronic sexually transmitted infections in UK and Greece: The use of WHOQOL-HIV/STI BREF. *Psychiatrike = Psychiatriki*. 2018;29(3):209–19.
33. Nick N, Torabizadeh C, Ghahartars M, Janghorban R. Adaptation of patients diagnosed with human papillomavirus: a grounded theory study. *Reproductive health*. 2021;18:1–16.
34. Kazeminejad A, Charati JY, Rahmatpour G, Masoudzadeh A, Bagheri S. Comparison of quality of life in anogenital warts with control group. *Tehran Univ Med J*. 2019;76(10):692–8.
35. Qaderi K, Geranmayeh M, Farnam F, Hasani SS, Mirmolaei ST. Iranian HPV-positive Women's Needs and Preferences in Relation to Receiving Health Services: A Qualitative Study. 2021.
36. Vakili MM, Jahangiri N. Content validity and reliability of the measurement tools in educational, behavioral, and health sciences research. *J Med Educ Dev*. 2018;10(28):106–18.
37. Shabankareh K, Hamidi A. Validity Assessment in the Knowledge & Information Science Researches. *Iran J Inform Process Manage*. 2022;34(3):1103–24.
38. Taghizadeh Z, Ebadi A, Montazeri A, Shahvari Z, Tavousi M, Bagherzadeh R. Psychometric properties of health related measures. Part 1: Translation, development, and content and face validity. *Payesh (Health Monitor)*. 2017;16(3):343–57.
39. Fowler J, Jarvis P, Chevannes M. *Practical statistics for nursing and health care*. John Wiley & Sons; 2021.
40. Melnyk BM, Kelly S, Tan A. Psychometric Properties of the Healthy Lifestyle Beliefs Scale for Adolescents. *J Pediatr Health Care*. 2021;35(3):285–91.
41. Meng F, Xuan B. Psychometric Properties of the Chinese Version of the Comprehensive Autistic Trait Inventory. *Psychol Res Behav Manag*. 2023;16:2213–23.
42. Goni MD, Naing NN, Hasan H, Wan-Arfah N, Deris ZZ, Arifin WN, et al. A confirmatory factor analysis of the knowledge, attitude and practice questionnaire towards prevention of respiratory tract infections during Hajj and Umrah. *BMC Public Health*. 2020;20(1):1–8.
43. Raykov T, Marcoulides GA. Scale reliability evaluation under multiple assumption violations. *Struct equation modeling: multidisciplinary J*. 2016;23(2):302–13.

Figures

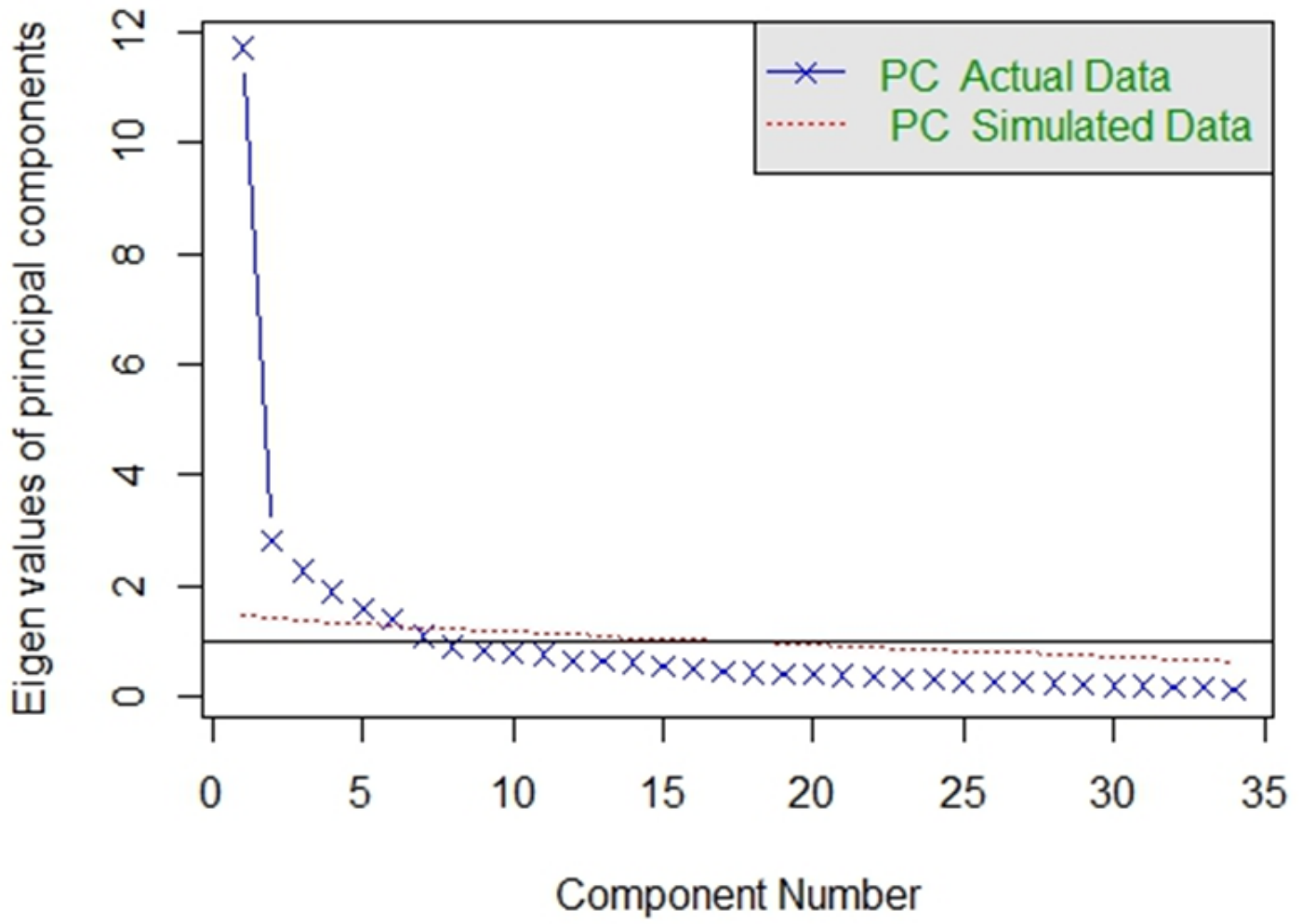


Figure 1

The scree plot of the factor analysis.

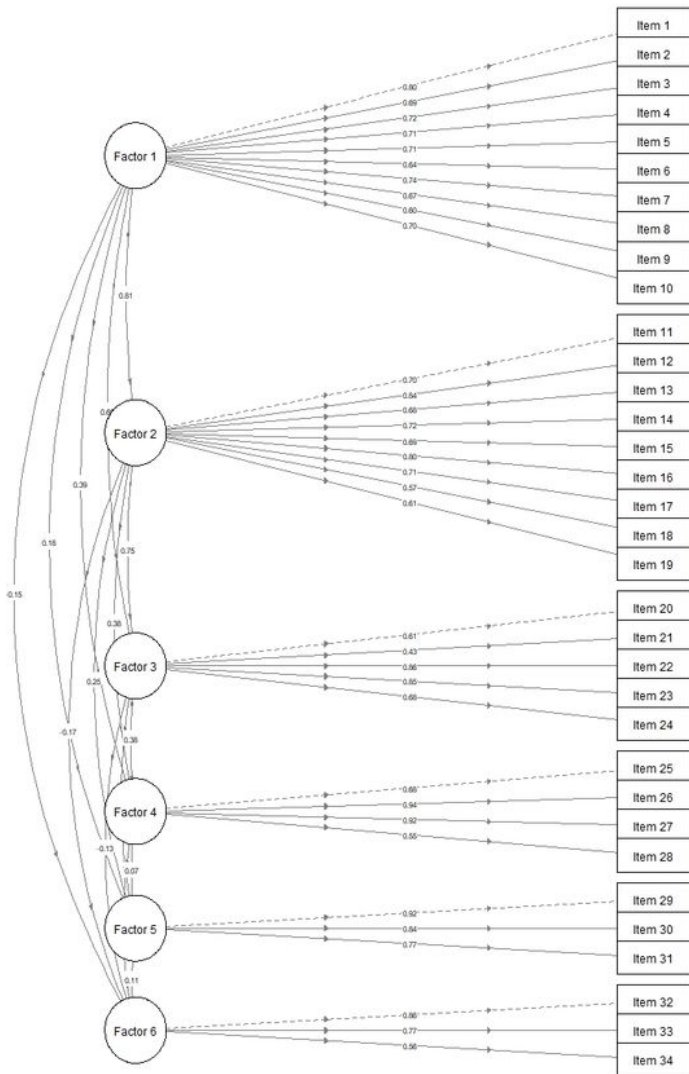


Figure 2

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

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [CVlandCVRattachedtable.docx](#)