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Development and Psychometric Properties of a Condom Use and Its Cognitive Determinants Questionnaire (CUCDQ)

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Abstract

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AIM: The aim of this study was to assess the psychometric properties of Condom Use and its Cognitive Determinants Questionnaire (CUCDQ) among married women in Tabriz, Iran.

MATERIALS AND METHODS: In this cross-sectional study, applying multistage cluster sampling 388 married women were recruited to participate in the study. A comprehensive literature review was conducted to develop CUCDQ. Face, content, and construct validity, as well as reliability, were investigated.

RESULTS: Principal component factor analysis with varimax rotation demonstrated a six factors structure as the best solution [Bartlett's Test of Sphericity (Approx. Chi-Square= 4193.07, df= 780, $p < 0.001$); KMO= 0.815] which explained 43.13% of all the variance between the items. CUCDQ represented a proper validity, reliability, simplicity and functionality.

CONCLUSION: CUCDQ may be helpful for family health care providers and family planning decision makers in precise assessing the behavioural, psychological, and educational factors related to condom use. This scale may be useful in a various range of studies including family planning or STIs prevention studies in different communities. Future research is recommended to assess the different dimensions of the tool in different communities.

Introduction

Family Planning indicators play an important role in balancing the populations' growth to the socioeconomic development of the societies [1, 2]. According to the definition of World Health Organization (WHO), family planning allows individuals and couples to anticipate and attain their desired number of children and the spacing and timing of their births [1].

On the other hand, there is a worldwide estimation of 340 million people newly infected with sexually transmitted infections (STIs) such as HIV [3, 4]. The most of these infections are happened in the poorest regions of the world, as a result of unsafe sex which is known as the second risk factor for illness, disability and death [5].

Considering the lack of vaccines for the most of STIs (especially HIV), condom use has been proposed as one of the most important preventive measures against such infections [6, 7]. If used correctly, a condom may be a reliable method to prevent unplanned pregnancy and many sexually transmitted diseases such as gonorrhoea, chlamydia, trichomoniasis, herpes, HPV, syphilis, chancroid and HIV, as well. As evidence, several previous studies have reported the effect of correct and permanent condom use on reducing the risk of HIV infection by 80% [8-13]. Moreover, based on the statistics reported by WHO, the failure rate of a condom, in perfect use, to prevent pregnancy is about 2% [14, 15].

Although the cost-effectiveness of condom use as a relatively simple intervention to prevent STIs have been, well, documented in previous studies [16, 17], condom effectiveness may be affected by people errors and inconsistent use [18]. The common errors

resulting in reduction in the effectiveness of condom use are incomplete use (like applying the condom only before orgasm and/or early removal of the condom before orgasm), not leaving space at the tip, not squeezing air from the tip before use, not using water-based lubricants and incorrect withdrawal [15].

Despite the remarkable role of condom use in STIs prevention, few studies have been conducted on this behaviour and its contributing factors in Iran. Fallahi et al., [19] in a study of people living with HIV/AIDS, suggested to study the associated factors of STIs (condom use) among the Iranian population. On the other hand, accurate research on a subject with the least mistakes needs reliable and validated instruments related to the subject [20]. To our knowledge, there is no valid, reliable and Iranian-native instrument for condom use and its cognitive factors in Iran. Therefore, the aim of this study was to develop an instrument named as Condom Use and its Cognitive Determinants Questionnaire (CUCDQ) and to assess its psychometric properties. Such instruments may help investigators in precise assessing the behavioural, psychological, and educational factors related to condom use, aiming to address the issue in a various range of studies including family planning or STIs prevention studies in different communities.

Material and Methods

Participants

In this cross-sectional study, applying multistage cluster sampling 388 housewives in Tabriz, Iran, were recruited to participate in the study. There are ten urban regions in Tabriz. To recruit the respondents, two healthcare centres were randomly selected from each region (20 centres). Then, based on the health documents of the population in the health care centres, 22 married women, who used the condom as a contraceptive method, were randomly invited to complete the questionnaires (Response Rate = 88%).

The inclusion criteria included the 15-49 years old married women who used the condom as a contraceptive method and were consent to participate in the study. The exclusion criteria were those women who announced no intercourse with their partner in the previous year, were not in the range of 15-49 years of age and refused to participate in a study.

Ethical approval for the study was provided by Ethics Committee in Tabriz University of Medical Sciences (Ethics Code = 5.4.98341). Before providing the participants with the questionnaires, the purpose of the study was explained and all those accepted the participation signed a consent form.

Instrumentation

The data were collected by a researcher-made questionnaire. To design the instrument a comprehensive literature review [19, 21-24] was conducted to provide an item pool focusing condom use behaviour and its cognitive factors. In this stage, all the possible contents related to the target constructs and the most relevant items to the cognitive factors associated with condom use were systematically selected. One of the researchers cross-checked the derived items. Finally, 50 items were selected.

A panel of experts, including four scholars in the areas of health education and behaviour, a psychologist and a midwife with a field experience in maternal health and family planning reviewed and assessed the items and evaluated the relevance and appropriateness of the items to the married women. The panel, also, evaluated the response format of the scale and confirmed the items to be representative of the constructs. In this stage, four items were omitted considering the suggestions of the expert panel. The instruments were revised based on the feedback from the panel of experts which was mostly regarding the wording and phrasing of the items. The first draft including 46 items was prepared following consultation with the multidisciplinary team. A brief description of the instruments follows.

The initial instrument (50 items) was categorized into six scales, based on the nature of the items, including Knowledge on Condom Use Scale (KCUC), Attitude Toward Condom Use Scale (ACUC), Barriers of Condom Use Scale (BCUC), Errors in Condom Use Scale (ECUC), Willingness to Condom Use Scale (WCUC) and, Behavioral Pattern of Condom Use Scale (BPCUS).

KCUC measured the individuals' awareness and understanding on how to use the condom. This scale included 8 items with 3-point responses (yes = 2, no = 0, I don't know = 1). Examples for KCUC are *Condom should be drawn to the bottom of the penis* and *Condoms should be used before any contact between penis and vagina*. The possible score for this scale ranged from zero to 16. The higher total score for a respondent indicated higher knowledge about condom use.

ACUC was a ten-item scale that was developed to measure the attitudes towards condom use by asking the women about their level of agreement. A five-point Likert-type scaling was used (one = totally agree, two = agree, three = no idea, four = disagree and five = totally disagree). Examples of the items are *Using condom destroys my sexual appeal*, and *Using condom is unfair as it decreases sexual pleasure*. After recoding the negatively stated items, the theoretical range was 0–50, in which higher scores indicate more positive attitude.

BCUC included 7 items with 3-point scaling

(yes = 2, no = 0, I don't know = 1). The scale assessed the beliefs of the respondents on the barriers to using condom. Two examples of the items are as follow: *The erection of my husband goes away before wearing the condom* and *Condom slips while ejecting penis from a vagina, at the end of intercourse*. The theoretical range for this scale was 0-14. The higher total score indicated more perceived barriers of condom use.

ECUC consisted eight items with three possible answers (yes = 2, no = 0, I don't know = 1) which measured the common errors of condom use during intercourse. Examples of the items are *the used condoms may be reused again*, and *a sharp object should be used to open the condom package*. The possible score for this scale ranged from zero to 16, higher the score, the higher rate of errors while condom use.

WCUC was a 7-item scale with 3-point scaling (yes = 2, no = 0, I don't know = 1) that measured the level of willingness among the women to use the condom. Two examples of the items included: *I feel worries while using the condom during intercourse* and *My husband is reluctant to use the condom*. Theoretical range for this scale was 0-14. The higher score indicated more willingness to use condom among the respondents.

BPCUS comprised ten items. In this scale, the women were asked to report the behavioural patterns of using the condom on a regular basis (once a month) during the previous 12 months. The women should select Yes or No for each item, which resulted in a theoretical range of zero to 10. The higher scores represented, the more appropriate pattern of condom use behaviour among the women.

Along with the instrument, a Demographic Data Form was also provided to the respondents. The demographic characteristics included ten variables as follow: age, level of education, occupation, age at menarche, age at marriage, the number of pregnancies, the number of children, and the desired number of children.

To provide the pre-final version of the scales, content and face validity were performed. The Content Validity Index (CVI) and Content Validity Ratio (CVR) were used to validate the content of the instrument, quantitatively.

To determine the CVR, the abovementioned expert panel members were asked to consider the necessity of each item by a 3-point Likert-type scale (It is necessary, It is useful but not necessary, It is not necessary). Items with the value more than 0.62 (based on the Lawshe table), were considered as necessary for the instrument [25]. To determine the CVI [26], the expert panel was, also, asked to assess the relevancy, clarity, and simplicity of each item. These three criteria were analysed, separately, by a 4-point Likert-type scale. Those items with the CVI

value less than 0.75 (2 items), were considered as inappropriate [27] and, therefore, deleted from the questionnaire.

Face validity of the instruments was carried out with both quantitative and qualitative methods. The same expert panel evaluated the quality of each item for difficulty, relevancy and ambiguity. To quantify the face validity of the items, the importance of each item was scored based on a 4-point rating scale. The impact of each item was calculated by multiplying the frequency of an item by its mean importance [Impact Score = Frequency (%) × importance]. The impact score for the items was considered to be 1.5 or higher, as recommended, previously [28]. Eventually, 1 item was removed, and the CUCDQ including 43 items was produced.

The reliability of the questionnaire was assessed using the Cronbach's alpha coefficient. Moreover, the test-retest reliability coefficient was conducted. The questionnaires were completed, on a second occasion, by 20 randomly selected women similar to the study participants, two-weeks later. The Intra-class correlation coefficients (ICC) with 95% confidence intervals (CI) were calculated, and those items with an ICC equal to or more than 0.70 were considered as acceptable.

Statistics

Data were analysed using the SPSS₂₁ statistical software package (SPSS Inc., Chicago, IL, USA). Central tendency and variability measures were used to summarise and organise the data. Content Validity Index (CVI) and Content Validity Ratio (CVR) were applied to assess the content validity. Exploratory Factor Analysis (EFA) was utilised to determine the construct validity and factor structure of the instrument. Also, the internal consistency of the instrument was assessed applying Cronbach's alpha coefficient method. ICC was, also, used to calculate the test-retest reliability coefficient. Descriptive (frequency, mean, standard deviation) and inferential statistics (Pearson correlation coefficient, and linear regression) were used to answer the research questions. P value less than 0.05 was considered statistically significant.

Results

The mean age of the participants was 30.77 ± 6.32 years. About 23% of the women had a less than diploma level of education. The majority of the participants (71.9%) were the employee. The demographic characteristics of the women participated in the study as well as the relationships between the characteristics and the mean score of the factors are shown in Table 1.

Table 1: Relationship between the respondents' characteristics and the mean score of the factors

Variables	Frequency (%)	1 2 3 4 5 6						
		p	p	p	p	p	p	
Age (yrs.) (n = 394)	15-28	154 (38.9)	0.258	0.078	0.240	0.220	0.186	0.093
	28-37	196 (49.5)						
	38-47	37 (9.3)						
	48-49	7 (1.8)						
Age of husband (yrs.) (n = 395)	Younger than 28	50 (12.5)	0.354	0.115	0.276	0.919	0.127	0.479
	28-37	252 (63.6)						
	38-47	77 (19.4)						
	48 and older	16 (4)						
Age at the monarch (yrs.) (n = 360)	9-12	75 (18.9)	0.008	0.045	0.739	0.222	0.144	0.147
	13-14	209 (52.8)						
	15-17	76 (19.2)						
Age at Marriage (yrs.) (n = 393)	Younger than 17	38 (9.6)	0.693	0.099	0.670	0.259	0.834	0.872
	18-22	173 (43.7)						
	23-27	130 (32.8)						
	28-32	44 (11.1)						
	Older than 32	8 (2)						
Occupation (n = 392)	Housewife	110 (27.8)	0.004	0.647	0.927	0.335	0.548	0.982
	Employee	280 (70.7)						
	Other	2 (0.5)						
Occupation of husband	Employee	120 (30.3)	0.952	0.198	0.878	0.409	0.569	0.984
	Self-employed	240 (60.3)						
	Other	34 (8.6)						
Level of Education (n = 393)	Under Diploma	91 (23)	0.197	0.002	0.47	0.316	0.316	0.017
	Diploma	144 (36.4)						
	Higher education	158 (39.9)						
Level of Education for husband (n = 394)	Under Diploma	104 (26.3)	0.273	0.035	0.677	0.011	0.131	0.333
	Diploma	131 (33.1)						
	Higher education	159 (40.2)						
Number of pregnancies (n = 395)	1-2	44 (11.1)	0.051	0.884	0.544	0.694	0.585	0.889
	3-5	313 (79)						
	6 and more	38 (9.6)						
Number of children (n = 396)	0	50 (12.6)	0.136	0.641	0.474	0.961	0.858	0.276
	1	211 (53.3)						
	2-3	121 (30.6)						
	4 and more	13 (3.3)						
Number of desired children (n = 376)	0	41 (10.4)	0.091	0.460	0.460	0.496	0.103	0.679
	1	171 (43.2)						
	2-3	145 (36.6)						
	4 and more	19 (4.8)						

Factor 1 = Negative Attitude toward Condom Use (NACU); Factor 2 = Behavioral Pattern of Condom Use (BPCU); Factor 3 = Perceived Barriers of Condom Use (PBCU); Factor 4 = Errors in Condom Use (ECU); Factor 5 = Willingness to Condom Use (WCU) and Factor 6 = Knowledge on Condom Use (KCU).

Construct validity

EFA was conducted applying the principal component factor analysis with varimax rotation. Bartlett's Test of Sphericity (Approx. Chi-Square = 4193.07, df = 780, p < 0.001) and Kaiser-Meyer-Olkin (KMO) measure (KMO = 0.815) showed suitable correlation matrix and sampling adequacy, respectively, for factor analysis.

Six factors extracted with eigenvalues more than 1, of which, 43.13% of all the variance between the items were explained. The rotated factor pattern coefficient for variables solution is shown in Table 2. For each factor, information is provided regarding the initial eigenvalues (before rotation), variance accounted for after rotation (rotation sum of squares), percentage of the variance explained (after rotation), intra-class correlation coefficients (ICC) with 95% confidence intervals (CI) and internal consistency reliability as showed by Cronbach's alpha for each factor.

As it is shown in Table 2, one of the six factors had Cronbach's alpha less than 0.6, which

argues omitting of this factor. The simple structure and the best solution were determined considering visual inspection and the hyper plane count [29], respectively, and the authors decided not to remove the factor's items. Thus, this factor pattern considered as the optimal solution. The factor pattern coefficient values were used to interpret the factors. According to the recommendations noted by Gorsuch [29] and Tabachnick and Fidell [30], the cut-off of 0.40 was considered to include one item in the interpretation of a factor (Table 2). Factors were named as follow: 1 = Negative Attitude Toward Condom Use (NACU); 2 = Behavioral Pattern of Condom Use (BPCU); 3 = Perceived Barriers of Condom Use (PBCU); 4 = Errors in Condom Use (ECU); Willingness to Condom Use (WCU) and Knowledge on Condom Use (KCU).

Table 2: Rotated matrix of the items of Condom Use and its Cognitive Determinants Questionnaire

Items	Factors*					
	1	2	3	4	5	6
Using condom destroys my sexual appeal	.841					
Using condom makes sexual relationship non-enjoyable	.831					
Using condom decreases my sex pleasure	.817					
Condom Use is annoying	.745					
I don't like using condom	.736					-.217
Using condom is unfair as it decrease sexual pleasure	.632	.253				
The man who uses condom express concern and dissatisfaction with sexual relationship to his partner	.446	.284				
I do not want to use condom as it cause allergy to me	-.396					.353
If my partner proposes condom use to me, it means that he doesn't trust me	.389					
I avoid using condom as far as possible	.360					
Condom may slip at the beginning of intercourse	.770					
The erection of my husband goes away before wearing the condom	.664				.327	
Condom slips during intercourse	.649					
Condom slips while ejecting penis from vagina, at the end of intercourse	.637					
The erection of my husband goes away after wearing condom and at the beginning of intercourse	.230	.513				
Condom does not fit the penis of my husband, and I can feel it during intercourse	.454				.332	
Condom is perforated during intercourse	.447				.347	
When I feel risk for pregnancy/infection during a sexual relationship I use a condom				.682		
During my ovulation period (the tenth to the eighteenth days) I use condom				.679		
I use condom to prevent sexually transmitted diseases and AIDS				.663		
In the case of failure in our routine contraceptive method, We use condom				.650		
My husband use condom only before ejaculation	.551					
We use condom throughout our intercourse	.474			.208		
My husband wear condom before erection	.420					
The used condoms may be reused again				.769		
The timely expired condoms may be used				.719		
A sharp object should be used to open the condom package				.626		
A condom may be reused for several times		.287	.442			
There is no need to check the condom regarding perforation and deflection			.397			
Using condom is difficult			.728			
I feel worries while using condom during intercourse			.694			
My husband is reluctant to use condom	-.234		.442			
I have no confidence to use condom as a contraceptive method			.431			
My husband does not appropriately cooperate in using condom while intercourse	-.268	-.326	.421			
The used condoms shouldn't be reused			.703			
The perforated or defected condoms shouldn't be used			.665			
The Latex condoms should be used	.242		.441			
Condom should be drawn to the bottom of the penis			.212	.397		
Condom should be drawn on an erected penis			.384			
Condoms should be used before any contact between penis and vagina		.266	.247	.332		
Initial Eigenvalues	6.68	3.09	2.41	1.84	1.65	1.56
Rotation sums of squares	4.85	3.16	2.85	2.56	2.24	2.01
Percent of variance explained	16.70	7.72	6.02	4.62	4.13	3.91
Cronbach α	0.77	0.79	0.70	0.65	0.61	0.51

Factor 1 = Negative Attitude Toward Condom Use (NACU); Factor 2 = Perceived Barriers of Condom Use (PBCU); Factor 3 = Behavioral Pattern of Condom Use (BPCU); Factor 4 = Errors in Condom Use (ECU); Factor 5 = Willingness to Condom Use (WCU) and Factor 6 = Knowledge on Condom Use (KCU). * In order to help in decreasing complexity of the table, the loadings less than .2 were omitted.

The bivariate correlation coefficients between the factors are shown in Table 3. Statistically, significant correlations were found between factors 4 (ECU) and all the other factors, except for factors number 3 and 6. The highest and the lowest significant correlations were found between the factor 1 and 2 ($r = 0.414$) and the factor 3 and 4 ($r = -0.141$), respectively.

Table 3: CUCDQ factors Correlation Matrix

Factor	1	2	3	4	5	6
1	1					
2	0.414*	1				
3	-0.032	0.048	1			
4	0.174*	0.381*	0.141*	1		
5	-0.408	-0.276*	-0.015	-0.211*	1	
6	-0.087	-0.069	0.169*	-0.083	0.092	1

Factor 1 = Negative Attitude toward Condom Use (NACU); Factor 2 = Perceived Barriers of Condom Use (PBCU); Factor 3 = Behavioral Pattern of Condom Use (BPCU); Factor 4 = Errors in Condom Use (ECU); Factor 5 = Willingness to Condom Use (WCU) and Factor 6 = Knowledge on Condom Use (KCU). * $p < 0.05$.

Discussion

If used correctly and permanently, condom use is among the safest ways to prevent unintended pregnancy and sexually transmitted diseases (STDs), as it has no side effect-unlike the most of other methods of contraception [8]. However, the effectiveness of this contraceptive method may be reduced due to various causes and factors. The most of the previous studies have focused on the physical causes of the condom use failure [31, 32], and few studies have examined the cognitive factors of the issue. A reason may be the lack of valid and reliable instruments designed specifically, to assess the condom use cognitive factors. Hence, the purpose of this study was to assess the psychometric properties of CUCDQ among Iranian women, to provide a background and a standard tool for further research on identifying the cognitive factors associated condom use.

Exploratory factor analysis showed a six factors structure as the best solution for the instrument. The factors named as Negative Attitude Toward Condom Use (NACU), Perceived Barriers of Condom Use (PBCU), Behavioral Pattern of Condom Use (BPCU), Errors in Condom Use (ECU), Unwillingness to Condom Use (UCU) and Knowledge on Condom Use (KCU). This solution predicted 43.13% of the total variance among the items, within which the explanatory power of the first three factors was 30.45%.

The results showed a moderate to high internal consistency for the factors of CUCDQ, according to the reference table provided by DeVellis [33] as well as Sim and Wright [34]. Cronbach's alpha for the factors was ranged between 0.51 and 0.79. In consistent with the present study, internal consistency

was applied in several previous studies [35-41] to confirm the reliability of different questionnaires. Moreover, applying face and content validity as well as measuring the CVI, the simplicity, clarity and relevancy of the instrument were assured.

Previous studies have suggested that correlations among factors should be reported [29, 35], as it may help other researchers to compare the results. Also, Gorsuch [29] recommended that the correlation between a factor and its related factors may be used as Cronbach's alpha coefficient to demonstrate the stability of each factor. The correlation between the CUCDQ factors indicated a range of low values (at least, -0.015 between NACU and BPCU) to average values (the highest, 0.414 between NACU and PBCU).

Based on the findings, there was a significant positive relationship between factors 1 (Negative Attitude Toward Condom Use) and 2 (Perceived Barriers of Condom Use), which means that more negative attitude toward condom use may result in more perceived barriers to using it. Also, in the present study, a significant negative correlation was found between factors 4 (Errors in Condom Use) and 5 (Willingness to Condom Use), which suggests that increasing the level of willingness to use condom associates to decreasing the level of common errors in the behaviour. Trussel and Guthrie [42] also suggested that common errors in condom use may lead to the failure of this contraceptive method and ultimately change the attitudes of people towards it as a contraceptive method.

There was also a significant positive correlation between factors 4 (Errors in Condom Use) and 3 (Perceived Barriers of Condom Use). Sanders et al., [15] found similar results and reported that condom use errors, such as using it before sex might be a barrier to use it among couples.

In general, condom use is an interpersonal behaviour, which may be affected by several psychosocial factors. As an emphasis, Warner et al., [43] concluded that the use of condom, despite the seemingly simple features (such as low cost and non-prescription availability), is a multi-faceted performance, which, even in the best conditions, is influenced by factors like inexperience, previous negative experiences in performing the behavior and gender inequalities in social relations. He also, emphasised that the use of the condom may be inherently more complex and more difficult due to such influential factors.

As limitations of this study, the low Cronbach's alpha coefficient in some factors and the weak to moderate correlations between the factors may be noted. These weaknesses may be due to the low number of sample. Considering the number of items (43 items), we invited 440 women in the study. But, as condom use and its associated cognitive factors are a taboo to be spoken about in Iranian

culture, about 12% denied to participate in the study. In the case of studying such culture-sensitive subjects in Islamic countries, the higher number of sample size is recommended to compensate the sample use. Moreover, due to the high privacy of the subject, some of the women may not answer to the items accurately. Therefore, providing greater accuracy in data collection of future studies among less open communities is recommended.

In conclusion, CUCDQ was found to be, appropriately, valid, reliable, simple and practical in the present study. Therefore, this instrument may be used as a useful instrument to assess condom use and its cognitive associates among Persian language communities. CUCDQ may help family health care providers and family planning decision makers in precise assessing the behavioural, psychological, and educational factors related to condom use, aiming to address the issue in a various range of studies including family planning or STIs prevention studies in different communities. Future research is recommended to assess the different dimensions of the tool in different communities and also to compare the dimensions with the other indicators of family planning and STIs prevention.

Author Contributions

HA, AT and SK were involved in the conception of the study, performed the analyses and drafted the manuscript. HN and TB were involved in the conception of the study, interpreted the results from the analyses, and HN assisted in drafting and revising the manuscript.

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