

Developing a Valid and Reliable Instrument to Predict the Protective Sexual Behaviors in Women at Risk of Human Immunodeficiency Virus

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Background: One much needed tool to assist with the monitoring and evaluation of Human Immunodeficiency Virus (HIV) prevention programs is to provide a valid instrument to measure protective sexual behavior and related factors.

Objectives: The current study aimed to design a valid and reliable instrument to predict the protective sexual behaviors of women at risk of HIV in Iran.

Patients and Methods: The current study was a sequential mixed cross-sectional and methodological research. Initially, via a qualitative research, constructs and factors associated with sexual protective behavior of women at risk were identified through 25 in-depth interviews. The questionnaire on predictors of protective sexual behaviors in women at risk of HIV (PSPB) was designed based on a qualitative study, and then its qualitative validity, content, and construct validity were evaluated. Exploratory factor analysis was performed and 200 women at risk participated.

Results: Seven concepts emerged after exploratory factor analysis of the 48 items. The content validity ratio (CVR) of the questionnaire constructs were 0.55 to 0.76, and content validity index (CVI) structure was 0.86 to 0.95. Cronbach's alpha coefficient for the entire questionnaire was 0.78, and correlation coefficient of the test-retest reliability for the constructs was from 0.73 to 0.89.

Conclusions: The current study proved the capability of the predictors of sexual protective behavior in women at risk for HIV questionnaire as a valid and reliable instrument for the Iranian community.

Keywords: Vulnerable Populations; Women; Questionnaires

1. Background

Despite the progress achieved in the past three decades, Human Immunodeficiency Virus/ Human Immunodeficiency Virus Infection (HIV/AIDS) is still considered a serious public health issue (1). This infection, in some subgroups in Iran which are at higher risk for HIV transmission, exists in form of an epidemic and is extensively spreading in most parts of the world. These subgroups include female sex workers, drug users, and spouses who are HIV positive and act as a vehicle to infect the other people in the community (2). It is estimated that around 92'000 people in Iran are infected with HIV/AIDS (1). In Iran, the primary means of HIV/AIDS transmission among women is through heterosexual sex and there are serious concerns regarding the spread of this disease in the country (3).

In addition to biological factors, social factors also play a role in women's HIV risks (4). In the first quarter of 2011, sexual transmission has accounted for 21.1% of the total individuals infected with HIV/AIDS (5). Access to reliable and accurate information regarding the behaviors of subgroups that are at risk of HIV/AIDS is important to

keep track of the epidemic and program planning, and to form the development of future prevention programs (6). Therefore, as the first step to assess the predictors of protective sexual behaviors of women at risk for HIV/AIDS, it is necessary to identify the constructs, important, and influencing concepts for these behaviors. In the next stage of the research, appropriate tools to assess protective sexual behaviors can be designed.

Currently, most of the questionnaires and their constructs to predict and assess protective sexual behaviors are patterned after the ones in the West and are used in the community and in different groups of the population; whereas, these models are not very successful in predicting preventive interventions for HIV (7, 8). The available scales developed to explore HIV related sexual behavior, considered individual concepts such as knowledge (9), attitude to the condom (10), self-efficacy to condom use (11), and the perceived risks (12) that are not the entire variables influencing HIV related behaviors. Considering the different social and economic contexts of these behaviors in different countries, a valid and ap-

appropriate instrument inherent to the social and cultural needs of the country must be provided, especially on the sensitive issues such as sexual behavior.

2. Objectives

As there are no gender sensitive scales in Iranian population, the current study was the first and aimed to design a valid and reliable questionnaire within the ecological framework that conforms to the cultural and social conditions of the Iranian population in order to predict protective sexual behaviors of women at risk of HIV.

3. Patients and Methods

3.1. Qualitative Study

The present cross-sectional and methodological study aimed to develop a valid and reliable instrument and was conducted in Tehran, Iran, in 2012 (13). The first step in the process of developing the questionnaire is a deep understanding of the concepts (14). The first stage of the study involved a qualitative study of protective sexual behaviors. Structures and relevant factors associated with the protective sexual behaviors of women at risk were identified through in-depth interviews based on a semi-structured interview guide with 25 women at risk aged 21-49 years. Participants were selected from those who came to the Voluntary Counseling and Testing (VCT) centers of the Shahid Behashti University of Medical Sciences and Non-governmental Organization (NGO) Drop-in-Centers (DICs) in Iran. Data collection and analysis was done using the grounded theory approach.

Constructs and variables identified from the qualitative study were as follows: Skills to negotiate condom and control sexual excitement, situational factors, social support, ability to use condom under the influence of drug use, male dominance in sexual decision making, attitudes towards condoms, and prioritization of male sexual needs. In the next step, items for the predictors of protective sexual behaviors of women at risk of HIV/AIDS questionnaire were determined based on the qualitative study and a review of the literature (9-12).

3.2. Initial Pool and Psychometric Characteristics

The initial pool of the items was composed of 81 items. Construct on knowledge was designed as dichotomy. In the next phase, in order to verify the validity of the questionnaire, qualitative face validity, and content and construct validity were assessed.

In terms of assessing fluency in writing and appropriate phrasing, the questionnaire was analyzed through a face-to-face method with the participation of 12 individuals, and then modifications were implemented in order to achieve qualitative validity. In order to evaluate the content validity of the questionnaire quantitatively; the content validity ratio (CVR) and content validity index (CVI) were used.

To validate a questionnaire, a CVR value is computed for each item. The CVR is an item statistic that is useful to reject or retain a specific item. The ratio of content validity was calculated by summing up the comments of the 14 experts from different disciplines including; health education, reproductive health, midwifery, nursing, epidemiology and researchers and experts from Center for AIDS Control in the Ministry of Health, and also experts from the National AIDS Research Centre, then the necessary modifications were implemented. For this purpose, these experts were asked to assess each item based on Lawshe scale (15). Data obtained from a panel of fourteen expert judges were analyzed. The following formula was devised for the content validity ratio (CVR):

$$CVR = \frac{ne - N/2}{N/2}$$

In which the ne is the number of panelists indicating essential, and N is the total number of panelists. Based on the Lawshe's table, when total number of the panelists is 14, as in the present study, a minimum value of CVR 51 is required to satisfy the five percent level (15). For CVI, the 12 experts used a 4-point Likert scale to assess the questionnaire in order to identify the following criteria: relevance, simplicity and clarity of statements for each item (16). Ceiling effect and floor effect for all of the constructs were under 20%.

Participants of the present study included women who were at risk of HIV, including drug injecting married wives, wives with HIV positive husbands, wives with husbands who were taking narcotics and psychotropic substances, and wives of husbands who had multiple sexual partners. These women were referred to the Voluntary Counseling and Testing (VCT) centers of the Shahid Beheshti University of Medical Sciences (three centers), and four NGO Drop-in-Centers (DICs) in Tehran, aged 18 years and above, were Farsi speakers residing in Tehran and had sexual intercourse experience in the past three months. Women with severe psychological disorders such as severe mental disorders or psychosis based on medical examination (two cases), transgender (0 case), HIV positive (1) and women who were not interested to continue to participate in the study and the corresponding data were incomplete (six cases) were excluded.

In the current study, exploratory factor analysis was used to assess construct validity. Based on the qualitative study that revealed seven concepts concerning protective sexual behaviors of women at risk of HIV, and the rule that 30 samples should be selected per construct (17), the sample size was determined 210. In order to analyze the exploratory factors, the Principal Component Analysis was used and factors were extracted by the oblique factors approach. Therefore, 200 women at risk of HIV aged 19 to 49 years participated in the current study. The cut-off point of 0.35 was considered as a minimum load

factor required to maintain each item (18). In the next phase, the reliability of the questionnaire was assessed by internal consistency (Cronbach's alpha with Kuder-Richardson 20) and stability (test-retest). Cronbach's alpha coefficient was calculated for each factor, and the questionnaire as a whole, for 30 samples. Also, Kuder-Richardson 20 was calculated to construct knowledge by 30 samples. According to the existing sources, the coefficient alpha for standard reliability of a tool was set at 0.7 or higher; however, for descriptive studies, the acceptable alpha value was greater than 0.6 (19). In order to determine the reliability of the questionnaire, the test-retest was applied to the 20 participants and was repeated after two weeks. Convenience sampling was used. After obtaining the necessary permits, the research was initiated and after obtaining informed consent from the participants, the data collection was implemented. Data were analyzed by SPSS software version 19. The current study was approved by Ethics Committee of Shahid Beheshti University of Medical Sciences on June 2012.

4. Results

Two hundred women at risk of HIV, aged 19-49 years participated in the current study. Participants' demographic information and information regarding drug use are shown in Table 1. The marriage age in 40% of the cases was under 16. None of them had a monthly income more than \$500, and 38.5% of these women had six or more sexual partners in their lifetime. Only 29% of the participants used condoms in their last sexual intercourse and 37.5% of them expressed that they abstained from using condom due to their partner's disapproval. Only 13% of the participants had always used male condoms in their sexual relationships for the last three months. Nearly 50% of the participants had transactional sexual relationships.

4.1. CVR and CVI

Assessing the questionnaire for CVR showed that 31 items must be deleted, since they had not met the necessary scores. The average CVR for the constructs of the questionnaire were 0.55 to 0.76. Also, two items were deleted after calculating their CVI. The mean content validity index of the structures was 0.86 to 0.95.

4.2. Construct Validity

In data reduction phase, principal components analysis (PCA) was used as the extraction method oblique (direct-oblimin) rotation (18). Decision making on the number of factors to retain for rotation was based on both the Kaiser criteria (eigenvalues more than one) and the Scree plot test (18). Seven factors emerged in this way. Items with a minimum 0.35 coefficient were retained. Constructs were maintained with an Eigen value of more than one. Since the Kaiser-Meyer-Olkin (KMO) value greater than 0.85 was obtained, the quality of factor analysis in KMO

was considered adequate. In this sequence, to predict the model, 48 items in the form of seven factors with the variance of 51.9% were detected. The number of items for each construct had the following sequence: Skills to negotiate condoms and control excitement (16 items), situational factors (four items), social support (six items), ability to use condom despite the influence of drugs (four items), male dominance in sexual decision making (seven items), attitudes towards condom (four items), and sexual needs of male in priority (three items). Four items had been loaded on more than one factor; therefore, due to their complexity (20) were deleted. Results of the Exploratory Factor Analysis are presented in Table 2. Table 3 shows Cronbach's alpha coefficient for the constructs.

Since rating the knowledge on HIV construct had two values, the Kuder-Richardson 20 was used to assess the internal consistency and the extracted value was 0.79. The Cronbach's alpha coefficient for the whole questionnaire was 0.78. Correlation and Cronbach's alpha coefficient on the questionnaire constructs are shown in Table 3.

Table 1. Participant Demographic and Drug Use

Variable	Number	Percentage
Age, y		
21-29	50	25
30-39	78	39
40-49	72	36
Education		
Illiterate	21	10.5
Primary and Guidance school	93	46.5
High school and Diploma	64	32
Higher education	22	11
Marital status		
Married	107	53.5
Divorced	71	35.5
Widow	10	5
Single	12	6
Number of children		
0	40	20
1-2	104	52
3 and more	56	28
Homeless		
Yes	50	25
No	150	75
Drug abuse in the last year		
Yes	143	71.5
No	57	28.5

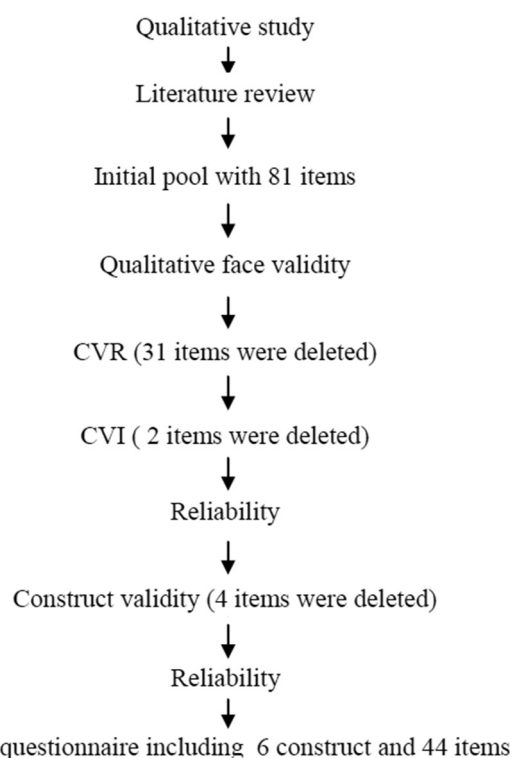
Table 2. Structure Matrix ^a

Item	Components						
	1	2	3	4	5	6	7
When I know that my husband/sexual partner does not agree to use condoms, it is no use insisting	0.812						
I never have sexual relationship without condoms	0.808						
If the spouse/sexual partner abstain from using condoms, I give up	0.795						
Regarding the use or abstaining from the use of condoms, it is the only husband /sexual partner who makes the decision	0.726						
If a man requests, the woman should agree to have sexual relationship without condoms	0.726						
If my husband/partner does not agree to use condom, I have no choice but to oblige to sex without condoms	0.718						
If the husband/partner dislikes condom, I don't have the ability to change his attitude towards condoms	0.711						
When the sexual emotions of my husband/ partner is strong, my appeal to use condoms will be useless	0.685						
When my sexual desire is very strong, I don't care anymore to use condoms	0.667						
If my husband/partner loves me intensely, I would willingly have sexual relation without condoms	0.657						
My husband or most of my sexual partners never agree to use condoms	0.656						
When I cannot avail of condoms, I have sex without it	0.644						
By any means I convince my husband/ sexual partner to use condoms	0.616						
With regards to use or abstain from using condom, my husband/ sexual partner and I make the decision together	0.615						
I'm always quite sure of myself to be able to use condoms	0.560						
My husband/sexual partner respects my opinion regarding the use of condoms	0.370						
Have you ever established a sexual relationship in order to obtain drugs, narcotics, or psychotropic drugs?		0.847					
Have you ever entered into a sexual relationship in order to earn money?		0.825					
During the last three months, while under the influence of drugs, did you also have sex?		0.804					
During the last three months, while under the influence of alcohol, did you have sex?		0.598					
I can get free counseling about HIV whenever I want			0.701				
I can be tested for HIV whenever I want			0.696				
Free HIV counseling is accessible			0.691				
I get free condoms from counseling centers			0.668				
I have enough knowledge about the preventive role of condoms in HIV			0.479				
Condom access is convenient			0.383				
I know how to use male condoms on my partner's penis				0.681			
I can use condoms even if I am under the influence of alcohol				0.671			
I can use condoms even if I am under the influence of drugs				0.630			
I usually have condoms with myself				0.483			
It is not desirable for a woman to suggest condoms to her husband					0.753		
This is a man that must offer when the couple must have sex					0.634		
This is a man who should initiate sex					0.632		
This is a man who should offer how the couple should have sex					0.626		
This is a man who should make a decision in sexual relationship					0.608		
It is not necessary for a woman to be submissive all the time					0.498		
A woman should be always dependent on a man					0.424		
Condoms can decrease male sexual desire						0.666	
Condoms can decrease female sexual desire						0.649	
Condoms can prevent HIV						0.539	
Condoms can reduce trust between the couples						0.478	
Sexual needs of male is more than female							0.624
This is the most important thing that a male enjoys the sexual relationship							0.486
A wife should not stop the sexual demand of her husband							0.372
Component number	1	2	3	4	5	6	7
Cumulative percent	25.78	32.58	37.24	41.61	45.37	48.70	51.87

^a Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

Table 3. The Cronbach's Alpha Coefficient for Constructs

Construct	Cronbach's Alpha	Correlation Coefficient
Skills to negotiate condoms and control excitements	0.84	0.91
Situational factors	0.80	0.84
Social support	0.71	0.88
Ability to use condom despite the influence of drugs	0.64	0.78
Male dominance in sexual decision making	0.82	0.80
Attitudes towards condom	0.54	0.78
Sexual needs of male in priority	0.54	0.73

**Figure 1.** Steps of the Study Stages

5. Discussion

Although various scales are designed worldwide to assess sexual protective behaviors in the communities, to date, there has been no scale to examine these constructs while conforming to the social and cultural conditions of the Iranian population. The appropriateness of the developed questionnaire relies on the fact that it enables the risk to be monitored within a population at risk of HIV by taking into account many important factors influencing HIV prevention.

Since the goal of most HIV programs and preventive interventions is the use of condoms as a protective sexual behavior (4), the present questionnaire would be able to

identify the women at risk and also monitor and evaluate HIV preventive programs. Therefore, its application is important both in terms of clinical and in research. The existing models in the context of HIV prevention is mainly focused on cognitive and individual structures, and often the role of environmental and structural factors are overlooked (21), while factors such as stereotypical schema and partner acceptance of condom use had important roles (21, 22). Therefore available instruments are designed using an individual framework. The instrument designed in the current study was within the ecological framework and its construct was formulated based on the concepts explored in the qualitative study.

Findings of the current study with mixed methodology showed important constructs related to protective behaviors. It was determined that, although variables such as attitudes toward condoms, and perceived risk regarding HIV, are of great importance in order to adopt this protective sexual behavior, it is not sufficient for women at risk of HIV (23-26). Other concepts such as social support in the area of HIV prevention, and also stereotypical gender roles which are considered as environmental and structural factors are considered to play a significant role for women at risk of HIV.

Validity of the questionnaire was evaluated and confirmed by qualitative face validity, CVR, CVI, and construct validity. In this evaluation, more than 33 items which did not meet the needed requirements were excluded; all these excluded items were taken from the review of articles. This point can indicate the importance and the urgency of developing indigenous tools that conform to the culture of the community in order to evaluate sensitive topics such as issues on sexual behavior.

Using exploratory factor analysis, construct validity showed that the protective sexual behavior of women at risk of HIV in the present study had seven factors. All the existing constructs and variables in the questionnaire regarding the use of condoms as a sexual protective behavior showed a meaningful statistical relationship which was another reason to confirm the construct validity. Although the alpha coefficient of the constructs, attitudes towards condoms, ability to use condoms despite the influence of drugs and the priority of male sexual satisfaction got a weak rating in the evaluation, the limited

number of items in this construct (three and four items) as the total item correlation was from 0.3 to 0.4 in the constructs; therefore, the reliability of these constructs are within the acceptable range.

The predictive factors of protective sexual behaviors of women at risk for HIV questionnaire designed in the current study was composed of seven constructs and 44 items and required 15 minutes to complete. Despite being the only available questionnaire used for the socially vulnerable women, its complexity, and lengthiness, and being composed of a large volume of questions resulted in decreasing the accuracy of data and loss of concentration the participants, but this questionnaire had its advantages. In addition, the presence of diverse groups of women at risk in the present study was considered as another strong point to this questionnaire.

There were several limitations to the current paper. Since it was difficult to access the risky women in the community, the current study relies on convenience sampling method. Many studies revealed that women tended to under-report their sexual behaviors especially in conservative countries, but the current research did its best to lessen the stress of the participants to build a safe environment to obtain more accurate data on sexual behaviors.

However, considering the importance of the present questionnaire and the fact that the current study was a preliminary study; therefore, more studies are needed in order to improve it. Evidently, further studies with larger sample sizes and also randomized sampling could help with a better presentation of the relationships between the existing constructs in the questionnaire and a step towards improving it.

In general, psychometric properties of each construct including internal consistency and construct validity for the questionnaire were satisfactory and results of the current study revealed that the current questionnaire (PSPB) was a valid and a reliable tool to assess at risk women in the Iranian community.

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Authors' Contributions

Razieh Lotfi contributed to study design, data gathering and analysis, and manuscript drafting. Fahimeh Ramezani Tehrani contributed to study design, analysis, manuscript editing and critical discussion. Farideh Yaghmaei contributed in study design and critical discussion. Ebrahim Hajizadeh contributes in study design and statistical analysis. All authors read and approved the final manuscript.

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