

Validity and Reliability of an Information-Motivation-Skill-Behavior Questionnaire: A Gender-Sensitive HIV Survey

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Abstract

Background: Despite the essence of HIV-related surveys, their precision in measurement of intended constructs has been an area of controversy. Considering the increasing trend of sexual transmission of HIV among women, standard gender-sensitive tools can yield pivotal information for researchers and policy-makers in Iran. **Aim:** To evaluate the reliability and validity of a questionnaire (IMSB) based on the Information-Motivation-Behavior model of HIV-related behavior prediction. **Methods:** The IMSB survey constituted of five main domains: HIV-related knowledge, attitudes toward people living with HIV, motivation to practice safe-sex, skills to practice safe-sex, and HIV-related behaviors. Completed questionnaires (n = 189) from pilot phases of three projects were accessed. We assessed face and content validity through expert consultation and respondent feed-backs for the primary pool of items. Discriminant validity was measured utilizing non-parametric tests. Cronbach's alpha was calculated for each domain to assess internal consistency, and paired t-tests were used to measure stability over time. **Results:** The primary pool of items was reduced in the process of validation. The discriminant validity was appraised to be favorable since the survey can differentiate between age groups, women with different levels of education and marital status. The survey was reliable in 4 domains; but a Cronbach's alpha of 0.6 was reported for the fifth domain (HIV-related behaviors). Younger women had higher knowledge and motivation scores; single women were more motivated to practice safe-sex and divorced/widowed women had lower motivation and skills scores. **Conclusion:** This questionnaire can be used as a valid and reliable tool to measure the IMB constructs. The lower reliability of the "behavior" domain is probably rooted in societal norms and cultural definitions. The integration of motivation and skill domains can provide valuable information for clinicians/interventionists to address

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vulnerabilities experienced by their female clients.

Keywords

Sexual Behavior, Reliability and Validity, HIV, Women

1. Introduction

Despite substantial progress in understanding the global HIV epidemic, knowledge on the epidemic in the Middle East and North Africa (MENA) is comparatively limited [1]. Between 2001 and 2012, the number of new HIV diagnoses in MENA grew by 52 percent, the most rapid increase among world regions [1] [2]. In most countries of the region including Iran the epidemic is concentrated among high-risk groups [2]; and much of the existing literature on their profile of risk is based on the results of bio-behavioral surveys and investigational studies that focus on HIV knowledge, attitudes toward safe-sex and self-reports of sexual behavior [1] [3].

Although injection drug users (IDUs) constituted the largest group to be affected in Iran a decade ago, sexual transmission has been on the rise in recent years and women are more vulnerable to HIV/AIDS than ever before [3]. Hence, understanding sexual behavior, determinants of involvement in safe-sex, and barriers on the way of protective behavior among women are critical in development of future preventive interventions [4].

Different socio-cognitive models explain the dynamics of sexual behavior and predict intentions to participate in safe-sex [5]; these models are applied to design questionnaires and interventions to evaluate and promote safe-sex [5]. Information-Motivation-Behavioral Skills (IMB) is the framework most commonly applied to behavior change in the field of HIV/AIDS [6]-[9]. IMB postulates that knowledge about HIV is essential in decision-making and motivates people to commit to safe sexual practices; but above all behavioral skills are imperative for behavior change [5] [9].

Previous studies among at-risk or HIV infected women in Iran suggest that knowledge on HIV does not necessarily lead to behavior change, hence more emphasis should be put on socio-cultural factors that affect women's behavior [10] [11]. Stigma and discrimination cause most-at-risk women to avoid HIV testing and to seek the treatment and support they need [3]. Accordingly, access to reliable and accurate information to understand the interactions between women's HIV-related knowledge, their attitudes toward people living with HIV (PLWH), their motivation and skills to practice safe-sex and finally their sexual behavior can improve efforts to develop effective safe-sex promotion programs [9] [11]. Biological and behavioral surveillance surveys (BBSS) concerning HIV are often used to inform and evaluate HIV prevention programs. However, the reliability and validity of utilized questionnaires for the behavioral component of these surveys is rarely considered.

We aimed to assess reliability and validity of a safe-sex questionnaire specifically designed for women at risk of HIV/AIDS in Iran based on the IMB model. The questionnaire is made up of five main constructs: HIV-related knowledge, attitudes toward PLWH, motivation to practice safe-sex, skills to practice safe-sex, and HIV-related behaviors.

2. Methods

2.1. Participants

To achieve the purposes of the present study, we accessed questionnaires from previous studies conducted among girls/women (≥ 15 years old). Three groups of women had been recruited including: at-risk youth, wives of imprisoned men, and a group of high-school educators. The re-known standard for reliability assessment is at least 15 or 20 subjects per domain. So a minimum sample size of 75 was to be considered for this study. Through careful evaluation of the ongoing projects at our center, we enrolled 127 women through pre-filled questionnaires. Overall, we utilized 189 questionnaires in data analysis, double surveys were filled by a group of respondents.

2.2. Measures

The questionnaire used in the present study consisted of five major domains: a) HIV-related knowledge; b) attitudes toward PLWH; c) motivation to practice safe-sex; d) skills to practice safe-sex (including 2 sub-domains:

perceived difficulty of AIDS preventive behaviors, perceived effectiveness of AIDS preventive behaviors); and e) HIV-related behaviors. The items for each sub-scale had been extracted from a pool of items utilized in previous studies [12]-[16] or from surveys previously validated in research works published by other Persian speaking researchers [10] [17]-[20]. We carefully evaluated the primary pool of items and further assessed the five domains as explained below:

Reliability

We measured two constructs of reliability;

- **Internal consistency:** Cronbach's alpha was calculated, values over 0.6 were considered as "acceptable". Values between 0.7 and 0.79 were interpreted as "good" and values over 0.8 were interpreted as "excellent" internal consistency [21].
- **Consistency over time (stability):** paired t-test was conducted to evaluate repeatability of measures over time. A group of respondents had re-filled questionnaires at a one month interval and the data driven from their surveys were used at this stage of analysis.

Validity

- **Face and content validity:** To appraise face validity, we interviewed 10 women regarding the apprehensiveness of the items. We noted any difficulty in understanding the questions and acted upon their feedbacks to implement necessary corrections. Drafted questionnaire was sent to eight experts in the field and their comments were discussed in a separate session. Further modifications were made to the final questionnaire.
- **Discriminant validity:** We assessed discriminant validity utilizing Mann-Whitney U test or Kruskal-Wallis test. The scores in different sub-scales were compared along different subgroups of age, education, and marital status.

2.3. Ethical Considerations

Data were extracted from pre-filled questionnaires from previous studies approved by the Review Boards of the Iranian Research Center for HIV/AIDS, Tehran University of Medical Sciences. All questionnaires were anonymous and all the data sheets were kept confidential.

3. Results

In total, we accessed 189 completed questionnaires (considering re-test questionnaire). We analyzed data driven from 127 questionnaires to assess internal consistency; 124 questionnaires were used to evaluate consistency over time (stability), and 92 questionnaires were analyzed to investigate discriminant validity.

3.1. General Characteristics

The mean age of the respondents to the questionnaires was calculated to be 29.79 (SD = 11.57) years. Other demographic features are shown in **Table 1**.

Table 1. General and demographic characteristics of study participants (N = 127).

Variable	Frequency	Percentage
Age (year)		
15 - 20	30	23.6
21 - 30	49	38.6
>30	48	37.8
Education		
Under diploma	36	28.4
Diploma	45	35.4
Higher diploma	46	36.2
Marital status		
Single	65	51.2
Married	56	44.1
Divorced/Widowed	6	4.7

3.2. Reliability Measures

Internal consistency: We calculated Cronbach's alpha for the six domains of the questionnaire ("skills" had two sub-domains). All domains showed acceptable internal consistency (knowledge: 0.89, attitude: 0.71, motivation: 0.84, perceived effectiveness of AIDS preventive behavior: 0.90) except for "perceived difficulty of AIDS preventive behaviors" (alpha: 0.62) and "HIV-related behaviors" (alpha: 0.60).

Consistency over time: To evaluate stability and repeatability, we performed paired t-tests on two sets of data driven from initial and repeated surveys from 62 respondents. For five domains, mean scores at time 1 and time 2 showed no significant difference hence stability of the questionnaire was confirmed over time (Table 2).

3.3. Validity

Face and content validity: A pool of items had been used to design the draft survey. The initial format constituted of 143 items; after consultation with experts, we reduced items to 102 in six main domains. Then the questionnaire was distributed among 10 random female respondents and another 27 items were omitted after primary analysis of data and authors' modifications. The final questionnaire had 75 items: 30 items for "HIV-related knowledge", 17 items for "attitudes toward PLWH", nine items for "motivation to practice safe-sex", 10 items for "skills to practice safe-sex", and nine items for "HIV-related behaviors".

Discriminant validity: We compared mean scores in various domains between different subgroups based on their age (<20, 21 - 30, >30), level of education (not finished high-school, finished high-school, college/higher education), and marital status (single, married, divorced/widowed). Table 3 shows that the questionnaire can differentiate between various subgroups of respondents.

Table 2. Test re-test reliability measures (N = 62).

Domain	Time 1 score Mean (SD)	Time 2 score Mean (SD)	(Time 2 - Time 1) score Mean (SD)	p-value
Knowledge	22.19 (5.3)	22.50 (6.7)	0.31 (6.6)	0.715
Attitude	12.08 (2.8)	11.82 (3.6)	-0.26 (3.9)	0.606
Motivation	21.96 (6.4)	21.75 (7.2)	-0.21 (8.5)	0.867
Safe-sex skills				
Perceived difficulty of AIDS preventive behaviors	10.23 (2.3)	10.44 (2.7)	0.21 (2.9)	0.619
Perceived effectiveness of AIDS preventive behaviors	11.0 (3.5)	10.77 (3.6)	-0.23 (3.7)	0.659

^aSignificance level = 0.05.

Table 3. Discriminant validity for main domains of the questionnaire (N = 92).

	Age			p-value ^a	Marital status			p-value	Education			p-value
	15 - 20	21 - 30	>30		Single	Married	Divorced/Widowed		Under diploma	Diploma	Higher diploma	
Knowledge; mean (SD)	22.03 (5.9)	20.87 (5.2)	16.33 (4.9)	0.001	21.82 (5.5)	19.27 (4.7)	12.83 (4.8)	<0.001	18.97 (7.1)	21.7 (4.4)	21.18 (3.3)	0.326
Attitude; mean (SD)	12.40 (3.2)	11.6 (2.7)	10.67 (3.8)	0.172	11.98 (2.9)	11.58 (3.2)	9.5 (4.7)	0.465	11.03 (3.9)	12.14 (2.3)	12.36 (2.8)	0.507
Motivation; mean (SD)	21.44 (6.7)	25.41 (8.6)	27.07 (9.9)	0.119	22.04 (7.3)	27.76 (8.9)	33.17 (7.1)	0.001	27 (8.9)	22.95 (7.8)	22.27 (7.7)	0.141
Safe-sex skills												
Perceived difficulty of AIDS preventive behaviors; mean (SD)	10.45 (2.3)	10.1 (2.9)	9.07 (3.9)	0.556	9.93 (2.4)	10.68 (3.4)	8.5 (4.4)	0.293	9.8 (3.5)	9.75 (2.4)	11.91 (1.4)	0.039
Perceived effectiveness of AIDS preventive behaviors; mean (SD)	11.14 (3.6)	13.17 (5.2)	15.07 (6.3)	0.115	11.72 (4.1)	14.31 (5.7)	17.17 (7.7)	0.061	14.81 (5.8)	11.45 (4.2)	11.45 (3.6)	0.021

^aSignificance level = 0.05.

4. Discussion

We assessed the reliability and validity of a self-report IMSB questionnaire among women. In the course of the study, we modified and improved the survey and came up with a final tool adjusted based on the IMB model. IMB is the socio-cognitive model most frequently utilized to predict HIV-related sexual behaviors [9]. The Persian version of the current questionnaire has proven to be reliable and valid in measurement of the different domains of HIV-related information, motivation, behavioral skills and behavior in our study population.

Size and homogeneity of the sample with regards to their gender is a strength for the present study. Women are physiologically more vulnerable to HIV and other STDs while contextual factors including gender norms prominently influence their sexual behavior [22]. Social factors affecting the process of decision-making to practice safe-sex is an area of under representation in the literature from MENA region [10]. The assessment of motivation and behavioral skills for safe-sex practice in the present study yields valuable information for interventional scientists to develop gender-specific surveys and educational materials. Three different groups of women at various levels of risk for contracting HIV were evaluated in this study hence the questionnaire can be applied to different sub-populations.

The limitation of the current questionnaire was in the reliability of the HIV-related behaviors domain (Cronbach's $\alpha = 0.6$), although we had reduced the sample size by excluding the missing data and had omitted many of the questions through validation. On the other side, the majority of excluded cases were single/unmarried women. An explanation to this finding could be the effect of cognitive and situational factors that influence response generation [23]. Other than recall biases, social values may interfere with the "decision-making" step of the cognitive process through which the respondent reports a specific behavior [24]. Gender norms accepted in the society could lead women to underreport their risk behaviors as observed in the current study [24]. We assume that the method of administration of the questionnaire has probably had subtle effect in lowering the reliability as current evidence has not proven superiority of technology based systems or face-to-face interview compared to self-administered surveys [25].

In the evaluation of discriminant validity, we found that women with higher levels of education had lower perceived difficulty and higher perceived effectiveness to practice safe sex. Motivation to practice safe-sex was higher among single respondents while the lowest for clients who were either divorced or widowed. Moreover, younger women had higher knowledge levels and most of them were single and reported no sexual contacts. We suggest several explanations for these findings: 1) younger and single respondents had higher knowledge levels hence more motivated and empowered to practice safe-sex; 2) pre-marital sex being highly prohibited could play a two-way role: single women may over-report motivation because they are expected to (social desirability); or they may overestimate their motivation not having experienced actual encounters; 3) widowed or divorced participants may be unwilling to seek information due to lower perceived risk (not studied here) compared to married or single women, hence less motivated to practice safe-sex.

Based on the findings of this study, we suggest that the current IMSB questionnaire is valid and reliable for research/survey purposes. The integration of motivation and skill domains in this questionnaire has yielded valuable information that could be implemented in design of gender-sensitive interventions. However, the low reliability of behavior domain highlights the importance of behavioral surveys at national level where biological markers are utilized to re-check precision. The results of such country-level studies could also help with evaluation of cost-effectiveness of STD/HIV clinics to be established throughout the country.

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