



# Predictors of HIV-Preventive Behavior Changes Among HIV-Infected Patients in Iran: Application of the Extended Health Belief Model

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## Abstract

**Background:** One mode of HIV transmission is through the high-risk behaviors among people who are HIV-positive. It is, therefore, exceedingly important to understand the factors predicting preventive healthy behaviors regarding HIV transmission in this population.

**Objectives:** The aim of this study was to evaluate the efficacy of the extended Health Belief Model (HBM) in predicting preventive behavior changes among HIV-infected patients in Iran.

**Patients and Methods:** In a cross-sectional study, the census sampling was applied and 139 HIV-positive patients in Saravan, Zarandieh, and Sarbaz cities of Iran were selected to participate in this study. In total, 131 participants completed and returned the anonymous self-administered questionnaires. The questionnaire included demographic questions, HBM constructs, and the questions of Zimet social support. Data analysis was performed using SPSS18. P-values less than 0.05 were considered significant.

**Results:** The HBM constructs with and without social support accounted for 62% and 56% of the behavior variance, respectively. In the first model (HBM construct alone), perceived barriers, self-efficacy, and benefits were the significant predictors. In the second model (HBM developed with social support), perceived barriers, social support, self-efficacy, and benefits were the better predictors of preventive behaviors, in sequence ( $P < 0.05$ ).

**Conclusions:** The findings indicated that the extended model of HBM predicted preventive behaviors better than the original HBM did. However, more studies are needed to examine the efficacy of the extended HBM in predicting preventive behaviors.

**Keywords:** Acquired Immunodeficiency Syndrome (AIDS), Health, Model, Cognition, HIV, Social Support

## 1. Background

The HIV/AIDS has become one of the major global public health threats around the world in recent decades (1). While the Middle East and North Africa (MENA) regions have the lowest rate of HIV/AIDS patients, the epidemic is at a quickly increasing rate. In the case of Iran, based on the recent estimation of the UNAIDS, the number of people with HIV in Iran was estimated at 73000 (50000 - 130000), in adults aged 15 to 49 years, the prevalence rate was 0.1% ( $< 0.1\%$  - 0.2%) and the number of deaths due to AIDS was 4400 (3000 - 6200) in 2015 (2, 3).

Increasing life expectancy in HIV-infected patients has been reported but high-risk behaviors have promoted the transmission risk of HIV among general populations (4). Studies have shown that HIV infection may remain asymptomatic in HIV-positive patients for a long time and the patients themselves may not be aware of their infection, which is another potential risk for other members of the

society (5, 6). Therefore, the World Health Organization recommend that special attention should be paid to HIV-positive patients in prevention programs, which means providing HIV-positive patients with support, care, and advice in order to rehabilitate them and improve the quality of their lives, as well as prevent the spread of the disease among the healthy population of the society (7).

The effectiveness of HBM used as the theoretical framework in this study in predicting AIDS-preventive behaviors has been proven by researchers (3). The model is used where we want to know what is required to change the patient's behavior, so applying this model for AIDS helps to better understand high-risk behaviors and provide grounds for improving unhealthy behaviors. Given the complex nature of healthy behaviors, no theory or model alone can describe and predict all aspects of health behaviors (8, 9).

The perceived social support construct added to HBM

in this study is, by definition, one aspect of interpersonal influences that evaluates the perceived support from family and friends (10). It is known that low social support from friends and others could affect the health status, and some studies indicate that there is a relationship between social support as a psychological and environmental factor and self-care behaviors. In general, social support encourages activities leading to personal goals (10, 11).

Individuals living with HIV/AIDS may be an important source for transmitting HIV disease in the community (12). Hence, understanding and increasing the knowledge on determinants of high-risk and preventive behaviors in people who live with HIV/AIDS is important for HIV prevention and control purposes.

## 2. Objectives

Considering the importance of social support on people's performance, and since to the best knowledge of the present research team, no study has so far been carried out in Iran for the assessment of this construct to explain the strength of HBM, the present study was designed aiming to assess the effectiveness of HBM developed with social support variable in predicting the preventive behaviors of HIV-positive patients.

## 3. Patients and Methods

### 3.1. Study Design, Settings, and Participants

In this descriptive analysis, 139 HIV-positive patients suffering from AIDS were selected through the census method due to the limited sample size and entered into the study from the cities of Saravan, Zarandieh, and Sarbaz in Iran. The inclusion criteria were HIV-positive patients over 18 years old with medical records at the counseling centers for infectious and behavioral diseases in the cities of Saravan, Zarandieh, and Sarbaz who also provided an informed consent for their participation in the study.

### 3.2. Measures

The data collection instrument was a researcher-made questionnaire designed based on similar studies and reliable scientific sources (2, 3, 7, 13). The validity of the questionnaire was determined using content, face, and construct validity techniques. To this end, the designed questionnaire was presented to 10 professors of health education and health promotion, as well as infectious diseases specialists who had sufficient expertise and experience in this field. They were asked to conduct a qualitative analysis of the instrument based on the criteria of compliance with grammar, using right words, proper placement of words,

and proper scoring. Their feedbacks were applied to remove the bugs and ambiguities. In the quantitative content analysis, both content validity ratio and content validity index were used with the help of the "panel of experts". Considering the number of 10 experts in the panel and the criterion of over 0.62 in Lawshe's table, the content validity ratio was verified and the criterion of over 0.79 was used to verify the content validity index. Exploratory and confirmatory factor analyses were used to determine the construct validity, the results of which indicated that the fit statistical indices reached the acceptable threshold of 90%, while all the load factors were at a  $P < 0.05$  level of significance (Table 1). To determine the validity, the questionnaires were first sent to 10 specialists in healthcare and infectious diseases, and then their views and opinions were collected and used to implement the required modifications. Content validity indices were measured between 0.96 and 1, while the content validity ratio of 1 was measured. The questionnaire's reliability was measured as 0.72 using Cronbach's alpha.

The questionnaire included 10 items for demographic information and 6 items for HBM constructs to measure perceived susceptibility with statements like "I am worried about my family getting infected with AIDS." They were rated on a 3-point scale ranging from 1 (disagree) to 3 (agree). Five items were used for assessing perceived severity with statements like "I am terrified to be infected with AIDS". The answers were rated on a 3-point scale ranging from 1 (disagree) to 3 (agree). Six items were used to measure perceived benefits related to preventive behaviors with items like "It is important to tell my dentist about my disease to prevent others from getting infected." They were rated on a 3-point scale ranging from 1 (disagree) to 3 (agree). Perceived barriers were measured by using six interval semantic differential scales, rated on a 3-point scale ranging from 1 (agree) to 3 (disagree). Six items were employed to assess perceived self-efficacy in behavior with items like "In case of sexual contact, I can tell my sex partner about my disease." Responses were rated on a 3-point scale, ranging from 1 (never) to 3 (always). There were also 11 items for assessing HIV transmission-preventive behaviors, like "Do you tell your hairdresser about your disease?" The probable responses were always, sometimes, and never. They were rated on a 3-point scale ranging from 1 (never) to 3 (always).

The Multidimensional Scale of Perceived Social Support (MSPSS) was prepared by Canty-Mitchell and colleagues to measure the perceptions of support from 3 sources: family, friends, and a significant other through 12 questions using a Likert 5-point scale, with a scoring system in the range of 1 (strongly disagree) and 5 (strongly agree) (14). To obtain the total score of the scale, the scores

**Table 1.** Fit Statistics for Confirmatory Factor Analyses of HBM Constructs and Social Support

Model	$\chi^2$	df	CFI	GFI	AGFI	RMSEA	SRMR
HBM construct	1521	511	0.92	0.91	0.88	0.08	0.06
HBM and social support	1302	479	0.96	0.92	0.90	0.07	0.04

Abbreviations: AGFI, Adjusted goodness-of-fit index; CFI, Comparative fit index; GFI, Goodness-of-fit index; RMSEA, Root mean square error of approximation; SRMR, Standardized root mean-squared residual.

of all items were summed up and then divided by the number of items, 12. The psychometric properties of the scale were investigated by Chenary and colleagues in Iran (15), and the reliability of the questionnaire was measured as 0.81 using Cronbach's alpha.

The questionnaires were completed for illiterate and less literate individuals through interviews with the presence of the researcher at the counseling center.

### 3.3. Ethical Considerations

Ethical considerations were observed in this research through keeping the questionnaires anonymous, keeping the information confidential, requiring written consent, allowing patients to withdraw at any stage of the study, and explaining the study's objectives to the participants clearly.

## 4. Results

In this study, eight questionnaires out of 139 questionnaires distributed to the patients were removed from the study due to the lack of informed consent, and the final analysis was conducted on the remaining 131 questionnaires. Of all, 78% of the patients were men, and the mean age of the participants was  $37.9 \pm 11.4$  years. With regard to the education level, 26% were illiterate, 46% had primary or secondary education, while the rest had a high school education or higher. In terms of marital status, 48% were married, 30% single, and 22% were divorced and widowed. In addition, 35% of the participants were workers, 21% homemakers, and the rest were either unemployed or self-employed.

As indicated in Table 2, there was a significant difference between men and women in terms of self-efficacy, as well as perceived social support and barriers, while there was no significant difference in terms of other variables. The group with high school education or higher had higher perceived susceptibility, higher perceived benefits, higher self-efficacy, and lower perceived barriers, while they had better preventive behaviors compared to illiterate or primary/secondary education groups, and the difference was statistically significant. Married people had higher perceived social support and benefits, as well as better preventive behaviors compared to divorced or single

people ( $P < 0.05$ ). No significant relationship was observed between employment status and the model constructs.

In the present study, stepwise multiple regression analysis was used to assess the predictive power of HBM constructs and social support construct in preventive behaviors of HIV patients. The results showed that the independent variables of perceived benefits, perceived barriers, and perceived self-efficacy were significant in the first model and they explained 56% (adjusted  $R^2$ ) of the variance of preventive behavior. With the addition of perceived social support variable to the HBM, the preventive power of the model increased by 6%, while the independent variables of self-efficacy, perceived barriers, perceived benefits, and perceived social support were significant in the second model and they explained totally 62% (adjusted  $R^2$ ) of the variance of preventive behavior (Table 3).

## 5. Discussion

The focal point of the present research was to assess and evaluate the effectiveness of HBM integrated with perceived social support variable in predicting disease-transmission preventive behaviors in HIV-positive patients, where the findings supported the adding of perceived social support variable construct to the HBM. In other words, the HBM developed by social support variable had better predictive power compared to the original model. This finding was in accordance with that of Bylund et al. study (8). Similarly, Gillibrand and Stevenson in the UK found that this extended model is an adequate model for understanding the socio-psychological variables among young people, which influences adherence to the diabetes self-care behaviors (16).

The present study indicated that social support variable was the second important factor influencing the preventive behaviors of HIV in patients. This is in line with the study of Masoudi and Farhadi showing that social support was the significant predictor of preventive behavior in HIV-positive patients (17). Similarly, a study conducted by Chenary et al. among chemical veteran showed that there was a significant relationship between social support and health-promotion behaviors (15). In addition, Malathum found that social support was a significant factor in pre-

**Table 2.** Means and Standard Deviations of the HBM Constructs and Social Support Variable According to Sociodemographic Information<sup>a</sup>

Variable	No.	Susceptibility	Severity	Benefits	Barriers	Self-Efficacy	Social Support	Behavior
<b>Gender</b>								
Male	102	14.1 ± 1.9	9.9 ± 2.5	11.2 ± 1.3	9.5 ± 1.1	10.7 ± 1.6	5.2 ± 1.7	15 ± 1.1
Female	29	14.3 ± 1.7	10.1 ± 2.1	11.7 ± 1.0	12.8 ± 1.9	8.2 ± 1.8	3.2 ± 1.2	13.4 ± 1.3
P value		0.69	0.27	0.48	0.001	0.001	0.001	0.001
<b>Education</b>								
High school	37	17.8 ± 1.7	10.6 ± 2.1	14.4 ± 1.5	9.4 ± 1.6	10.8 ± 1.9	4.9 ± 1.2	17.6 ± 1.5
Primary or secondary	60	15.6 ± 2	8.5 ± 2.2	11.9 ± 1.5	11.1 ± 1.2	8.5 ± 1.8	5.3 ± 1.4	15.5 ± 1.7
Illiterate	34	13.9 ± 1.6	8.2 ± 2.1	10.3 ± 1.2	13.5 ± 1.7	7.6 ± 1.3	4.6 ± 1.5	12.2 ± 1.3
P value		0.001	0.001	0.001	0.001	0.001	0.01	0.001
<b>Marital status</b>								
Married	63	10.7 ± 1.5	9.5 ± 1.9	14.7 ± 2.6	8.1 ± 1.5	11.8 ± 1.9	5.9 ± 1.8	17.2 ± 2.4
Divorced or widowed	29	10.1 ± 1.8	9.4 ± 2.3	8.9 ± 2.2	9.5 ± 1.3	8.2 ± 2.2	3.2 ± 1.4	13.3 ± 2.1
Single	39	10.2 ± 2	9.5 ± 2.1	9.4 ± 2.1	12.9 ± 1.9	9.5 ± 1.6	4.2 ± 1.6	13.7 ± 2.8
P value		0.001	0.001	0.001	0.001	0.001	0.001	0.001

<sup>a</sup>Values are expressed as mean ± SD.

**Table 3.** The Results of Multiple Linear Regression of Preventive Behavior Based on HBM Constructs and Social Support

	Unstandardized Coefficients		Standardized $\beta$	P Value
	B	SE		
<b>Step 1</b>				
Perceived barriers	-0.83	0.15	-0.54	0.001
Self-efficacy	0.29	0.08	0.31	0.001
Perceived benefits	0.27	0.10	0.18	0.01
Model adjusted R <sup>2</sup>	0.56			
<b>Step 2</b>				
Perceived barriers	-0.67	0.14	-0.44	0.001
Self-efficacy	0.20	0.08	0.22	0.01
Perceived benefits	0.26	0.10	0.17	0.01
Social support	0.53	0.15	0.28	0.001
Model adjusted R <sup>2</sup>	0.62			

dicting perceived abilities for health-promoting self-care among older adults in Thailand (18). In another study, Qiao et al. concluded that policymakers needed to consider social support for female sex workers to protect them from HIV risks (Social support and condom use among female sex workers in China) (10). However, a study by Bhatta and Liabsuetrakul showed that social support could be a useful asset among HIV-infected patients to promote their quality of life, decrease stigma, and increase adherence to antiretroviral treatment (4).

Considering the effectiveness of social support and its relationship with preventive behaviors proved in this

study and similar ones, and according to the WHO which believes that emotional and social support of HIV patients helps them to better cope with the disease and leads to increased personal inclination for treatment and control of the infection (17, 19, 20), it is, therefore, recommended to design interventions for the patients' relatives to promote their social support of the patients and encourage them to contribute to disease-transmission preventive behaviors.

In the present study, perceived barriers were the strongest predictive measure of preventive behaviors. Indeed, it is less likely to have preventive health behaviors if an HIV-positive patient perceived more barriers. A body

of literature supports the role of perceived barriers in behavior change of people. For instance, a study conducted by Asare et al. on African immigrants in the U.S. revealed that the perceived barriers were significant predictors of safe sexual behaviors (21). Similarly, a study by Zhao et al. among female sex workers in China showed that perceived barriers were the proximate determinant of condom use (22). Moreover, in another study by Schnall et al. in the United States, it was revealed that perceived barriers were significantly associated with decisions to get tested for HIV (9). Perceived barriers refer to the beliefs regarding the actual costs of following new behaviors. The reason behind such contradictions in the results of perceived barriers construct could be found in the diversity of perceived barriers such as physical and material barriers, or social and psychological barriers in different people and different behaviors. Barriers perceived by people could act against behaviors and cause people to do high-risk behaviors despite their awareness of prevention methods and practices.

Our findings revealed that self-efficacy of the patients could significantly predict their preventive behaviors. In other words, it is more probable to have preventive behaviors in patients with higher self-efficacy. Consistent with our study, several studies have documented, the relative impact of self-efficacy construct on preventive behaviors of disease transmission in HIV patients (13, 23-25). For instance, Asare et al. found that self-efficacy was a significant predictor of condom use among African immigrants (21). In addition, a study carried out by Xiao et al. among young Chinese migrants underscored the importance of self-efficacy in HIV prevention interventions (26). In addition, a study by Parriault among female sex workers in French Guiana showed that self-efficacy was central to condom use with intimate partners (27). These results point to self-efficacy as an important benefit factor in reducing high-risk behaviors related to AIDS. Self-efficacy improvement is known as an intermediate goal for reducing HIV infection (3). Self-efficacy is defined as the person's confidence in his/her ability to follow a specific behavior. Previous studies showed that (3, 26) self-efficacy plays a pivotal role in changing behaviors. Self-efficacy makes people pay more attention to environmental opportunities and be motivated to pursue their personal goals and take advantage of these opportunities. These people set challenging goals and strong commitments for themselves and in case of failure, they double their efforts (19). The study by Buldeo and Gilbert showed that self-efficacy makes people try hard to reach their goals and resist the obstacles (6).

The result of our study indicated that raising the level of perceived benefit is a significant factor to have preventive health behaviors in HIV positive patients. This result is

in line with the findings obtained by Karimy et al., which showed that perceived benefit was a significant factor in predicting high-risk behaviors among drug users (13). Similarly, a study by Nothling and Kagee among South African students showed that the perceived benefit was an important factor in the acceptability of routine HIV counseling and test (28). The prediction of preventive behaviors through perceived benefits indicates that the potential benefits of preventive behaviors are well perceived by people, and we can move towards changing behaviors and employing safe behaviors in society by removing obstacles to following new behaviors; therefore, if a belief is established in educational interventions that the available preventive behavior is effective in reducing the severity of the disease and prevents the transmission of the disease to others, then people will follow the preventive behavior.

Concerning the socio-demographic variables, the results of this study showed that male patients compared to female patients had a better preventive behavior, higher scores of perceived self-efficacy and social support, and lower perceived barriers. These differences could be attributed to the specific nature of AIDS disease and its related stigma and cultural conditions of women in the study population that have higher social restrictions. Contrary to the findings of our study, in the study by Balali Meybodi, females had higher self-efficacy (23, 29), which could be due to the difference between the study populations (HIV patients in this study) since infection with this disease has negative effects on the efficacy and self-esteem of patients, especially female patients.

Today, researchers believe that the education level is a more important predictor of health compared to other variables like age, income, employment status, or race (30). In addition, in this study, people with higher education levels had better average scores in model constructs and preventive behaviors. This finding is in line with the study by Karimy on drug users in Zarandieh, which showed that people with higher education levels had a better attitude and performance in preventing AIDS (13). Similarly, the study by Latkin and colleagues on injecting drug users in India showed that people with higher education levels had more awareness, and the prevalence of high-risk behaviors such as using shared syringes and needles was less common among them (31).

In this study, married people had better self-efficacy, better perceived social support and benefits, and better preventive behaviors compared to single or divorced people. This was an expected finding since previous studies had shown that (17, 20) family is the best place for supporting people infected and affected with AIDS, and family support contributes to better coping with the disease, promoting life quality, and preventing infection transmis-

sion. Similarly, the study by Masoudi showed that married people receive more social support than single people, and they use condoms for their sexual contacts more often than single people do (17).

### 5.1. Conclusion

In this study, we surveyed an extended model of the HBM and found that this extended model predicted preventive behaviors better than original HBM did. In fact, the results from this study reinforced the idea that the HBM might benefit from being extended with social support. In other words, our findings highlighted a primary foundation to improve health intervention and information campaigns with the extended HBM. Similar studies are suggested in other places of the world to plan better HIV prevention intervention strategies.

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