

# Investigating social support, self-efficacy, and factors affecting adherence to medication in people living with HIV/AIDS: application of IMB model

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## Abstract

**Introduction:** Low social support and self-efficacy can result in negative impact on physical and mental well-being. Therefore, the present study was carried out to investigate social support, self-efficacy, and factors affecting adherence to medication in people living with human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS).

**Material and methods:** This descriptive co-relational study was performed among HIV/AIDS individuals over the age of 18 years, who were referred to the Behavioral Diseases Counseling Center in Kerman City, Iran, in 2017. In this regard, 117 patients were selected by census method and categorized into intervention and control groups. Later, we used AIDS Clinical Trials Group (ACTG) questionnaire to collect required data, and then before and 3 months after the intervention to assess medication adherence. The intervention was included eight 60-90 minutes training sessions, over the course of 14 weeks, based on Information-Motivation-Behavioral Skills (IMB) model.

**Results:** The main reasons for ART non-adherence were forgetfulness in taking antiretroviral therapy (ART) (17.9%), away from home, depression (9.4%), and transportation problems (8.5%). Significant relationship was observed after the intervention based on IMB model with self-efficacy (0.000) and social support (0.010).

**Conclusions:** The IMB model can be effective in promoting self-efficacy and social support in HIV patients. However, the information model was ineffective for major problems that had reduced adherence to medication regimen, such as forgetting to take medications, depression, and transportation issues.

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**Key words:** antiretroviral therapy adherence, HIV/AIDS, Information-Motivation-Behavioral Skills model, social support, self-efficacy.

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## Introduction

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) have physical, psychological, and social consequences on people living with HIV (PLHIV) [1]. Globally, 36.9 million people are living with HIV/AIDS [2]. The number of HIV patients in Iran was reported as 66,000 in 2016. Moreover, the number of new cases of HIV infections has increased by 21% since 2010, but AIDS mortality rate decreased by 14% [3]. According to the latest reported statistics, 21.7 million people have already received antiretroviral therapy (ART) up till 2017 [3]. Failure to ART adherence can cause depression and spread of infections.

The Joint United Nations Program on HIV/AIDS (UNAIDS) has set the goal of ending the AIDS epidemic by 2030 [4]. This goal includes 90% of PLHIV globally being diagnosed, on treatment, and virologically suppressed. To achieve this goal, ART adherence should be higher than 95% [5]. The goal of ART is to prevent the progress of disease, improve quality of life [6], reduce HIV symptoms, enhance immunological body, and reduce drug-related side effects [7].

A study on PLHIV in India in 2016 showed that ART adherence was at a low level [8]. But in Tehran, Brazil, and Nepal, it was 59.5% to 94.8% [9, 10]. Movahed *et al.* in 2019 showed that 75.4% of HIV-positive cases had good adherence, with most patients (74.6%) believing that ART had a positive effect on their health. In addition, 67.2% of participants were satisfied with a support of other people. In this regard, 71.3% of patients mentioned that their family members and friends encouraged them to take ART [11]. Results of a study by Bam *et al.* indicated that transportation problems and lack of knowledge led to non-adherence to treatment in PLHIV [9]. Also, low social support can result in a negative impact on patients' physical and mental well-being [12]. Low social support could result in poor adherence to medication and immune suppression, and finally lead to depression. The prevalence of depression among PLHIV in sub-Saharan Africa was 9% to 32% [13]. In Ethiopia, it ranged from 7.3% to 73.3% [12].

Therefore, in order to adherence more to drugs, skills and self-efficacy should be increased in HIV/AIDS individuals. The Information-Motivation-Behavioral Skills (IMB) model is one of the models widely considered in the area of ART adherence in health psychology [14]. In this model, information is considered as a prerequisite of personal and social motivation, while risk perception is a motivational requirement for learning skills [15]. The results of a study by Alexander *et al.* showed that behavioral skills were significantly affected by mediating effects of information and motivation in treatment adherence [14]. Given the prevalence of HIV/AIDS and importance of ART for PLHIV, ART adherence seems to be the best and most effective way to improve patients' quality of life. In addition, a limited number of studies were conducted on this subject in Iran. Therefore, the present research was carried out to investigate the social

support, self-efficacy, and factors affecting adherence to medication in people living with HIV/AIDS, with the application of IMB model.

## Material and methods

### Study and setting

This intervention study was conducted among HIV/AIDS-positive patients, who were over 18 years of age. These patients were referred to the Behavioral Diseases Counseling Center of Iran in 2018.

### Sampling

Inclusion criteria for the study participants were having 18 years or more and using ART for 6 months. Exclusion criteria was lack of cooperation. Since the statistical population included 183 individuals, census sampling method was applied, with total of 117 people participating in the study.

### Intervention

Intervention included eight 60-90 minute training sessions carried out over the course of 14 weeks, based on participants' opinions about timely drug administration and practical solutions using IMB model (Table 1).

Following the intervention, the researcher returned to the counseling center every Monday for three months to refresh the contents.

### Data collection

AIDS Clinical Trials Group (ACTG) questionnaire, designed by Kekwaletswe for HIV-positive patients, was used in the present study. The questionnaire consists of three parts. First part of the questionnaire deals with self-efficacy of adherence and beliefs with regard to usefulness of drugs. This section contains three items, which should be answered on a 4-point Likert scale (ranging from 0 = 'I am not sure at all' to 3 = 'I am completely sure'). Second part considers social support, in which participants' satisfaction with family and friends' support is assessed in one item (0 = 'very dissatisfied' to 3 = 'very satisfied'). Patients' satisfaction with family and friends' support in taking ART is also evaluated in one item (0 = 'not at all' to 4 = 'very much'). Third part of the questionnaire considers causes of ART non-adherence, including 18 items (0 = 'never', 1 = 'rarely', 2 = 'sometimes', and 3 = 'often'). Kekwaletswe *et al.* confirmed the validity and reliability of this questionnaire by Cronbach's  $\alpha$  of 0.71 [16, 17]. To conduct this study in the Iranian culture and among people of Kerman, necessary adjustments were made in ACTG questionnaire. Its' content validity was confirmed by a panel of experts, including 10 physicians and infection specialists of the Kerman University of Medical Sciences. Reliability of the adjusted questionnaire was also calculated as 0.79 by Cronbach's  $\alpha$ .

**Table 1.** Designing educational intervention in people living with HIV based on Information-Motivation-Behavioral Skills (IMB) model

Intervention duration	Construct	Strategy	Educational intervention
Two sessions within two weeks	Information	Training by the patient's friends, question-answer, lecture	Familiarity with directions for taking medications on an empty and full stomach, with drug interactions, and with strategies for taking medications on time when following the instruction (ART-adult-12-6-96) of designing pamphlet, message
Two sessions within three weeks	Personal motivation	Brainstorming, group discussion, interview, and motivational message	Influencing behavioral beliefs: through brainstorming (taking medication, increasing life expectancy, and reducing stigma) Influencing outcomes evaluation: through group discussions about increasing CD4+ count, decreasing virulence, and lowering pills Motivational interview: emphasis on open discussion, empathy, and open questions, avoiding arguments and confirming desired behaviors, supporting self-efficacy, summarizing and providing feedback
One session during intervention	Social motivation	Formation of a support group, formulation of statements on support strategy for HIV patients	Requesting that the patient introduce best friend or supporter Phone and face-to-face contact with patients' families as well as introduction of a positive club
One session within two weeks	Risk perception	Scenario, poster	A scenario for a challenge, based on five principles: follow-up, analysis, visualization, decision-making, and action by the researcher and with the assistance of patients Patients read a scenario aloud in the training classroom HIV mortality statistics Comorbidities associated with HIV The risk of depression in HIV patients
Two sessions for one month	Self-efficacy	The researcher's practical demonstration and division of behavior into smaller steps, which was repeated by the patient	Short video on how to take medications and practical solutions to not forget the pills as well as a face-to-face demonstration Sharing experiences of people who outperformed their peers Patients will be regularly rewarded for doing the desired behavior appropriately
	Skills	Problem-solving process	Discussing how to resolve a problem with management of one of the patients and allowing patients to express their ideas
		Putting a poster in a visible location in patient's home	Installing a poster behind patient's room door depicting skills of remembering to take medicine on time
		Examining patient's diary, questioning and discussing with patient	Setting up medication self-assessment tables and keeping a diary

### Ethics approval and consent to participate

After obtaining ethics code from the Ethics Committee of Yazd University of Medical Sciences (IR. SSU. SPH. REC 1396.83), the researcher received a list of eligible individuals referred to the Behavioral Diseases Counseling Center, Iran. Prior to sampling, participants were provided with explanations on the study purpose, and confidentiality of their information was reassured. Participants were also

requested to sign an informed consent forms to participate in the study.

### Statistical analysis

Descriptive statistics were applied to describe characteristics of the study population and pair *t*-test was applied to investigate factors of adherence to drugs for before and after the intervention in two investigated groups. To analyze the data, SPSS version 24 was used.

**Table 2.** Clinical information of the participants

Variable	n (%)
Disease transmission	
Sexual intercourse	45 (38.4)
Injection	42 (35.9)
I do not know	24 (20.5)
Others	6 (5.2)
BMI	
Normal (18.5-24.9)	63 (53.8)
Less than normal (< 18.5)	19 (16.2)
More than normal (> 24.9)	35 (29.9)
CD4+ count	
< 100	9 (7.7)
101-200	15 (12.8)
201-350	21 (17.9)
> 350	72 (61.5)
Disease stage	
HIV	113 (96.6)
AIDS	4 (3.4)
Viral load	
< 100	80 (68)
≥ 100	37 (32)
Risk factor	
No	46 (39.31)
Yes	71 (60.69)

## Results

A total of 117 HIV/AIDS-positive patients with a mean age of  $42.29 \pm 9.40$  years participated in the study. Of all participants, 51.3% were males, 46.2% were married, 36.8% presented diploma or higher education levels, 54.7% were unemployed, 32.5% had no children, and the rest had at least one child. Furthermore, 41.5% of the individuals had an income of more than 48 \$. According to Table 2, the disease was transmitted by sex in 38.4% of the persons, BMI was normal in 53.8% of patients, and CD4+ count was higher than 350 in 61.5% of participants. According to the findings, 96.6% of the respondents had HIV, viral load was less than 100 in 68% of patients, and 39.31% of them did not mention risk factors, such as substance use (Table 2).

In 17.9% of the cases, forgetfulness was the cause of ART non-adherence. Moreover, away from home and felt depressed in 9.4%, and transportation problems in 8.5% were the main reasons for ART non-adherence (Table 3).

Significant relationship was observed after the intervention based on IMB model, with self-efficacy (0.000) and social support (0.010) (Table 4).

## Discussion

The main reasons for ART non-adherence included forgetfulness in taking ART (17.9%), away from home, depression (9.4%), and transportation problems (8.5%). Significant relationship was observed after the intervention based on IMB model with self-efficacy and social support. Similar to our study, Movahed *et al.* [11] and Fonsah *et al.* [18] showed

**Table 3.** Frequency distribution of the reason for not taking medication by people living with HIV

Row	Phrase	Sometimes/often, n (%)	Confidence interval
1	I was away from home	11 (9.4)	4.3-15.4
2	I was very busy (I had more important things to do)	6 (5.1)	1.7-9.4
3	I forgot	21 (17.9)	11.1-25.6
4	There were many pills	7 (6.0)	1.7-11.1
5	I did not understand the value of the drugs	3 (2.6)	0.0-6.0
6	I wanted to get away from the side effects of medications	4 (3.4)	0.9-6.8
7	I did not want others to realize that I'm taking the medicine	2 (1.7)	0.0-4.3
8	I wanted to make a difference in my daily life	4 (3.4)	0.9-6.8
9	I felt that drugs were harmful and toxic	3 (2.6)	0.0-2.6
10	I felt very drowsy	5 (4.3)	0.9-8.5
11	I was sick (my condition got worse)	7 (6.0)	2.6-10.3
12	I had transportation problems	10 (8.5)	4.3-13.7
13	I felt depressed	11 (9.4)	5.1-15.4
14	Taking pills in certain meals (with a meal, or on an empty stomach, etc.) confused me	3 (2.6)	0.0-6.0
15	I lost my medications	1 (0.9)	0.0-2.6
16	Pills were destroyed due to hot weather	0 (0.0)	-
17	I was tired of taking the pills (I felt disabled)	4 (3.4)	0.9-6.8
18	I had a good feeling and thought that I was healthy	4 (3.4)	0.9-6.8

**Table 4.** Mean and standard deviation of ACTG adherence in the two study groups

Variable/Stage	Pre-intervention, mean (SD)	Post-intervention, mean (SD)	Test statistics	p-value
Intervention group				
Self-efficacy	6.15 (2.65)	7.71 (1.76)	-3.88	0.000
Social support	3.74 (2.05)	4.50 (1.54)	-2.65	0.010
Cause of forgetfulness	2.79 (0.72)	1.69 (0.53)	1.81	0.075
Control group				
Self-efficacy	6.58 (2.19)	6.74 (2.10)	-0.49	0.621
Social support	4.51 (1.87)	4.24 (1.83)	1.05	0.295
Cause of forgetfulness	2.18 (0.54)	2.20 (0.53)	-0.02	0.979

\*Based on independent t-test

that main reason for ART non-adherence was patients' forgetfulness. However, Bam *et al.* mentioned side effects of ART as another major cause of ART non-adherence in these patients [9]. In a study, Hosseinalipour *et al.* described fatigue (28.8%), problems with medication (19.0%), and forgetfulness of taking medication (11.0%) as reason for ART non-adherence [19]. Also, in a systematic review by Shubber *et al.*, most frequently reported individual barriers were forgetting (41.4%), being away from home (30.4%), change to daily routine (28.0%), depression (more than 15.0%), alcohol/substance misuse (12.0%), secrecy/ stigma (more than 10.0%), feeling sick (5.9%), and distance to clinic (17.5%) [20]. The number of samples, tools, and different locations produced differences in the results. But in most studies, forgetfulness and being away from home were cited as the main reasons. Differences in study tools may lead to such discrepancies between results of the present study and those reported by Bam *et al.* [9]. In the present study, self-efficacy and social support were increased after the intervention based on the model IMB. In Morowatisharifabad *et al.*, risk perception and self-efficacy had the highest mean scores after intervention based on IMB model among PLHIV [21]. But in a study of Ameri *et al.*, results were inconsistent with our data [22]. In studies by Barclay and Alexander *et al.*, self-efficacy was shown low among HIV-positive adults [15, 23]. Numerous studies have demonstrated an appropriate effect of social support and self-efficacy on increasing drug adherence [17, 24, 25]. In a study of Wesevich *et al.* after couple of HIV testing and counseling (cHTC), self-efficacy increased, and there was a significant median difference ( $p = 0.02$ ) for participants before and after cHTC [26]. This discrepancy in findings can be attributed to a variety in participants' age (elderlies did not have enough trust in ART adherence), different tools, and geographic region. In our study, significant relationship between the cause of forgetfulness after intervention was not observed. But, in a study by Eftekhar Ardebili *et al.*, according to planned behavior theory constructs, perceived behavior control had a significant relationship with medication adherence [27]. Additionally, Lindsay *et al.* shown younger age and lower health literacy were associated with higher barrier scores for all IMB model con-

structs [28]. In a study by Costellia *et al.*, in order to increase breast cancer screening behavior, functional breast cancer literacy and motivation interventions were important factors after intervention based on IMB model [29]. Comparison of these results showed that information model is not useful in all behaviors, as it has been more effective in promoting breast cancer screening behavior in middle-aged, older, and literate people. Therefore, in the forgetting of drugs taking behavior, the information model did not have a suitable application.

## Conclusions

The IMB model can be effective in promoting self-efficacy and social support in HIV-positive individuals. Since these patients face a high level of stigma, increasing self-efficacy and social support can help them to become more self-sufficient in adhering to the medication regimen and increase their participation. However, the information model was ineffective for major problems, which had reduced adherence to the medication regimen, such as forgetting to take medications, depression, and transportation issues. It is suggested that behavioral skills of policy-makers and planners prioritize the use of daily and weekly medicine boxes, support of experienced psychologists, and reduced cost of transportation in order to avoid forgetting to take medications.

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## Conflict of interest

The authors declare no conflict of interest.

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