

The effects of theory of planned behavior-based intervention on quality of life in women living with HIV in Iran: a randomized controlled trial

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Abstract

Introduction: Despite growing research, only few studies have investigated effective models for improving quality of life (QoL) of people living with human immunodeficiency virus (HIV). This study aimed to determine the impact of theory of planned behavior-based (TPB) intervention on the quality of life in women living with HIV.

Material and methods: This randomized controlled trial was conducted among 80 women living with HIV in Tehran, Iran, between January and October 2018. 80 women were selected randomly, and 40 women were assigned to each intervention and control group. Intervention program included four weekly sessions, each lasting 90-120 minutes. A demographic characteristics questionnaire and World Health Organization quality of life questionnaire for HIV brief version (WHOQOL-HIV-BREF) instrument were used at baseline, 8, and 12 weeks after intervention in both groups. Higher score indicated better QoL.

Results: The score of overall QoL in the intervention group, 8, and 12 weeks after education were 102.38 ± 16.10 and 107.97 ± 15.40 , compared with 78.92 ± 13.60 and 75.10 ± 12.90 in the control group. Analyzing between-group differences revealed that the score of QoL in the intervention group at 8 and 12 weeks after education were significantly higher than baseline (102.38 ± 16.10 and 107.97 ± 15.40 vs. 93.2 ± 19.40 , respectively). Whereas in the control group, this score decreased significantly, indicating a decline in the quality of life in HIV-positive women (78.92 ± 13.60 and 75.10 ± 12.90 vs. 94.50 ± 16.50 , respectively) ($p < 0.001$).

Conclusions: Theory-based training of planned behavior improves attitudes towards HIV, abstract norms, control and behavioral intention, behavior, and overall quality of life in women living with HIV.

Registration number: IRCT20120414009463N58.

HIV AIDS Rev 2024; 23, 1: 49-57

DOI: <https://doi.org/10.5114/hivar.2024.135745>

Key words: HIV, quality of life, theory of planned behavior-based, health education, intervention.

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Article history:
Received: 16.01.2022
Revised: 31.03.2022
Accepted: 01.04.2022
Published: 22.02.2024



Introduction

Human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) is a chronic disease affecting all aspects of life of people living with HIV (PLWH), including physical, mental, economic, and social. Since its start in 1981, HIV/AIDS has been considered a public health crisis worldwide [1]. More than 36.7 million people were infected by HIV/AIDS globally by the end of 2015 [2]. Based on official statistics in Iran, more than 66,000 people live with HIV, of whom more than one-third either are not aware of their infection or not disclosing because of stigma and condemnation of society [3].

Given considerable improvements in HIV treatment, the nature of this disease has changed from an end-stage illness to a chronic disease, which created new hope for people living with HIV for increased life expectancy [4]. However, various issues, including the need for life-long treatment, side effects of medication, permanent stigma, discrimination, and prejudice against people living with HIV, have raised concerns about different aspects of their lives, such as physical and mental functioning, and spiritual well-being. Whereas all these aspects of health have been considered indicators of quality of life (QoL), understanding PLWH QoL has emerged as a crucial factor in managing HIV/AIDS [5]. According to the World Health Organization (1995), quality of life means: "The individual's perception of his or her position in life within the cultural context and value system, his or her goals, expectations, parameters, and social relations, and is a broad-ranging concept reflected in a complex way of the person's physical health, psychological state, level of independence, social relationships, and their relationship to salient features of their environment" [6].

Despite growing research, few studies have investigated effective models for improving QoL in people living with HIV [7]. One approach to improve QoL is to guide people towards positive health-related behaviors. Theory of planned behavior (TPB) is a well-established social cognition framework to understand and predict social health-related behaviors [8]. TPB explains how an individual's intention can improve behaviors that enhance health outcomes. People's intention is determined by their perception of a particular behavior and interacts with their actions. The intention is influenced by three independent constructs, including attitude, subjective norms, and perceived behavioral control [9, 10]. Attitude means the positive or negative evaluation of a person's behavior [11]. At the same time, subjective norms reflect the effect of perceived social pressure on performing or not performing a particular behavior. Perceived behavioral control indicates the difficulty or easiness of doing a particular behavior that can directly or indirectly influence the behavior [12]. Sometimes, people evaluate a behavior positively, leading to cause intention to perform it [9, 11, 13].

Behavioral intention is the most influential predictor of behavior [14-16]. TPB was developed to describe the effects of people's intentions to engage in healthy behaviors [17]. According to the theory, attitudes towards the be-

havior and subjective norms affect behavioral intentions, which itself determine an individual action. Furthermore, perceived behavioral control through behavioral intention influences an individual's decision.

As a theoretical framework, the TPB intervention has been well used in research on improving health-related behaviors as well as QoL [9, 15, 18-21]. Few studies assessing quality of life in PLWH indicated that females more than males suffer from a lower quality of life. This is because, generally, women experience higher levels of violence, discrimination, and stigma. They also usually have lower social support [22]. Women account for more than half the number of people living with HIV/AIDS worldwide [23, 24]. The incidence of HIV among women of reproductive age has increased in recent years in Iran [25]. Therefore, the present study was conducted to examine the TPB intervention on QoL of Iranian women living with HIV/AIDS.

Material and methods

Hypothesis

This study presumed that the theory of planned behavior intervention improves the quality of life in women living with HIV in the intervention group compared with the control group.

Design and sample

This randomized controlled trial study was conducted among 80 women living with HIV referred to the Behavioral Disease Counseling Center and AIDS Research Center of Imam Khomeini Hospital in Tehran, Iran, between January and October 2018. Considering two-tailed $\alpha = 0.05$, $\beta = 0.2$, and effect size = 0.5, sample size was acquired as 35 people in each group. Taking into account the probability of a 20% drop-out, 40 women in each group were recruited.

$$n = \frac{(z_{1-\alpha/2} + z_{1-\beta})^2 \times (s_1^2 + s_2^2)}{d^2}$$

$$z_{0.975} = 1.96$$

$$z_{0.8} = 0.84$$

$$d = 10$$

$$s_1 = s_2 = 15$$

$$n = \frac{(1.96 + 0.84)^2 \times (2 \times 15^2)}{10^2} = 35$$

Initially, all women living with HIV, who agreed to participate in the study and signed an informed consent form were selected using convenience sampling. Participants were screened for inclusion criteria, which were as follows: women who were diagnosed with HIV for at least three months, no history of receiving HIV-related education or counseling, Iranian nationality, not pregnant, ability to read and write, absence of any known mental or chronic disease, and no

drug abuse. Exclusion criteria were not attending of more than one session or pregnancy. After screening for inclusion and exclusion criteria, 80 women, who agreed to participate in the study were selected, and then random allocation using table of random numbers was performed by two assistant researchers (working at the AIDS Research Center), who were blinded to information about participants. For randomization, even numbers were assigned to the intervention group, and odd numbers were allocated to the control group. Finally, 40 women were assigned to each group. Intervention sessions were presented by the first author (FN).

The study was carried out in two stages: Pre-test, and follow-up to assess the impact of theory of planned behavior on the quality of life in women living with HIV in the intervention and control groups at baseline, 8, and 12 weeks after intervention. In the baseline stage of pre-test, participants in both the intervention and control groups completed two questionnaires, and then participants were randomly assigned into two groups. The intervention was performed as four sessions per week, each lasting 90-120 minutes. Follow-up was performed at 8 and 12 weeks after the intervention. Similar questionnaires were given to both the groups during the two phases. Four and two subjects were lost to follow-up in the intervention and control groups during the study period, respectively (Figure 1).

Given the educational nature of the intervention, blinding participants was impossible. However, to minimize the risk of bias, after performing intervention by the first author (FN), the questionnaires before and after intervention were collected by another author (MV) and analyzed by yet another

author (SP), who were uninformed of the random allocation results and grouping.

This study was recorded in the Ministry of Health Clinical Trials Database, with IRC registration number: IRCT20120414009463N58, and approved by the Ethics Committee of Tehran University of Medical Sciences, with approval number: IR.TUMS.REC.1396.4262 dated December 16, 2017.

Measures

Demographic characteristics questionnaire and the World Health Organization quality of life questionnaire for HIV-brief version (WHOQOL-HIV-BREF) instrument were used at baseline, 8, and 12 weeks after intervention in both the groups.

Demographic profile

Data on age, education, employment, history of chronic or mental disease, history of infection by sexually transmitted diseases, antiviral treatment, marital status, number of children, husband's education and occupation, status of husband's infection, obstetrics history, history of sexual abuse, smoking, accommodation, and economic status were acquired. To assess content validity, this questionnaire was given to ten experts, including specialists in infectious diseases, experts working in Behavioral Disease Counseling Center and AIDS Research Center, faculty members, and sexual and reproductive health specialists. Their opinions and comments on the need to remove or add items, appropriate position of items, and the use of appropriate words were applied.

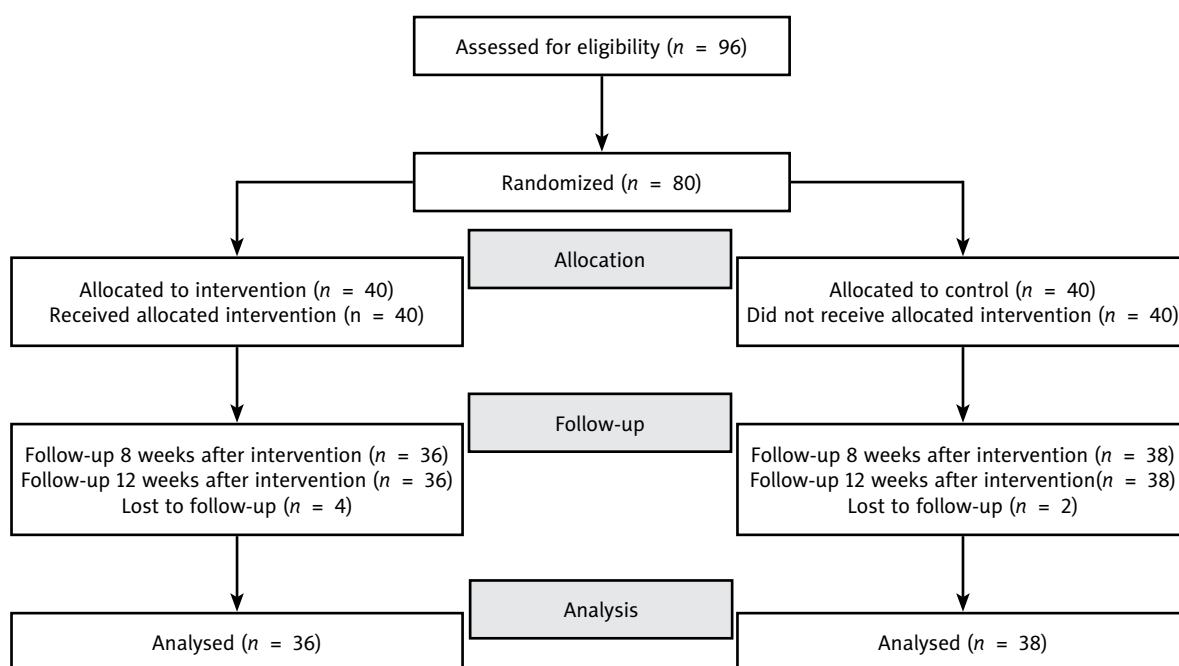


Figure 1. Flow diagram of the progress through phases of a parallel randomized trial among 80 women living with HIV

WHOQOL-HIV-BREF instrument

WHOQOL-HIV-BREF is a 31-item scale covering the overall quality of life perceived by respondents [26]. This multidimensional, generic, and conceptualized scale assesses six domains of quality of life and their facets, including physical health domain (4 facets), psychological health domain (5 facets), level of independence domain (4 facets), social relationship domain (4 facets), environmental domain (8 facets), and spirituality, religion, and personal beliefs domain (4 facets). Two questions evaluate general quality of life and general health perceived. Mean score of the domain was obtained by calculating mean score of its items [5, 27]. Each item's score ranged from 1 to 5. Value of 1 indicated the lowest, and 5 implied the highest score. Accordingly, total score in physical health domain was between 4 to 20, in psychological health domain, 5-25, in level of independence domain, 4-20, in social relationship domain 4-20, in environmental domain 8-40, and in spirituality, religion, and personal beliefs domain, 4-20. Overall, the score of QoL in women with HIV was between 31 to 155. Higher score indicated better QoL.

This questionnaire has been translated into various languages, including Persian, and its reliability and validity were re-evaluated [28-31]. Validity and reliability of the Persian version of this instrument were confirmed in various studies in Iran [27, 31]. The latest psychometric properties study of the Persian version of WHOQOL-HIV-BREF in Iran was performed by Nikooseresht *et al.* (2015). In this study, for the reliability, Cronbach's alpha and split-half coefficients were tested. The value of Cronbach's alpha was 0.93, indicating satisfactory reliability. Scientific validity of the questionnaire was assessed by content, face, and construct validity, and was satisfactory [27].

Intervention

At the pre-test stage and before conducting the intervention, questionnaires were completed by the participants in both the intervention and control groups. The educational content of interventional sessions, in addition to the content of CD, pamphlet, and booklet given to the participants, was adapted from an in-depth review of the literature based on TPB framework. Then, this content was evaluated and approved by an expert panel of sixteen specialists in various fields, including two experts in infectious diseases, four working in Behavioral Disease Counseling Center and AIDS Research Center, three faculty members, three sexual and reproductive health specialists, one psychologist, and three midwives. The expert panel assessed cultural appropriateness and adherence to TPB framework, addressing all necessary information and comprehensibility of the content by the participants; their opinions and comments were applied to improve TPB quality.

The intervention program included four sessions. These sessions were held in a weekly manner, each lasting for 90-120 minutes. Educational content was applied mainly through lecture and group discussion. In every session, the partici-

pants were allowed to ask questions, and appropriate answers were provided by the researcher. Moreover, educational CD, pamphlets, and booklets were given to the participants for providing more information. The control group did not receive any education, but routine care in the center. At the end of the study and after completing the last questionnaire, the control group was given all booklets and educational pamphlets to appreciate their participation. At the beginning of the study, the researcher introduced herself to the participants and explained the study's aims. The participants were ensured that their personal information would remain confidential. By assigning a code to every participant instead of name, confidentiality was assured. Written consent was acquired from all participants.

In the first two sessions, the education was based on the first construct of TPB, attitude. The intervention content included explaining the history of HIV/AIDS in Iran and the world, latest statistics on HIV prevalence, ways of transmitting the infection, difference between HIV and AIDS, risk factors, preventive measures, treatment, misconceptions, main points on self-care, nutrition, health, etc. To create positive changes in attitude, group discussion was performed, and women shared their experiences. In this stage, the researcher had an active role in correcting wrong beliefs and attitudes.

In the third session, the social, mental, and physical consequences of HIV, quality of life and its dimensions (physical, mental, independence, social, and environmental), QoL of HIV-positive women, importance of improving their QoL, importance of receiving correct information about HIV, and transferring these information to their relatives in order to enhance QoL, were all elaborated for the participants. The fourth session discussed incorrect attitudes towards HIV, beliefs, HIV awareness, motivation to follow influential people, and subjective norms by the group discussion.

In the third and fourth sessions, the education was based on the second and third constructs of TPB, subjective norms, and perceived behavioral control. Particular attention was paid to barriers and facilitators of behavioral changes. Some of these barriers, such as perceived stigma of obtaining help from health centers or inability to pay travel cost to reach HIV/AIDS center were recognized, and possible solutions were presented. Furthermore, some key people were asked to attend sessions to help improve subjective norms. For key people who could not attend sessions, on-line sessions and phone calls were performed, and educational materials were provided.

Statistics analysis

Statistics analysis was conducted using paired *t*-test, independent *t*-test, Fisher exact test, and χ^2 test. Data were collected and analyzed using SPSS version 16 software. χ^2 test was applied to compare continuous variables between the two groups. For comparing QoL between the intervention and control groups, an independent *t*-test was performed. Within-group differences at baseline, eight, and

Table 1. Basic characteristics of the study participants

Groups	Intervention (n = 36), n (%)	Control (n = 38), n (%)	p-value
Age (years)			
≤ 25	3 (7.9)	3 (8.4)	0.487 [†]
25-29	5 (10.5)	4 (13.9)	
30-34	11 (21.1)	8 (30.6)	
35-39	10 (39.5)	15 (27.8)	
≥ 40	7 (21.1)	8 (19.4)	
Husband's age (years)			
≤ 35	13 (36.1)	5 (13.2)	0.22 [†]
35-39	7 (19.5)	11 (29.0)	
40-44	9 (25.0)	9 (23.6)	
45-49	5 (13.8)	9 (23.6)	
≥ 50	2 (5.6)	4 (10.6)	
Marriage status			
Single	1 (2.8)	1 (2.6)	0.494 [†]
Married	27 (75.0)	29 (76.3)	
Widow divorcee	8 (22.2)	8 (21.0)	
Educational level			
Primary	8 (22.2)	6 (18.4)	0.255 [§]
Secondary	11 (30.6)	6 (15.8)	
Diploma	14 (38.9)	19 (50.0)	
Academic	3 (8.3)	7 (18.4)	
Husband's educational level			
Primary	6 (16.7)	5 (13.0)	0.527 [§]
Secondary	12 (33.3)	13 (34.0)	
Diploma	14 (38.9)	15 (40.0)	
Academic	4 (11.1)	5 (13.0)	
Occupation/job			
Housewife	28 (77.8)	32 (84.2)	0.480 [§]
Employee	8 (22.2)	6 (15.8)	
Husband's occupation/job			
Unemployed	6 (16.6)	9 (23.7)	0.241 [§]
Worker	30 (83.4)	29 (76.3)	
Duration of disease (years)			
≤ 5	16 (44.4)	11 (28.9)	0.530 [†]
5-9	16 (44.4)	17 (44.7)	
≥ 5	4 (11.1)	10 (26.3)	
History of sexual abuse			
Yes	5 (13.9)	2 (5.3)	0.2 [§]
No	31 (86.1)	36 (94.7)	
Accommodation			
Rental house	34 (94.4)	33 (86.8)	0.6 [†]
Own house	0 (0.0)	2 (5.3)	
Other	2 (5.6)	3 (7.9)	

Table 1. Cont.

Groups	Intervention (n = 36), n (%)	Control (n = 38), n (%)	p-value
Smoking			
Yes	4 (11.11)	5 (13.15)	0.4 [§]
No	32 (88.89)	33 (86.85)	

[†] – independent t-test, [‡] – Fisher exact test, [§] – χ^2 test

twelve weeks after intervention were analyzed using analysis of variances with repetitive measures that compared means across one or more variables based on repeated observations.

Results

At the beginning, 80 women living with HIV were enrolled in the study, but six subjects were lost to follow-up, including three women in the intervention and one in the control group who withdrew their consent to participate in the study, one woman in the intervention group who got pregnant, and one in the control group who started anti-depression medicine. Finally, there were 36 women in the intervention and 38 in the control groups (Figure 1). Demographic characteristics of the subjects are summarized in Table 1.

Overall, the participants' mean age in the intervention and control groups was 33.94 ± 6.642 years and 34.97 ± 6.034 years, respectively (Table 1). Most of them were married: 75% and 76.3% in the intervention and control groups, respectively. The duration of the disease since diagnosis was 5.22 ± 3.473 years in the intervention group, and 6.92 ± 3.928 in the control group. Sexual transmission was the most common way of transmitting the infection, with 66.7% and 76.3% in the intervention and control groups, respectively. Most participants in the intervention (77.8%) and control groups (84.2%) were housewives. In terms of education, most of the individuals in the intervention (38.9%) and control (50%) groups completed high school (Table 1).

The mean score of QoL in the intervention and the control groups at baseline were 93.25 ± 19.46 and 94.55 ± 16.58 , respectively. There was no significant difference in quality of life between the two groups at baseline ($p > 0.05$) (Table 2). The score of overall QoL in the intervention group at 8 and 12 weeks after education were 102.38 ± 16.10 and 107.97 ± 15.40 , respectively, while in the control group, the scores were 78.92 ± 13.60 and 75.10 ± 12.90 , respectively, indicating a statistically significant difference ($p < 0.001$). Moreover, the scores in all domains in the intervention group were higher than in the control group, showing a better quality of life. On the other hand, analyzing between-group differences revealed that the score of QoL in the intervention group at 8 and 12 weeks after education were significantly higher than baseline (102.38 ± 16.10 and 107.97 ± 15.40 vs. 93.20 ± 19.40 , respectively). In the control group, this score decreased significantly, indicating a decline in the quality

Table 2. Analysis of pre-test and two post-tests results between the two groups

Dimensions of QoL	Baseline		8 weeks after intervention		12 weeks after intervention	
	Intervention (mean ± SD)	Control (mean ± SD)	*p-value	Intervention (mean ± SD)	Control (mean ± SD)	*p-value
Physical domain (4-20)	13.1 ± 3.7	13.3 ± 2.5	0.81	14.52 ± 2.90	12.05 ± 2.50	< 0.001
Psychological domain (5-25)	14.8 ± 3.7	15.2 ± 2.9	0.4	16.22 ± 3.00	13.26 ± 2.30	< 0.001
Social relationships (4-20)	10.1 ± 3.1	11.4 ± 2.9	0.39	11.91 ± 2.80	9/81 ± 2/4	< 0.001
Environmental domain (8-40)	24.1 ± 5.2	24.8 ± 4.7	0.55	26.13 ± 4.70	22.57 ± 4.40	< 0.001
Spiritual domain (4-20)	11.5 ± 3.7	11.2 ± 4.1	0.77	12.91 ± 3.10	9.60 ± 3.60	< 0.001
Level of autonomy (4-20)	12.3 ± 3.6	11.90 ± 2.90	0.56	13.61 ± 3.00	10.57 ± 2.80	< 0.001
Quality of life (31-155)	93.2 ± 19.4	94.5 ± 16.50	0.75	102.38 ± 16.10	78.92 ± 13.60	< 0.001
				107.97 ± 15.47	107.97 ± 15.47	< 0.001

*Independent t-test

of life in HIV-positive women (78.92 ± 13.60 and 75.10 ± 12.90 vs. 94.50 ± 16.50 , respectively) ($p < 0.001$) (Table 2). Moreover, comparison of QoL and its dimensions in the intervention group at three time-point measurements using analysis variances with repetitive measures showed scores in all dimensions, and the total QoL score at 8 and 12 weeks after intervention were significantly higher than pre-test (93.20 ± 19.40 vs. 102.38 ± 16.10 and 107.97 ± 15.47 , respectively) ($p < 0.001$) (Table 3). The results of analysis variances with repetitive measures in the control group also showed that the scores of QoL at least in one time was different, indicating a reduce in overall QoL (94.50 ± 16.50 vs. 78.92 ± 13.60 and 75.10 ± 12.90 , respectively; $p < 0.001$) (Table 4).

Discussion

The current study is one of the first to evaluate the effect of educational intervention based on TPB principles on quality of life in a sample of Iranian women living with HIV. The theory of planned behavior is one of the leading theories in conducting health-related behaviors that proposes a person's behavior defined by behavioral intentions and perceived behavioral control (PBC) [32]. PLWH report a lower QoL than people without HIV [33]. Quality of life as people's subjective perception of their lives is an important health outcome [33]. Improving the quality of life can have a crucial role in performing positive health activities, and reducing or eliminating high-risk behaviors [34]. The present study's results found that TPB-based intervention significantly improved the overall QoL and all domains in women living with HIV compared with the control group.

Evidence showed that people living with HIV experience low social support, psychological distress, and impaired quality of life [25]. A considerable number of studies have shown a lower level of HR-QoL among women living with HIV compared with HIV-positive men [4]. A previous study conducted in Iran showed that women living with HIV had significantly lower QoL compared with healthy women. QoL of HIV-positive women was influenced by variables, such as sex, education, occupation, marital status, CD4+ cells count, and clinical stage of the disease [35]. Therefore, interventions are needed to improve the quality of life of these people.

Several studies support the current study's results. In one research, the TPB intervention was not only effective in improving various dimensions of QoL, but also in reducing the prevalence of mental health problems of PLWH. Additionally, the intervention group showed lower levels of depression, anxiety, and stress as well as significant improvements in problem-solving skills, self-confidence, and feeling of being cared for by others [25]. The results of our study are in line with another research in Iran that assessed the impact of education and empowerment model-based program consisting of four steps of threat, such as perception, problem-solving, educational participation, and evaluation on quality of life of HIV-positive women. The participants showed a significantly higher score in psychologi-

Table 3. Comparison of QoL and its dimensions in intervention group at three time-point measurements

Dimensions of QoL	Baseline (mean ± SD)	8 weeks after intervention (mean ± SD)	12 weeks after intervention (mean ± SD)	Analysis of variance on repeated measures (p-value**)
Physical domain (4-20)	13.16 ± 3.70	14.52 ± 2.90	15.36 ± 2.60	$F = 59/873, p < 0.001$
Psychological domain (5-25)	14.80 ± 3.70	16.22 ± 3.00	17.47 ± 3.10	$F = 100/047, p < 0.001$
Social relationships (4-20)	10.10 ± 3.10	11.91 ± 2.80	12.63 ± 2.20	$F = 31/641, p < 0.001$
Environmental domain (8-40)	24.10 ± 5.20	26.13 ± 4.70	26.86 ± 4.80	$F = 34/766, p < 0.001$
Spiritual domain (4-20)	11.50 ± 3.70	12.91 ± 3.10	13.86 ± 3.00	$F = 57/758, p < 0.001$
Level of autonomy (4-20)	12.30 ± 3.60	13.61 ± 3.00	14.08 ± 2.80	$F = 27/828, p < 0.001$
Quality of life (31-155)	93.20 ± 19.40	102.38 ± 16.10	107.97 ± 15.47	$F = 156/392, p < 0.001$

**Analysis of variance on repeated measures

Table 4. Comparison of QoL and its dimensions in control group at three time-point measurements

Dimensions of QoL	Baseline (mean ± SD)	8 weeks after intervention (mean ± SD)	12 weeks after intervention (mean ± SD)	Analysis of variance on repeated measures (p-value**)
Physical domain (4-20)	13.30 ± 2.50	12.05 ± 2.50	11.23 ± 2.40	$F = 41/129, p < 0.001$
Psychological domain (5-25)	15.20 ± 2.90	13.26 ± 2.30	12.05 ± 2.30	$F = 104/273, p < 0.001$
Social relationships (4-20)	11.40 ± 2.90	9/81 ± 2/4	9.13 ± 2.40	$F = 58/517, p < 0.001$
Environmental domain (8-40)	24.80 ± 4.70	22.57 ± 4.40	22.05 ± 4.50	$F = 87/760, p < 0.001$
Spiritual domain (4-20)	11.20 ± 4.10	9.60 ± 3.60	9.10 ± 3.40	$F = 42/585, p < 0.001$
Level of autonomy (4-20)	11.90 ± 2.90	10.57 ± 2.80	10.13 ± 2.50	$F = 34/641, p < 0.001$
Quality of life (31-155)	94.50 ± 16.50	78.92 ± 13.60	75.10 ± 12.90	$F = 280/108, p < 0.001$

**Analysis of variance on repeated measures

cal and spiritual domains and overall quality of life [36]. In our study, we tried to convey the knowledge about various aspects of HIV/AIDS. Whenever patients acquired sufficient and correct knowledge, along with a positive attitude towards the ability to control HIV, they decided to adopt healthy behaviors [37].

Ayodele [8] evaluated the impact of TPB as a predictor of HIV testing intention on university undergraduate students in Nigeria. The results revealed that TPB constructed 35% of the explained variance in HIV testing intention. It also highlighted the importance of perceived behavioral control, attitude, and perceived risk of HIV in predicting the intention of performing HIV testing among students, who have not previously tested for HIV. Another main component of our intervention was addressing self-efficacy in participants. Accordingly, Zhou *et al.* [34] suggested that self-efficacy can reduce the negative impacts of perceived barriers on adherence to medication and antiretroviral therapy in PLWH. Therefore, conducting interventions for increasing self-efficacy and reducing behavioral and psychological barriers in HIV-positive individuals has been recommended.

Researchers have reported the effect of TPB on quality of life in patients with other chronic diseases. One study showed that TPB intervention was effective in enhancing general and specific HR-QoL in patients with knee/hip os-

teoarthritis in the intervention group comparing the control group ($p < 0.01$) [17]. Moreover, TPB was effective in increasing health-related behaviors, such as physical activity in men [38-40], sexual and reproductive health in adolescents [41], improving male adolescents' skills in rejecting risky suggestions, and using techniques of delaying risky suggestions [37]. TPB was also effective in improving AIDS prevention skills in another study; it is a recommended approach in human immunodeficiency virus prevention behaviors [9].

The outcomes of the current study also showed that the quality of life in the control group decreased significantly at the end of follow-up. This could result from increasing the duration of the disease, which exposes people to chronic stress. In one study, clinical stage of the disease was reported as the most important predictive factor in the quality of life of PLWH [35].

Our study has several implications, because it confirmed the potential effects of TPB interventions on enhancing the QoL of women with HIV. The results showed a higher score of QoL at 8 and 12 weeks after the intervention compared with baseline in the control group. Therefore, it is recommended that healthcare professionals apply this kind of intervention in people living with HIV. The present study has some limitations; short-term intervention was ap-

plied and booster educational sessions could not be assigned for the participants. Moreover, although the subjective norm is a main construct of TPB, it was impossible to educate all family members of people living with HIV. Furthermore, the results of this study are restricted by its small sample size and limited intervention. Therefore, more studies with bigger sample sizes are suggested.

Conclusions

This is the first study evaluating the effect of TPB intervention on the QoL in women living with HIV in Iran. Theory-based training of planned behavior that emphasizes the essential psychological factors and causing or modifying behaviors can improve attitudes towards HIV, abstract norms, control and behavioral intention, and behavior in women living with HIV. Based on the positive results obtained in this study, it is suggested that this theory should be used at different levels of educational programs for prevention and control of HIV infection.

Acknowledgments

This study is a part of Master's thesis approved by the Ethics Committee of Tehran University of Medical Sciences (approval No.: IR.TUMS.REC.1396.4262 -12/16/2017). We are grateful for the cooperation of the participating women, the Behavioral Disease Counseling Center staff, the AIDS Research Center of Imam Khomeini Hospital, and all those who assisted in this study.

Conflict of interest

The authors declare no conflict of interest.

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