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The influence of personality and motives on highly HIV-adherent patients from Venezuela: Theoretical and structural equation analysis

Influencia de la personalidad y la motivación en la adherencia al tratamiento en pacientes venezolanos con VIH: análisis de ecuaciones teóricas y estructurales

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SUMMARY

Introduction: *The practice of adherence behaviors in patients living with HIV is essential to keep viral load levels undetectable and to avoid complications associated with the disease. One of the most important influences for practicing such behaviors is the psychological factors.*

Methods: *This cross-sectional study was carried out in a sample of 212 HIV patients under antiretroviral treatment from Venezuela. Patients completed two instruments measuring personality dimensions (tolerance to frustration/ambiguity, follow-up instructions/impulsivity, and decision-making), motives, and behavioral competencies as theoretical predictors of adherence behaviors. Structural equation analysis was used to test hypothesized theoretical model.*

Results: *The patients reported adherence percentages ≥ 0.90 %, finding that the personality factor in its modality of tolerance to frustration/ambiguity modulated the operation of the motives factor (structural coefficient = 0.22), which in turn directly predicted adherence behaviors (structural coefficient = 0.74). The goodness fit of the model were optimal: $\chi^2/df = 2.23$, P = 0.001, GFI = 0.95, AGFI = 0.91, CFI = 0.96, RMSEA = 0.07.*

Conclusions: *Moderate levels of tolerance to frustration/ambiguity and high levels of motivation predicted the practice of adherence behaviors in a group of patients living with HIV in Venezuela. According to a psychological model for the study of adherence behaviors, the importance of both factors for promoting such behaviors is discussed.*

Keywords: *HIV patients, personality, motives, adherence behaviors, psychological model.*

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RESUMEN

Introducción: *La práctica de conductas de adherencia en pacientes que viven con VIH es fundamental para mantener indetectables los niveles de carga viral y evitar complicaciones asociadas a la enfermedad. Una de las influencias más importantes para practicar tales comportamientos son los factores psicológicos.*
Método: *Este estudio transversal se realizó en una muestra de 212 pacientes con VIH en tratamiento antirretroviral de Venezuela. Los pacientes completaron dos instrumentos que miden las dimensiones de la personalidad (tolerancia a la frustración / ambigüedad, instrucciones de seguimiento / impulsividad y toma de decisiones), motivos y competencias conductuales como predictores teóricos de las conductas de adherencia. Se utilizó el análisis de ecuaciones estructurales para probar el modelo teórico hipotetizado.*
Resultados: *Los pacientes reportaron porcentajes de adherencia ≥ 0,90 %, encontrando que el factor personalidad en su modalidad de tolerancia a la frustración / ambigüedad modulaba el funcionamiento del factor motivos (coeficiente estructural = 0,22), el cual a su vez predijo directamente las conductas de adherencia (coeficiente estructural = 0,74). El ajuste de bondad del modelo fue óptimo: $\chi 2$ / df = 2.23, P = 0.001, GFI = 0.95, AGFI = 0.91, CFI = 0.96, RMSEA = 0.07.*
Conclusiones: *Niveles moderados de tolerancia a la frustración / ambigüedad y altos niveles de motivación predijeron la práctica de conductas de adherencia en un grupo de pacientes viviendo con VIH en Venezuela. De acuerdo con un modelo psicológico para el estudio de las conductas de adherencia, se discute la importancia de ambos factores para promover dichas conductas.*

Palabras clave: *Pacientes con VIH, personalidad, motivos, conductas de adherencia, modelo psicológico.*

INTRODUCTION

The practice of adherence behaviors in patients living with HIV disease is key to keep viral load levels undetectable and avoiding complications associated with the disease (1,2). One of the most important factors influencing such behaviors is the psychological (e.g., personality, motivation, self-efficacy, beliefs, behavioral competencies, positive affect, etc.) (3-6). According to a psychological model for the research of adherence behaviors, psychological factors include the consistent ways in which persons interact with situations containing unpredictable, ambiguous, or uncertain stimuli signal and/or stimuli consequences (personality), the motives to behave, the past and current behavioral competencies, as well as the diseases-related behaviors (e.g., anger, anxiety, depression, social isolation, etc.) (7).

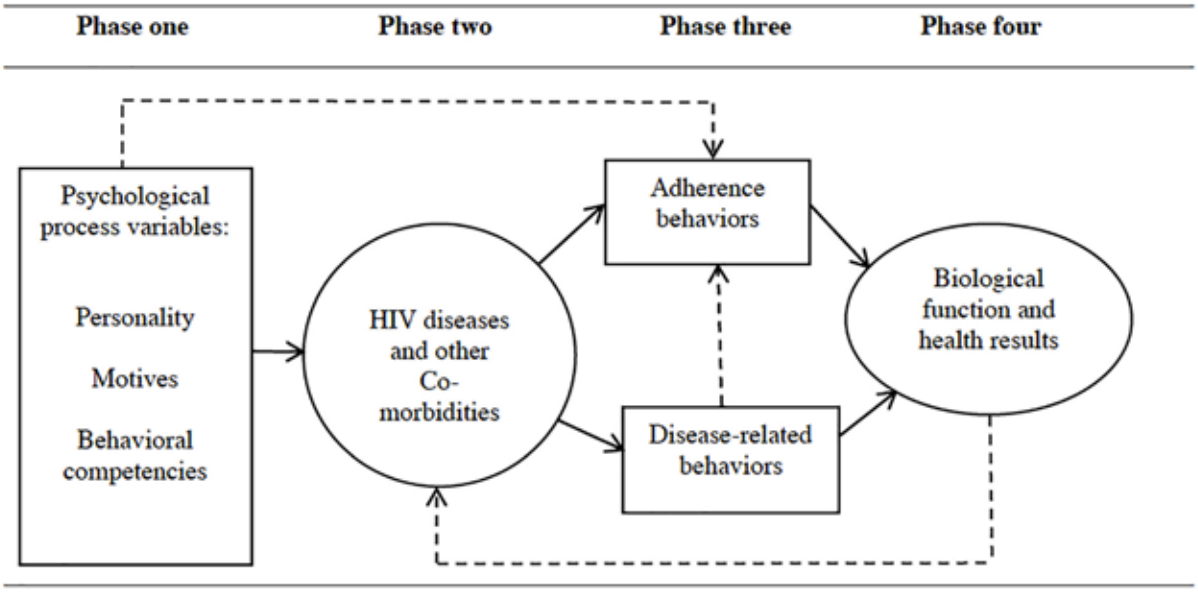

Figure 1. Psychological model for the research of adherence (7).

Based on the model we have been conducted several studies including samples of highly HIV-adherent patients and those reporting adherence problems (<0.90 %). Those studies demonstrated that in the first group the predictors have been highly motivated and a good competencies performance (8,9), whereas in the second group the predictors have been related to the personality factor in its modalities of tolerance to frustration, tolerance to ambiguity, and decision-making (10-12).

In studies conducted in Venezuela, the research on HIV-adherence patients has focused on analyzing some psychological, interpersonal, or biological factors (13-15), but in none of them, the personality factor has been considered explicitly. This study was aimed at determining the direct and indirect effects of the personality factor, motives and behavioral competencies on adherence behaviors in a sample of highly HIV-adherent patients from Venezuela, based on the psychological model presented using structural equation modeling.

METHODS

Setting and Participants

This cross-sectional study was carried out between January and March 2018 at the headquarters of the National AIDS Program (PRONASIDA) in the cities of Barquisimeto (Lara) and Valencia (Carabobo), Venezuela. The selection of participants was non-probabilistic by convenience and initially included 282 patients diagnosed with HIV infection, who were under a regimen with antiretroviral medication. Patients who did not answer all the questions contained in the instruments applied were discarded; likewise, and to fulfill the proposed objective, those who reported adherence < 0.90 % were also discarded. The final sample consisted of 212 patients, corresponding to 75.1 % of the initial participants.

Procedure

The study was approved by the Humanities and Arts Deanship of the Central-Western University "Lisandro Alvarado" and by the PRONASIDA authorities in both cities. Once the research protocol was approved and according to the principles of the Declaration of Helsinki (16), the patients were interviewed face to face. The informed consent was given to those who agreed to collaborate voluntarily, which they read and signed. They were instructed to respond to the instruments to be applied. The administration of the instruments ranged between 30 and 45 minutes. The ethical principles of the American Psychological Association were applied (17), ensuring the confidentiality of patients through non-personal identification.

Factors and Self-Administered Instruments

To measure the psychological factors of the model two self-administered instruments were used, both previously adapted and validated in Venezuela. The first one (18) includes 24 questions about past behavioral competencies (what patients have done in relation to other diseases and their respective treatments), current competencies (those for assessing knowledge and abilities related to the HIV disease and treatment), the motives to behave, as well as adherence behaviors. Questions about behavioral competencies and motives were defined in a four-point Likert-type format. An example of a question about past competencies was: *Before you were diagnosed with HIV infection if you got sick and prescribed a medication treatment, did you take them as your doctor indicated?* The response options ranged from 1 (never) to 4 (always). One question about current behavioral competencies was: *From the moment you were diagnosed with HIV infection and started treatment, how often have you been given the task of asking health personnel about the care you should take in relation to the disease and the consumption of your medication?* The response options ranged from 1 (I have never done) to 4 (I have always done it). One question about motives was: *If you are on treatment and you take your medications most or every day of the week, can you tell us how important it was that you saw benefits in your health condition?* The response options ranged from 1 (it was not a determining reason) to 4 (it was a very determining reason). Adherence behaviors were measured using a Likert-type format with five response options, ranging from

1 (I did not consume it on any day of the week) to 5 (I consumed all days of the week).

The second instrument includes 12 questions that synthesized personality dimensions such as tolerance to frustration/ambiguity, follow-up of instructions/impulsivity, as well as decision-making (19). All the questions were in a 10-point scale format, ranging from 1 (it was not a threatening situation) to 10 (it was a very threatening situation). One question about tolerance to the frustration was: *Even though you follow the medical treatment, you do not obtain positive responses or support from your doctor; then it turns out to be...* One about the follow-up of instructions question was: *You are receiving medical treatment and follow the instructions as indicated by your doctor, but do not see immediate improvements in your health; then it turns out to be...* Finally, one about decision-making was: *You are in treatment and your doctor gives you instructions to follow them, but you decide to continue with another treatment, for example, receive home remedies, follow a naturopathic treatment, or follow the advice of someone who is not your doctor; then it turns out...*

Statistical Analysis

The SPSS program for Windows (23.0 Version) was used to obtain the descriptive statistics of socio-demographic, clinical, psychological, and behavioral variables. Pearson's product-moment (r) was used to identify correlations between the different psychological factors and adherence behaviors. Also, the AMOS program (20 Version) was utilized to test the proposed theoretical model. According to literature recommendations (20,21),

Table 1
Socio-demographic, clinical, and psychological characteristics of the study participants (N = 212)

Variables	M	SD	Min/Max	N	%
Age	42.1	10.8	22-68		
Gender					
Male				168	79.2
Female				44	20.8
Marital status					
Single				162	76.4
Divorced				33	15.6
Married				7	3.3
Widowed				10	4.7
Work status					
Unemployed				56	25.9
Occasional employment				38	17.9
Permanent employment				119	56.1
Time since HIV+ diagnosis (months)	97.2	73.7	6-336		
Consumption of pills by day					
Between 1-3				166	78.3
Between 4-6				43	20.3
Seven or more				3	1.4
Personality dimensions and psychological factors					
Tolerance to frustration/ambiguity	25.0	11.2	1-50		
Follow-up instructions/impulsivity	19.9	9.6	4-40		
Decision-making	17.8	8.9	3-30		
Motives to behave	13.7	2.7	4-16		
Past competencies	14.6	4.1	5-20		
Current (treatment-related) competencies	13.2	2.5	5-16		
Current (personal) competencies	7.6	2.4	4-16		

M = Mean; SD = Standard deviation; Min = Minimum value; Max = Maximum value; N = Simple absolute frequency; % = Percentage.

to evaluate the fit of the proposed model we included the ratio between Chi-Square and the degree of freedom (χ^2/df), the Jöreskog-Sörbom Goodness of Fit Index (GFI), the Adjusted Goodness of Fit Index (AGFI), the Bentler-Bonett Normed Fit Index (NFI), the Comparative Fix Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). The stipulated criteria for acceptable fit were as follows: χ^2/df ≤ 3, GFI, AGFI, NFI, and CFI ≥ 0.90, as well as RMSEA < 0.80 (22,23).

RESULTS

Table 1 summarizes the socio-demographic, clinical, and psychological characteristics of the participants. The average age was 42.1 years (SD = 10.8), the majority were male, remained single and just over half had stable employment. The patients had lived with HIV infection an average of 97.2 months (SD = 73.7) and the majority consumed between 1 and 3 pills a day. On the other hand, stress means levels associated with each personality dimension remained low to moderate, while the mean average of past competencies and motives to behave were high, current behavioral competencies oscillated between high (treatment-related competencies) and moderate to low (personal competencies).

Table 2

Product-moment Pearson (r) correlations between psychological factors and adherence behaviors

Factors	FI/I	DM	M	HC	TRC	PC	AB
TF/A	0.620**	0.505**	0.222**	0.121	0.072	-0.014	0.061
FI/I		0.532**	0.228**	0.045	0.122	-0.042	0.042
DM			0.248**	0.154*	0.048	-0.147*	0.137*
M				0.132	0.159*	-0.066	0.478**
HC					0.236**	-0.187**	0.041
TRC						-0.165*	0.108
PC							-0.073
AB							

TF/A: Tolerance to frustration/ambiguity; FI/I: Follow-up instructions/impulsivity; DM: Decision-making; M: Motives; HC: History of competencies; TRC: Treatment-related competencies; PC: Personal competencies; AB: Adherence behaviors. Significant association to P = 0.05 (*) and P= 0.01 (**).

Table 2 shows the associations between different psychological factors and adherence behaviors. Moderate to high correlations were found between the three personality dimensions, but only the decision-making dimension was associated with adherence behaviors. There were also low but significant associations of the three personality dimensions with the motives factor, which in turn was associated with both treatment-related competencies and with adherence behaviors, but not with past competencies and personal competencies. As expected, past competencies were associated with treatment-related and personal competencies, with this one in a negative direction. The two types of behavioral competencies were associated with each other in a negative direction, although neither of the two was associated with adherence behaviors.

Considering these correlations, the following analysis with structural equations was proposed.

The first model tested included factors such as tolerance to frustration/ambiguity, follow-up on instructions/impulsivity, decision-making, and motives. According to the logic of the theoretical model, we expected that the first three factors to modulate the operation of the motives factor, which would mediate the relationship between

them and adherence behaviors. The results of the analysis showed that in the dimension of personality tolerance to frustration/ambiguity and motives, one of its indicators contributed with a factorial weight <0.30. Contrary to expectations, none of the personality dimensions showed a direct and statistically significant effect on the motives factor: tolerance to frustration/ambiguity (β = 0.050, P = 0.342), follow-up instructions/ impulsivity (β = 0.017, P = 0.691) and decision-making (β = 0.058, P = 0.212). Finally, several indicators of goodness of fit were not adequate: χ^2/df = 2.52, P = 0.001, GFI = 0.86, AGFI = 0.81, NFI = 0.82, CFI = 0.88, RMSEA = 0.08. After eliminating the non-significant factors one by one and setting the different parameters at zero, a second model was tested.

The results obtained with the model yielded a final admissible solution, with its parameters being the optimal ones (see Figure 2). All the factorial weights in each of the indicators were ≥ 0.30, finding that the frustration tolerance/ ambiguity personality dimension was directly and significantly associated with the motives factor (β = 0.94, P = 0.005), providing a structural coefficient = 0.22. Furthermore, the motives factor was also associated with the practice of adherence behaviors (β = 0.306, P = 0.001), contributing with a structural coefficient = 0.74. The goodness of fit reflected the pertinence of the theoretical model proposed with the data: χ^2/ df = 2.23, P = 0.001, GFI = 0.95, AGFI = 0.91, NFI = 0.93, CFI = 0.96, RMSEA = 0.07.

DISCUSSION

This study aimed to identify which factors included in a psychological model would predict the practice of adherence behaviors in a sample of patients who were receiving medical attention in the cities of Barquisimeto and Valencia, in Venezuela. The results demonstrate the capacity of prediction of our theoretical model, contributing to understanding what psychological factors are relevant when patients are practicing adherence behaviors in levels of ≥ 0.90 %. In studies conducted around the world among patients reporting those levels of adherence, the factors facilitating this behavior includes the lowest number of pills consumed per day (24), the role of self-efficacy over depression (25), a high motivation (26), as well as the role of family and friends support (27,28).

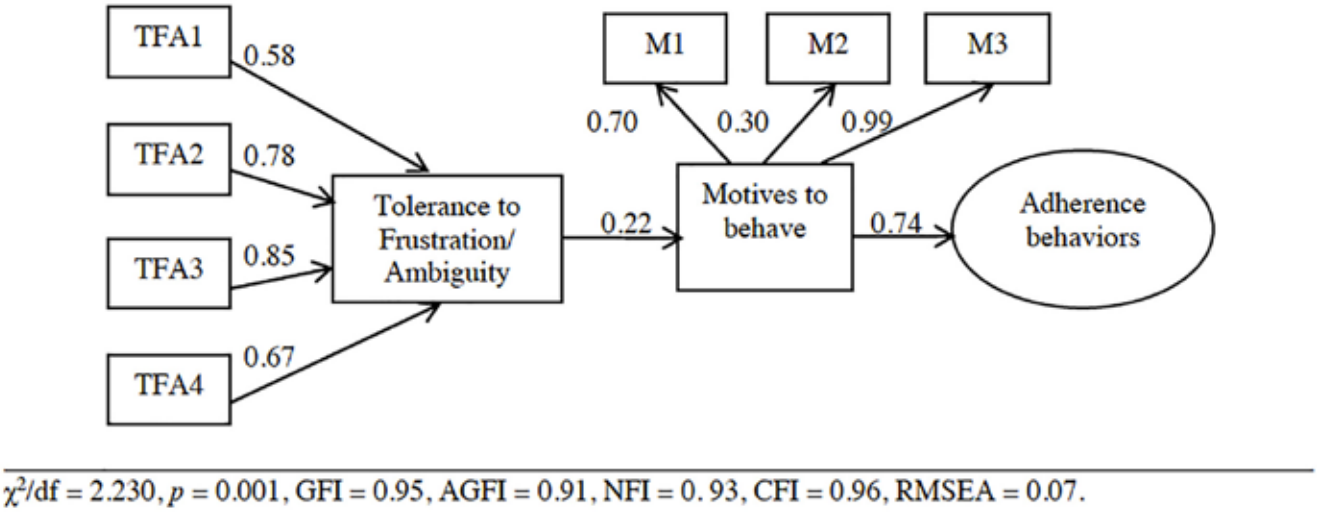

Figure 2. Final model of psychological predictors of the adherence behaviors.

However, little has been explored about the relationship between the personality factor and other psychological factors proposed in our theoretical model (7). Here, the personality factor (in its modality of tolerance to frustration/ ambiguity) modulated the operation of the motive factor, and this one influenced the consistent practice of adherence behaviors. The tolerance to frustration/ambiguity factor implies that a patient has learned to display consistent patterns of behavior, regardless of whether he receives positive consequences provided by significant persons, that the consequences are delay or less than expected (frustration), or even not establishing a clear association between the disease and the possible negative consequences over time (ambiguity). Therefore, if we consider that the average score obtained for this dimension was 25.0 (on a scale of 1 to 50), it is understandable that a moderate score had directly impacted the motives factor, modulating its operation and its impact on adherence behaviors. This means that based on their psychological history and according to the time living with the diseases (mean of 97.2 months), the patients have learned to face typical situations in which they do not cause stress reactions due to frustration and ambiguity associated with the disease itself and the antiretroviral treatment. In addition, the motivation to practice adherence behaviors was a key influence in the patients of this sample.

From a theoretical point of view, the personality factor synthesizes the unique and idiosyncratic way in which patients behave according to their psychological history, while the motives factor allow us to identify what patients have learned to do in specific circumstances depending on the stimuli consequences that have been positively associated with the practice of adherence behaviors (e.g., experiencing an optimal health condition or receiving verbal expressions of support from significant persons of their social environment).

Therefore, based on the logic of our theoretical model, we expected that if low to moderate scores were obtained in the analyzed personality dimensions, these finally should modulate both the operation of motives and behavioral competencies, what happened, even only in one of the personality dimensions. However, it is important to say that this finding differs from what we have reported in Mexico with samples of 100 % HIV-adherent patients, in which the constant has been the decisive influence of motives and behavioral competencies, not of any personality dimension (8,9). Moreover, we can assume that the fact that the majority of patients were consuming between 1 and 3 pills per day has also favored the practice of adherence behaviors; in this sense, it cannot be ignored that more simplified treatment regimens with antiretroviral drugs may have a greater probability to be motivated for practicing adherence behaviors (29,30).

Despite the results obtained in this study, it is necessary to recognize two limitations. First, the size of the sample was limited to only 212 patients living with HIV from two cities in the states of Lara and Carabobo. Second, due to the economic problems in the country, it was not possible to have the complete information of the laboratory studies in which viral load and CD4 lymphocyte counts were documented. Third, considering that the analysis of the personality factor is based on an alternative theoretical proposal developed in Mexico by Ribes (31), for obvious reasons it is difficult to compare or to contrast the results previously reported with those adopting others reference theoretical frameworks, including dimensions such as openness, conscientiousness, neuroticism, extraversion, agreeableness, etc. (32,33).

In order to overcome these limitations, it will be necessary to promote a broad-spectrum study (both longitudinal and cross-sectional) including a representative sample of HIV patients, with three potential objectives: one, to assess the role of the personality factors over time (one or two years, using repeated measures); two, to assess the main biological markers (e.g., viral load and CD4 lymphocyte counts); third, to assess some of the psychological factors grouped in the category of diseases-related behaviors (e.g., depression, affective states, etc.).

Our interest speaking in general terms dual. On the one hand, we intend to identify behavioral profiles historically constructed (personality) and analyze how they related functionally with motives and behavioral competencies, as potential predictors of medication-adherence behaviors and the practice of diseases-care behaviors. On

the other hand, we pretend to collaborate in interdisciplinary terms (including physicians, nutritionists, nurses, psychologist, etc.) for designing intervention programs for behavioral change and maintenance behavior, as well as to improve the psychological condition and the quality of life among patients living with the HIV disease.

Competing interest: The authors declare no conflict of interest.

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Contributions: JFLA and JLYS analyzed the data and reviewed the two versions of the work. RDGM and MATB prepared the research protocol, interviewed the patients, prepared the database, and reviewed the final version of the work.

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