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Personality, Psychological Mediators and Adherence to ART: A Correlational Clinical Study

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Abstract

Since the effectiveness of antiretroviral treatment (ART) depends on adherence, this study aimed to assess the personality characteristics of people living with HIV/AIDS (PLWHA)—by considering general patterns of behavior and attitude—and to verify its association with perceived social support, expectation of self-efficacy to follow ART, and biological markers of adherence. This clinical, exploratory, descriptive, and cross-sectional study was conducted on PLWHA on ART by means of a structured questionnaire, scale of perceived social support in HIV (PSS-HIV), Scale of self-efficacy expectations of adherence to antiretroviral treatment (SEA-ART) and the HumanGuide (HG) personality test. Scores indicative of good prognosis on the PSS-HIV correlated with higher CD4+ T cells and lower viral load. Personality characteristics such as sociability and optimism, ability to deal with changes, and flexibility influenced perceived social support. Low self-efficacy expectations to follow ART were associated with dependency on social approval and recognition, while high expectations when associated to negative emotional and physical conditions had a positive impact on adherence. Sense of responsibility and care for life correlated with higher CD4+ T cells. Thus, personality characteristics may influence psychological mediators in terms of adherence to ART and can offer relevant information to plan a successful intervention for PLWHA.

Keywords

Personality Determination, Perceived Social Support, Self-Efficacy, Treatment Adherence, High-Activity Antiretroviral Therapy

1. Introduction

Forty years since the emergence of the acquired immunodeficiency syndrome

(AIDS), in the early 1980s, the speed of diagnosis (World Health Organization, 2015), the emergence of more powerful drugs (da Silva & de Oliveira, 2017; Waldvogel et al., 2015), the simplification of the antiretroviral scheme (Brites, 2016), the creation of post- and pre-exposure prophylaxis programs (Cohen et al., 2016; da Silva & de Oliveira, 2017; Jansen, 2017) and public policies on HIV/AIDS (Guimarães et al., 2017; Brazilian Ministry of Health, 2018) have contributed to the systematic decrease in the occurrence of new cases, with more and more carriers rendered asymptomatic of the HIV virus and having a good quality of life (Mayer et al., 2016; Teeraananchai et al., 2017), and for AIDS to be considered a chronic disease (Swendeman et al., 2009). Despite the promising scenario, the achievement of therapeutic benefits still depends on adherence to ART, as it is the best predictor of treatment success for those with access to the drugs (Chesney, 2003; Mills et al., 2006), as well as preventing transmission of the virus (Cohen et al., 2016). Non-adherence increases the risk of virologic failure, decreases the individual's survival, compromises their quality of life, increases the risk of AIDS progression, and favors the development of more resistant viral strains. The drugs cease to be effective when the patient does not follow the prescribed treatment, which poses grave consequences to their health. As insufficient adherence decreases clinical benefits and the effectiveness of health systems, it presents a threat to the individual and collective health (Bonolo et al., 2007; Brazilian Ministry of Health, 2015; Wright, 2000), thereby making it a priority in public policies in countries like Brazil (Polejack & Seidl, 2010), where the present study was conducted.

Treatment adherence is associated with self-care (Camargo-Borges & Japur, 2008; Swendeman et al., 2009; Webber et al., 2013) as it implies persistence, constant compliance or maintenance of the medication routine and evokes the patients' tenacity to adhere to a therapeutic regimen (Aronson, 2007). Studies on the frequency of non-adherence in PLHIV have shown that this behavior is comparable to that of other groups of patients with chronic diseases; even those whose severity of condition can lead to their death, exhibit similar behaviors (Straub, 2014; Wright, 2000). Efforts have been made over the past two decades to assess the impact of adherence on disease progression, identify barriers to ART adherence and the factors that may favor it (Holtzman et al., 2015; Ma et al., 2016; Mills et al., 2006; Mueller et al., 2018; Shubber et al, 2016), with a view toward planning interventions that can help improve its sustainability (Conn et al., 2016; Haberer et al., 2017; Kanters et al., 2017; Langebeek et al., 2014; Mbuagbaw et al., 2015; Munro et al., 2007; Nachega et al., 2016; Penn et al., 2018; Ridgeway et al., 2018).

Non-adherence behavior is a multi-determinate phenomenon whose determinants can be grouped into four factors categories: 1) factors associated with treatment, as such; 2) socio-demographic factors, such as low education, low family income, and unemployment; 3) psychosocial factors, such as poor social support, maintenance programs, and treatment supervision by health profes-

sionals; 4) psychological factors or personal characteristics of the patient, such as expectation of self-efficacy, perception of social support, skepticism or overconfidence in treatment, negative experiences at the beginning of treatment, fear of contracting opportunistic diseases and deteriorating health, use of licit and illicit drugs, psychiatric disorders, and neurocognitive dysfunction (HAND) (Aronson, 2007; Bandura, 1990; Bonolo et al., 2007; Carvalho et al., 2019; Drachler et al., 2016; DiMatteo, 2004; García & Côté, 2003; Mills et al., 2006; de Freitas et al., 2021; Moyle, 2002; Pinheiro et al., 2002; Santos et al., 2014; Seidl et al., 2007; Sweeney &Vanable, 2016; Turan et al., 2019; World Health Organization, 2015).

Among the psychological factors, we highlight the role of social support and the expectation of self-efficacy in the adherence to ART. Social support corresponds to the provision of assistance or comfort to the individual facing adversities throughout their lives, especially in periods of stress. It has a protective effect and contributes to the process of adaptation and living with the disease (Camargo, 2012; Camargo et al., 2014). The relationship between social support and health has long been the subject of study in health psychology and behavioral medicine, as it can influence the immune, endocrine, and cardiovascular systems, recovery from illness, and health maintenance (Uchino et al., 1996). Establishing the significant and substantial relationship between social support and treatment adherence suggests that it is an important mediating mechanism between prescription compliance and health condition outcome (Berghoff et al., 2018; DiMatteo, 2004). Despite the provision of social support, individuals differ in how it is perceived in different contexts, and how socially integrated they feel. Personality characteristics can influence the perception of social support (Allemand et al., 2015; Costa et al, 2018; Pierce et al., 1997), causing a given event or situation to be perceived in different ways by different people, due to the influence of motivational aspects on the perceptual process (VandenBos, 2009).

Self-efficacy is associated with the individual's perception not only of their own ability to perform in each situation but also of the means available to produce a certain result. The ability of the individual to act effectively in order to obtain the desired results reflect the beliefs in one's own ability to organize and act in order to reach a certain goal and accomplish something. It depends on the perception of the degree of difficulty of the task, the effort, time, and perseverance required, and the quality of resilience to deal with obstacles and difficulties (Bandura, 1977; VandenBos, 2009), all of which are aspects subject to the regulatory effect of motivation (Bandura, 2004).

Personality traits constitute fundamental endogenous tendencies whose intrapsychic and interpersonal elements develop over time through interaction with external influences—requiring the individual to adapt—and affect the perception of reality. The forms of adaptation are subject to modification over time, with regard to what is a natural response to the maturation process, expectations and social roles played, environmental factors, or a result of direct intervention (Soto & Jackson, 2013).

The purposes of this study are to verify whether perceived social support and expected self-efficacy can be influenced by personality traits and whether they correlate with ART adherence behavior. As a treatment adherence parameter, the biological markers described in the literature were chosen, such as undetectable viral load (<50 copies) and CD4+ T lymphocyte count (≥500/ml).

2. Method

With the aim of comparing differences between groups, and due to the limitations imposed by the pandemic of the new coronavirus, a clinical, exploratory, descriptive, cross-sectional study with quantitative data was conducted at the outpatient clinic of Instituto de Infectologia Emilio Ribas, in São Paulo, Brazil, between March 2019 and March 2020

2.1. Participants

The convenience sample consists of PLWHA on ART. Participants were randomly approached in the waiting room of the outpatient clinic and invited to participate in the study, if they met the inclusion criteria: age 18 years or older, on ART, education level of nine years or more, and familiarity with computers, to meet the application guidelines of the instruments to be used, and to prevent measurement errors deriving from possible difficulty in understanding the wording of the items and in using a digital interface.

2.2. Material

The data collection was carried out by means of an interview and application of the following instruments, within a 60-minute duration.

1) A form prepared based on the study by Camargo (2012) to survey the sociodemographic profile (age, gender, marital status, family arrangement, education, training, occupation, history of seropositivity, treatment regimen, hospitalizations, co-infections, and clinical data including viral load and CD4+ T cell count, updated and/or supplemented by consulting medical records).

2) Brazilian version of the Perceived social support scale in HIV (PSS-HIV) (Cortes et al., 2014): The adaptation and translation of the original version of the instrument from Spanish into Brazilian Portuguese followed the guidelines of the international test commission (ITC) (Bartram et al., 2018). The PSS-HIV aims to comprehend how the individual perceives social support in being a carrier of the HIV virus, considering the three dimensions based on Maslow's motivational theory (Peng, 2020)—*esteem* (need for acceptance, affection, and help from other people), *self-development* (perception of being able to achieve personal growth and getting instrumental support for it), and *belonging* (basic needs for belonging and social security).

3) Self-efficacy expectation scale to follow ART (SEA-ART) (Drachler et al., 2016; de Carvalho Leite et al., 2002; Pinheiro et al., 2002): This aims to investigate the expectation of self-efficacy in situations that may represent an obstacle

to following ART prescription, and differences in terms of the degree of difficulty—environmental circumstances and drug regimen (situations that require more planning, attention, and organization to take the medication); unsupportive relationships (situations that tend to decrease concern about the disease or affect confidence in the treatment); negative emotional experiences and physical condition (negative experiences regarding antiretroviral medication and negative emotions).

4) HumanGuide test (Welter, 2011; Welter & Capitão, 2007): This is an online psychological assessment instrument aimed at determining the personality profile through the apprehension of the respondent's drive needs' structure, according to Szondi's (1972, 2013) theory. The test assesses eight dimensions or drive needs factors: Sensitivity (empathy, receptivity to others, need for physical and psychological closeness); strength (determination and commitment to overcome obstacles, need to transform reality); quality (ethical principle, sense of responsibility, care for life in general); exposure (moral principle, care for image, structure (objectivity, principle of reality, need for control); imagination (creativity, need for expansion and attraction to the new and unknown); stability (conservatism, orientation toward the past, need to keep things stable); contacts (sociability and gregariousness, need to communicate).

2.3. Procedure

The research was approved by the ethical committee (Statement 2.981.920). After clarification about the study objectives, the participants were taken to a reserved room where they received information about the conditions of participation in the study and signed an informed consent form, which was followed by the application of the research instruments.

2.4. Data Analysis

Descriptive analyses of sociodemographic data, CD4+ T cell count, and viral load were carried out, as well as of the scores of the HIV social support perception scale, the self-efficacy expectation scale to follow ART, and the HumanGuide test. Frequencies and proportions of the variables were estimated. Adherence to ART was established through CD4+ T cell count and viral load (LT CD4+ ≥ 500 cel/ml and viral load < 50 copies). Correlations were made between the scores obtained in the two scales and treatment adherence, and between these and the HumanGuide test personality profile. Analyses were performed using Excel v. 16.49 and the statistical package SPSS v. 20.

3. Results

A total of 66 PLWHA (44 men and 22 women) participated in the study, with a mean age of 50 years (SD = 12.19; Min = 21; Max = 75). Most participants were whites (60.6%), followed by 25.8% Browns, and 12.1% Blacks, with one Asian. The education level of the participants corresponds to 12.6 years in average (SD

= 3.8), with 60.1% having at least an incomplete college education. No difference was observed between the mean years of education between the male (M = 13.14; SD = 3.5) and female (M = 11.76; SD = 3.9) participants.

The sample group was heterogeneous regarding sexual orientation, with a predominance of men who have sex with men (MSM) (45.4%), followed by heterosexual men (MSM) (21.2%) and heterosexual women (MSW) (33.3%). Among male participants (n = 44), 61.3% reported being homosexual or 4.5% reported being bisexual, which corresponds to 68% of the whole group. Although the respondents did not differ as to whether they had a partner, Goodman and Kruskal's analysis showed this difference to be statistically significant with regard to MSM ($p < 0.01$), with 50% of them living alone and only 10% living with family, compared to MSW, with 29% of them living alone and 50% with family.

On average, the participants have been living with HIV for 17 years and six months (SD = 8.95; Min = 2; Max = 37); no statistically significant difference was observed between the two groups. The years of living with seropositivity of the participants was significantly higher than the years of ART, with a mean of 15 years (SD = 7.8; Min = 2; Max = 31) [$t(63) = 4.74 < 0.01$]. The mean interval between HIV diagnosis and initiation of treatment was 2.5 years (SD = 4.4; Min = 0; Max = 21). While 47% of the participants started treatment immediately after diagnosis, 18.2% started treatment after one year of diagnosis, 34.8% of the respondents let more than two years pass, and 12.6% started treatment only after seven years had passed. Regarding the biological markers of adherence, it was observed that 87% had undetectable viral load, and 20% of women had a viral load above the desirable (10% up to 1000 copies/mL, 5% between 1000 and 10,000 copies/mL, 5% above 10,000 copies/mL), while 7% men had values up to 1000 copies/mL, and 2% had values above 500,000 copies/mL.

The mean CD4+ T cell count for the sample group was 659.87/mL (SD = 39.73; Min = 13; Max = 1632), with 68% of the participants having levels considered adequate (≥500/mL) and 12% having values considered critical (<350/mL). Although a gender difference was identified, with a higher frequency of women with critical CD4+ T cell levels, it was not statistically significant ($X^2(2) = 0.101$; $p = 0.950$). Co-infections were observed in 60.9% of the participants without distinction of sex ($X^2(1) = 0.961$; $p > 0.05$), and among the 34.4% of participants with CD4+ T cell counts below 500 cel/ml (n = 22), 82% had a coinfection. However, among those with CD4+ T cell counts of ≥500 cel/ml (65.6%), 50% had a coinfection, while 50% had no coinfection. The difference between the two groups was significant ($X^2(1) = 6.140$; $p < 0.05$), indicating that CD4+ T cell count is a good indicator of immunity against opportunistic infections.

A mean of 2.2 changes in therapeutic regimen was observed ($SD = 0.1$), and the introduction of the "3-in-1" cocktail was shown to be able to predict the number of medication changes with a large effect size (*eta square partial* = 0.068; $p > 0.05$). Medication change showed no association with years of seropositivity

(*eta square partial* = 0.016; $p = 0.316$). The only variable able to discretely predict the number of medication changes is a viral load above 10,000 copies ($p < 0.05$). Regarding adverse effects, 53.8% reported no adverse effects and 46.2% reported having had some type of effect, of which 29.3% reported that adverse effects occurred in the past, prior to the current medication. The mean treatment discontinuation time reported by participants was 98.4 days (SD = 184.4), with a minimum of one day and a maximum of two years. A significant positive correlation was observed between the duration of the treatment-free period and viral loads ($r = 0.480$; $p < 0.05$).

The PSS-HIV was answered by 65 participants, showing a mean total score equal to 41.1 (SD = 12.7.0; Min = 12; Max = 60). The Pearson's correlation matrix showed an association between CD4+ T cell elevation and total score on the PSS-HIV ($r = 0.342$; $p < 0.01$) and the dimensions *self-development* ($r = 0.337$; $p < 0.01$) and *belonging* ($r = 0.302$; $p < 0.05$). Based on the classification of the overall score in the PSS-HIV, as indicated by the authors (Cortes et al., 2014), it was observed that 46.1% of the participants presented scores classified as beneficial for health, 20.1% presented scores classified as medium health risk potential, and 33.8% presented scores that could represent a high health risk. The differences observed are significant at the 0.01 level when associated with CD4+ T cell count ($X^2(2) = 9.721$; $p < 0.01$). Regarding viral load, the differences observed were not statistically significant ($X^2(2) = 1.133$; $p > 0.05$).

The mean score on the expected self-efficacy to follow ART (SEA-ART) (Leite et al., 2002) was 102.2 (SD = 4.8; Min = 86; Max = 105). No correlation was observed between SEA-ART and CD4+ T cell count, although a positive correlation was observed between CD4+ T cell count and the dimension *negative emotional experiences and physical condition* ($r = 0.286$; $p < 0.05$). Spearman's correlation analysis revealed positive correlation between CD4+ T cell count and the dimensions expressing the possibility of not taking medication, depending on *environmental circumstances and therapeutic regimen* ($r = 0.295$; $p < 0.05$) and *negative experiences and affect* ($r = 0.299$; $p < 0.05$). Regarding viral load, it showed a negative correlation with the dimension *negative experiences and affect* ($r = -0.305$; $p < 0.01$), which can predict adherence as indicated by viral load with a large effect ($p < 0.01$). The coefficient of determination R^2 estimated that 13.1% of the variability in viral load is explained by the expectation of not taking the drug in the face of the possibility of having a negative experience or feeling. Since the SEA-ART score is measured in units, with each upward change in the score on this dimension, the viral load decreased by 1338.64 copies.

The HumanGuide personality profile test (Welter, 2011) was completed by 63 participants. **Table 1** presents the mean scores on the eight dimensions. The factor *sensitivity*, which expresses the need for physical and psychological closeness, showed the highest mean score and the lowest standard deviation, with low variability among participants, therefore corresponding to a common characteristic among them. At the other extreme, we found that the factor *exposure*,

Table 1. Participants' mean scores on the eight personality dimensions of the HumanGuide test, regardless of gender (n = 63).

HumanGuide Factors	Average	DP	Min.	Max.
Sensitivity	5.13	2.13	0	9
Power	1.73	2.97	−4	7
Quality	4.06	2.64	−2	9
Exposure	−0.97	3.83	−8	7
Structure	2.94	3.15	−4	9
Imagination	1.71	3.13	−5	8
Stability	1.92	3.1	−4	9
Contacts	2.63	2.99	−5	9

which expresses the need to be in evidence and to meet other people's expectations, had the lowest mean score and the highest standard deviation, indicating that this factor presents high variability among participants.

The differences observed between the mean scores of female and male participants are not significant, except for the *imagination* factor which showed a significant difference in relation to sex [$t(61) = -2.784 < 0.07$], with males showing a mean score (M = 2.45) significantly higher than that of females (M = 0.24). The mean *imagination* factor scores of MSM participants (M = 2.93; SD = 2.782) was higher than that of MSW (M = 1.43; SD = 2.782), which in turn was higher than WSM (M = 0.24; SD = 2.869), presenting a statistically significant difference ($p < 0.01$). A single positive correlation was observed between the *quality* factor, which expresses sense of responsibility and care for life in general, and CD4+ T cells ($r = 0.297$; $p < 0.05$).

Significant positive correlations were observed at significance level ≤ 0.01 between the *contacts* factor, which expresses sociability and the need to communicate with people, the total score on the PSS-HIV and all the dimensions that make up this scale (Table 2).

Only one significant negative correlation at significance level ≤ 0.05 was observed between the HumanGuide *exposure* factor, which expresses the need to be in the limelight and gain social recognition, and the dimension *unsupportive relationships* in the SEA-ART (Table 3).

4. Discussion

Based on the data obtained from the participants' medical records, we found that 87% had undetectable viral load, and 30% of women had a viral load above the desirable level, while only 2% of men had this value. This result suggests that men are more aware of the importance of following treatment, and show a greater adherence to it.

Table 2. Pearson's correlation matrix between the dimensions of the HumanGuide test and the dimensions of the perceived social support scale in HIV (n = 63).

PPS-HIV		HumanGuide							
		SENS	POW	QUA	EXPO	STR	IMAG	STA	CONT
Total score	r	0.218	−0.05	0.058	0.126	−0.276*	−0.019	−0.284*	0.393**
	p	0.086	0.695	0.652	0.327	0.029	0.88	0.024	0.001
Esteem	r	0.171	−0.062	0.034	0.081	−0.258*	−0.012	−0.206	0.323**
	p	0.181	0.627	0.788	0.527	0.041	0.928	0.105	0.01
Self-development	r	0.159	−0.033	−0.008	0.155	−0.233	0.059	−0.290*	0.342**
	p	0.213	0.80	0.949	0.225	0.066	0.647	0.021	0.006
Belonging	r	0.277*	−0.041	0.124	0.06	−0.219	−0.139	−0.19	0.328*
	p	0.028	0.748	0.332	0.64	0.084	0.279	0.135	0.009

Abbreviations corresponding to the HumanGuide dimensions: SENS: Sensitivity; POW: Power; QUAL: Quality; EXPO: Exposure; STR: Structure; IMAG: Imagination; STA: Stability; CONT: Contacts. *$p < 0.05$; **$p < 0.01$.

Table 3. Spearman's Correlation between the SEA-ART Dimensions and the exposure factor of the HumanGuide test (n = 63).

Self-efficacy expectation scale for following antiretroviral treatment		Exposure
Environmental circumstances and medication regimen	r	−0.140
	p	0.281
Unsupportive relationships	r	−0.302*
	p	0.017
Negative emotional experiences and physical condition	r	−0.144
	p	0.268

*Correlation at 0.05 significance level (two-tailed).

The participants' years of living with HIV very close to the years of treatment, indicate that AIDS has become a chronic disease for them (Mayer et al., 2016; Teeraananchai et al., 2017; World Health Organization, 2015). Since more than 50% of the participants have been living with the virus for more than 15 years, this data is indicative that ART is a determinant of the participants' longevity. Changes in treatment regimen were not related to years of seropositivity, but the introduction of the "3-in-1" cocktail proved to be able to predict the number of drug changes with a large effect size. The decrease in the frequency of therapeutic regimen changes coincided with the strategy of simplifying ART from 2002, when there was a significant reduction and stabilization of the number of daily doses, aimed at improving adherence and reduction of the occurrence of adverse events, while preserving virological suppression (Brites, 2016; Moyle, 2002).

4.1. Perceived Social Support and Adherence

The correlations observed between the prognostic indicative scores on the HIV social support perception scale with the two biological markers of adherence were in accordance with the authors' indication (Cortes et al., 2014). Individuals with positive perceived social support tended to be more adherent to treatment, as cited in several prior studies (Berghoff et al., 2018; DiMatteo, 2004; Langebeek et al., 2014; Uchino et al., 1996). Perceived support constitutes an important mediating mechanism between adherence and treatment efficacy, to the extent that subjective conditions have an objective impact on health status. The results obtained with the Portuguese version of the scale of perceived social support in HIV, new in Brazil, were compatible with those presented by the authors (Cortes et al., 2014), pointing to its usefulness in predicting treatment adherence. Its reduced format with only 12 items allows its application to be fast and well-accepted by patients.

4.2. Self-efficacy Expectations and Adherence

The correlations observed between expected self-efficacy and biological markers of adherence indicated that when faced with negative experiences and emotions, patients tend to be less adherent. Emotional states, such as irritability and depressive states, can contribute to an individual's discontinuation of medication. Unsupportive relationships can also compromise self-efficacy expectation due to insecurity in social contacts and possible fear of being discriminated against, as highlighted by several authors (Langebeek et al., 2014; Santos et al., 2014; Shubber et al., 2016; Sweeney & Vanable, 2016; Swendeman et al., 2009; Turan et al., 2019). On the other hand, individuals with good expectation of self-efficacy to follow treatment tend to take the medication even when facing negative experiences and feelings, encountering unfavorable environmental circumstances, and/or finding it difficult to ingest the medication. When there is a fear that one's HIV-positive status will be revealed, and when the individual is away from home at the time of taking their medication, there is a risk of decreased self-efficacy expectation, with an impact on adherence. Considering that the self-efficacy scores of adherent participants were higher than the scores of non-adherent participants, these results coincided with those obtained in previous studies (Drachler et al., 2016), indicating that the strength of expectation varies according to the anticipated risk by the patient of not taking the medication, depending on the situation.

4.3. Personality Differences among Participants

Regarding the personality characteristics of the participants, there were no significant differences in the mean scores of the HumanGuide factors between the genders, except for the *imagination* factor, which was much higher in male participants compared to females. Since most of the male participants have sex with men (MSM), when we analyzed the differences in the score of this factor consi-

dering the sexual orientation of the participants, we found that MSM differed significantly from women in this aspect. The need for expansion, to be everything, underlying the *imagination* factor (Welter, 2011; Welter & Capitão, 2007), may motivate the individual to wish to go beyond the social boundaries associated with gender to seek new experiences, with curiosity and an attraction to the unknown. This is an interesting and unexpected finding, yet in line with the Szondian theoretical assumptions that underpin the HumanGuide.

4.4. Personality and Psychological Adherence Mediators

Regarding the direct influence of personality traits on adherence, it was found that high scores on the HumanGuide *quality* factor, which expresses the sense of responsibility and care for life in general (Welter, 2011; Welter & Capitão, 2007), can positively influence ART adherence behavior, reflected in increased CD4+ T cell counts. This result suggests that caring for life in general, and for one's own life is associated with self-care, which in turn favors adherence to treatment for chronic diseases, as cited by some authors and bulletins (Brazilian Ministry of Health, 2018; Camargo-Borges & Japur, 2008; Swendeman et al., 2009; Webber et al., 2013; World Health Organization, 2015).

The results obtained through the significant correlations found between the HumanGuide and the PSS-HIV indicate that perceived social support can be influenced by personality. Individuals with a greater need to be with people and communicate intensely with them (accentuation of the *contacts* factor), tend to build a network of relationships which they can turn to in times of need. This behavior contributes to a positive perception of social support, especially in relation to feelings of esteem, as pointed out by Allemand et al. (2015) and Pierce et al. (1997). The need to establish close contacts with people, which allow to satisfy affective needs (accentuation of the *sensitivity* factor), favors the positive perception of social support associated with the feeling of belonging. Individuals who are more flexible and open to the new (depletion of the *structure* and *stability* factors), presented a better perceived social support, probably because they feel less self-sufficient and are less critical and attached to their own routine and the way they do things. On the other hand, individuals with a need for control and a tendency for rigidity (accentuated *structure* and *stability factors*), presented a negative perceived social support, possibly due to their critical sense and desire for things to be their way. This result is in line with the observations of Uchino et al. (1996) who stated that certain personality traits influence social behavior, and Allemand et al. (2015) who stated that there is a reciprocal relationship between personality traits and social support, since the individual may be able to actively build a supportive social network (Pierce et al., 1997). Adherence behavior, in turn, may also influence the provision of support by individuals, as pointed out by DiMatteo (2004), as they tend to devote more attention and care to those who match the care and attention received through adherence and self-care. In addition, perceived social support appears to be associated with

motivational selectivity (VandenBos, 2009) and may be influenced by psychological motives (Szondi, 2013).

Participants' personality differences in relation to self-efficacy expectation to follow ART were most evident in relation to the polar factors *stability* and *contacts* and *sensitivity* and *power* in the HumanGuide (Welter, 2011). The need to retain and conserve, as expressed through the tendency toward conservatism, cultivation of habits and attachment to routine, seem to contribute positively to the feeling of being able to follow treatment in adverse environmental circumstances, such as being on the street and facing changes in the rhythm of life, such as on weekends and holidays, or when experiencing negative emotional states, such as boredom and melancholy. Aspects related to the need to meet people and communicate with them may represent an obstacle to follow the treatment in situations of greater social interaction, such as being on the street and away from home, which favor dispersion and forgetfulness. Impatience may favor non-adherence to treatment because of the resistance to having to interrupt one's daily routine to take the medication several times a day.

The negative correlation between the dimension *non-supportive relationships*, which covers situations that pose a risk of not taking the medication because they are associated with the AIDS stigma (discrimination, insecurity in front of people you do not know, concealment of the HIV-positive status, questioning the importance of treatment and instability in the doctor-patient bond) and the HumanGuide factor *exposure*, suggests that the feeling of shame and the need to convey a more positive self-image can decrease the self-efficacy expectation. This result is consistent with the surveyed literature (Sweeney & Vanable, 2016; Turan et al., 2019) and the theoretical assumptions of the HumanGuide (Szondi, 1972; Welter, 2011).

5. Conclusion

Considering that adherence to ART determines treatment efficacy and contributes to the prevention of comorbidities, understanding the factors that influence it, including psychological mediators, is especially important. The results of this study suggest that the psychological mediators of adherence to treatment, perception of social support and expectation of self-efficacy, have an impact on adherence to ART. Furthermore, personality characteristics such as sociability, optimism, willingness to deal with change, flexibility, and need for acceptance and recognition may influence the psychological mediators. Personality traits related to sense of responsibility and self-care can also have an impact on the adherence to ART.

The relative scarcity of instruments to evaluate personality in the health field increases the possibilities of psychologists' work in this context, seeking to understand the motivational determinants of adherence to ART—a fundamental condition for the quality of life and longevity of patients with HIV. Since the sample of this study is small and of convenience, and the influence of personality

was addressed only on certain psychological aspects associated with ART adherence, the results obtained here cannot be generalized. Moreover, the cross-sectional nature of this study precludes any causal inferences from the results. However, it is reasonable to argue that personality is an aspect to be considered when addressing adherence to ART.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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