Original article

# Predictors and Evolution of Antiretroviral Therapy Adherence Among Perinatally HIV-Infected Adolescents in Brazil

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A B S T R A C T

**Purpose:** Antiretroviral therapy medication adherence is a complex phenomenon influenced by multiple factors. This study examines its evolution and predictors among perinatally HIV-infected youths in São Paulo, Brazil.
**Methods:** During a 1-year longitudinal cohort study, perinatally HIV-infected youths aged 13–21 years taking antiretroviral therapy were recruited in hospitals and HIV/AIDS reference centers. Data were collected at baseline and after 12 months. Variables assessed were adherence, self-efficacy regarding medication intake, social support, stress level, depression, CD4 cell count, viral load, and symptoms. Adherence was defined as taking ≥95% of prescribed HIV medication in the past 7 days. Generalized estimating equation and analysis of variance methods were used.
**Results:** A total of 268 adolescents participated in the study (59% female; mean age of 16 years). At baseline, 63.06% of the sample was adherent to their HIV medication, and 52.99% had an undetectable viral load. All participants, regardless of adherence, reported: low levels of stress and symptoms of depression; high perception of medication self-efficacy and social support; and a mean of 6.8 symptoms related to their HIV medication. Predictors of adherence were: high perception of medication self-efficacy (odds ratio = 2.81; 95% confidence interval: 1.94–4.05) and low number of reported medication side effects (odds ratio = .97; 95% confidence interval: .95–.99]. Between baseline and follow-up, 49.6% remained adherent, 22.3% remained nonadherent, and the adherence level changed over time for 28.2%.
**Conclusions:** These findings suggest the need to develop interventions to enhance self-efficacy toward medication and to help youth better manage HIV medication symptoms.
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**IMPLICATIONS AND CONTRIBUTION**

Approximately one third of adolescents are not optimally adhering to their HIV medication, and as a result, initiatives to better support them are needed. The results of this study could help adequately tailor interventions: enhanced self-efficacy toward medication and medication symptoms management are keys to optimal medication adherence.

Sustaining optimal antiretroviral therapy adherence to daily oral dosing remains a challenge to survival, health, and prevention of sexual transmission for many people living with HIV. Adolescents and young adults [1] report lower adherence than adults [2]. Many reviews report that the extent of adherence to medication is highly variable among young people living with HIV. A recent meta-analysis of 50 studies among adolescents and young adults (12–24 years) from 53 countries estimated an overall global adherence of 62.3% [2]. In another meta-analysis of 37 studies among HIV-infected children, adolescents, and young adults, the authors reported a mean adherence of 68% that ranged from 21% to 99.5% [3]. The variability across the studies could be attributed to the different measures and definitions of medication adherence [1,3,4]. The studies included in these reviews are mainly cross-sectional: one meta-analysis included exclusively cross-sectional studies due to the paucity of longitudinal studies [2], and in other reviews, longitudinal studies and prospective cohorts represent the minority of the studies included in the analyses [1,3,5].

These reviews comprised perinatally infected youth (PIY) and those who acquired HIV behaviorally (i.e., through risky sex and/or drug use). In Brazil, most of the adolescents and youth living with HIV were infected perinatally. Results from five studies conducted in that country have reported levels of medication adherence that vary between 33% and 79%. These studies were cross-sectional, and three of them had small sample sizes of fewer than 50 participants [6–8].

Factors related to HIV medication adherence among youth remain inconsistent across studies [1,4], and the establishment of causal relationships is limited by the methodology used [1]. Medication adherence is thus a complex phenomenon influenced by multiple factors. To account for the unique reality of PIY, who have long treatment histories, additional studies are needed to better understand the factors related to medication adherence. Rosenbaum (1990) proposed a self-regulation model useful for studying self-management behaviors. This model considers the cognitive processes underlying their adoption, as well as the contribution of situational factors and physiological states. Therefore, it targets important factors that play a role in promoting self-control behavior such as medication adherence [9]. To plan well-designed interventions to maintain and optimize the adherence, it is important to identify the factors influencing it. Thus, Rosenbaum's model was used as a conceptual framework and guided the choice of variables for this study.

### Objective/goal

Considering the inconsistencies in factors related to medication adherence and the small number of studies that have explored it longitudinally, the Projeto Adoliance aims to better understand the evolution and predictors of medication adherence among a cohort of PIY during a 1-year longitudinal study in São Paulo, Brazil.

To our knowledge, this is the first 1-year longitudinal study conducted among Brazilian PIY. The data will allow cultural and geographical comparisons among youth regarding their HIV medication adherence. It will also provide a meaningful contribution to research in parts of the world were a pediatric, and adolescent HIV population is more prevalent.

### Methods

#### Study design

A 1-year longitudinal cohort study among PIY in São Paulo, Brazil, was conducted.

#### Participants and settings

A convenience sample of participants was recruited among 15 pediatric and adult services in hospitals and HIV/AIDS reference centers in São Paulo during their routine medical consultation with their doctor. To be included in the study, participants were required to be: PIY; aware of their HIV diagnosis; currently prescribed HIV medication; aged 13–21 years; able to understand and read Portuguese; and willing to participate in two follow-ups. Youth were excluded if they presented uncontrolled psychiatric problems (indicated in the patient record) or a neurological problem (i.e., cerebral toxoplasmosis) affecting their ability to participate in this study.

#### Measures

The self-regulation model proposed by Rosenbaum [9] allows identification of important factors that play a role in promoting self-control behavior such as medication adherence. These variables included: cognitive process through which individuals control their behavior (self-efficacy); specific skills and personality repertoires (stress and depression); physical states (symptoms); and situational factors (social support). These factors were assessed as follows.

*Adherence.* Medication adherence was assessed through a self-reported questionnaire consistent with recommendations related to adherence measures [10] and validated among patients with HIV taking antiretroviral medication [11]. The psychometric validity of this measure has been demonstrated among adult patients with HIV (sensitivity: 71%; specificity: 72%) [11]. The questionnaire consists of seven questions that situate the respondent in a context where they are prone to forget their medication. It also enables the quantification of the number of times the participant has failed to take his medication. Adherence is defined as taking at least 95% of prescribed pills in the last 7 days [12,13].

*Self-efficacy.* Self-efficacy was defined as the confidence of his/her ability to take HIV medication in different situations. It was measured with 22 items rated on a five-point Likert scale (from 1 "I am sure that I cannot" to 5 "I am sure that I can"). This instrument was adapted from a scale developed by Godin et al. [11] and was previously used on a larger adult HIV sample (n = 399; Cronbach's alpha score was .87; and test–retest reliability coefficient was .71). To adapt the instrument to the present context, the items were developed based on expert consensus, focus groups, literature reviews, and the self-efficacy theory of Bandura [14]. Content validation was carried out. In this sample, the Cronbach's α score was .95.

*Perceived stress.* The stressfulness subscale of the Stress Appraisal Measure [15] was used to measure global perceived stress. This subscale contains four items rated on a five-point Likert scale (from 1 "not at all" to 5 "excessively"). According to