Published in final edited form as:

AIDS Care. 2021 November ; 33(11): 1394–1403. doi:10.1080/09540121.2020.1798336.

Sociodemographic and Psychosocial Predictors of Longitudinal Antiretroviral Therapy (ART) Adherence among First-Time ART Initiators in Cape Town, South Africa

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Abstract

First-time antiretroviral therapy (ART) initiators may be more vulnerable to poor ART adherence because they may be coping with a new HIV diagnosis, facing logistical challenges to accessing and adhering to ART for the first time, and have not yet developed support networks or the skills to support long-term adherence. We recruited 324 participants in two HIV clinics near Cape Town, South Africa. Sociodemographic/psychosocial factors were measured at baseline and self-reported adherence at the 6 month follow-up. We conducted multivariable regression to determine which baseline factors were associated with 6-month adherence. A better patient-clinic relationship score (OR: 1.08 [95% CI: 1.05–1.11]) was associated with higher adherence. A drug use problem (0.51 [0.29–0.87]), higher social isolation (0.93 [0.87–0.99]), and greater number of years living with HIV before initiating ART (0.92 [0.86–1.00]) were associated with adherence levels below 90%. Patient-clinic relationships and social support are key psycho-social factors in early adherence behavior. Reducing drug use problems through targeted screening and early intervention may improve ART adherence.

Keywords

Highly Active Antiretroviral Therapy; Medication Adherence; Substance Abuse; Social Support Systems; Social Isolation

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INTRODUCTION

Adherence to antiretroviral therapy (ART) is the most important factor in achieving undetectable viral loads in people living with HIV (PLWH) (Flynn, Rudy, Douglas, & et al., 2004; McNabb et al., 2001), with continuous viral suppression essential to improving the long-term prognosis of PLWH and reducing the transmission of HIV (Cohen et al., 2011; Trickey et al., 2017). Non-adherence to ART has been linked to the development of drug resistance, which limits future treatment options for PLWH and has the potential to increase transmission of drug-resistant strains (Bangsberg, Acosta, Gupta, & et al., 2006; Lima, Harrigan, Murray, & et al., 2008). With over 3 million people on antiretroviral therapy (ART), South Africa has the largest ART treatment program in the world, accounting for 20% of people on ART globally (Meyer-Rath et al., 2017; UNAIDS, 2019). Current South African treatment guidelines recommend immediate ART initiation for all individuals living with HIV regardless of CD4 counts (Meintjes et al., 2017). However, despite universal treatment guidelines, challenges to ART initiation and adherence remain. In 2017, only 61% of PLWH in South Africa were on ART and only 47% of all PLWH were virally suppressed (UNAIDS, 2019). These represent significant gaps in the UNAIDS 90–90-90 goals.

PLWH face multiple individual, interpersonal, and structural challenges to optimal ART adherence (Coetzee, Kagee, & Vermeulen, 2011; Davis et al., 2018; Groh et al., 2011; Kaufman, Cornish, Zimmerman, & Johnson, 2014; Shubber et al., 2016; Sileo et al., 2018). At the structural level, factors such as poverty and barriers to health care access can impede adherence to ART (Davis, et al., 2018; Kagee et al., 2011). At the interpersonal level, quality of patient-provider relationships, stigma, discrimination, and social support can affect ART adherence (Sileo, et al., 2018; Xu, Munir, Kanabkaew, & Le Coeur, 2017). At the individual level, mental health challenges, comorbidities such as substance use disorder, and misperceptions about HIV treatment may limit adherence to ART (Davis, et al., 2018; Remien et al., 2019; Sileo, et al., 2018).

First-time ART initiators may be especially vulnerable to poor adherence because they may also be coping with a new HIV diagnosis, facing logistical and structural challenges to accessing and adhering to ART for the first time, and have not yet developed social support networks or the skills, such as use of reminders and problem solving, that can support long-term adherence. While a number of studies have examined methods of predicting medication adherence among treatment-experienced populations in developed countries (Kleeberger, Buechner, Palella, & et al., 2004; Lazo, Gange, Wilson, & et al., 2007; Levine, Hinkin, Castellon, & et al., 2005; Mannheimer, Friedland, Matts, & et al., 2002), considerably fewer studies have examined changes in adherence over time among first-time ART initiators in low and middle income countries (LMICs). Understanding predictors of adherence among first-time ART initiators is critical to identify which factors may impede or facilitate ART adherence early on in treatment regimens, thus providing an opportunity to prevent adherence challenges. This is especially important in LMIC settings where viral load testing is conducted less frequently due to cost, and access to second and third line drugs is very limited. Because viral load testing is infrequent and erratically applied in LMICs (Stevens and Marshall, 2010), detecting poor adherence can be more challenging, leaving greater opportunity for drug resistance to develop. Understanding factors associated

with early adherence problems may be critical to preventing poor adherence, as new ART initiators may face different barriers to adherence and have different intervention needs than ART-experienced populations (Huntington et al., 2014; Kipsang, Chen, Tang, Li, & Wang, 2018). In this paper, we examined factors associated with adherence among new ART-initiators six months following ART initiation.

MATERIALS AND METHODS

Design and Study Population

Participants for these analyses come from a randomized controlled trial of an adherence intervention (Masivukeni) (Gouse et al., 2018; Remien et al., 2013). They were recruited from November 2012-October 2014 in two HIV treatment clinics located in high HIV-prevalence peri-urban neighborhoods near Cape Town, South Africa. To be eligible, participants had to be 1) HIV-positive; 2) first-time ART initiators; 3) English- or isiXhosa-speaking; 4) capable of providing informed consent; and 5) eligible under South African Department of Health guidelines for ART initiation (Republic of South Africa Department of Health, 2013) and ready to initiate mandatory counseling. During the study period, the Department of Health (DOH) changed some HIV treatment criteria. At study onset, ART initiation criteria was a CD4 count of ≤200. In March 2013, this changed to ≤350. Patients eligible for ART were told about the study and given a flyer by clinic providers. Interested patients were referred by a study nurse for eligibility screening. Upon verification of eligibility, informed consent procedures were conducted with the patient. They then completed the Baseline Assessment, which measured sociodemographic and psychosocial factors potentially associated with adherence. After enrollment and completion of the Baseline Assessment, participants were randomized 2-to-1 to receive either the Masivukeni intervention or standard of care (SOC). Additional details about the intervention have been described elsewhere (Gouse, et al., 2018; Remien, et al., 2013). Data for this paper come from the baseline and six month assessments, controlling for study arm assignment.

Informed consent was obtained from all individual participants included in the study. All study procedures were approved by institutional review boards at Columbia University, the New York State Psychiatric Institute, and the Human Research Ethics Committee of the Health Sciences Faculty, University of Cape Town.

Measures

Adherence—We measured ART adherence six months following ART initiation using a three question, validated scale developed by Wilson et. al. (Wilson, Lee, Michaud, Fowler, & Rogers, 2016). The scale has been associated with viral load levels in PLWH in Cape Town and shown to have the ability to discriminate between patients with elevated and non-elevated viral load in this population (Phillips et al., 2017). It consists of three self-report items: 1) *Days taken* -- number of days the patient missed at least one dose of their medication (number of days, 0–30); 2) *Frequency* -- how often the patient took their medication in the way they were supposed to in the past 30 days (never/rarely/sometimes/usually/almost always/always); and 3) *Rating* – how good a job the patient did in taking their medication in the way they were supposed to in the past 30 days (very poor/poor/fair/good/

very good/excellent). Reliability of Wilson et al.'s Adherence Scale in this population was high (Cronbach's α=0.87).

Item responses for the three adherence items were linearly transformed to a 0–100 scale with 0 being the worst adherence, and 100 the best. Using Wilson et al.'s (Wilson, et al., 2016) method, we then calculated the mean of the three items to create one combined adherence variable. We then grouped individuals into high adherence and low adherence groups using a cut point of 90% and above. The cut point of 90% and above was chosen based on existing literature indicating that a 90% cut point has high sensitivity for detecting individuals with elevated viral load (Phillips, et al., 2017) and that newer ART regimens no longer require ≥95% adherence to achieve viral suppression, but that lower levels of adherence can be considered high adherence (Viswanathan et al., 2015). Because the data were highly skewed (skewness: −3.59), the variable was dichotomized to avoid ceiling effects.

Sociodemographic Characteristics—Sociodemographic characteristics included age, gender, education level, employment status, income, relationship status, physical health, and self-reported date of HIV diagnosis (which we used to calculate the number of years living with HIV). All sociodemographic variables were collected through self-report.

Psychosocial Factors—Based on Social Action Theory (Ewart, 1991), which posits that behavioral change is the result of contextual influences (e.g., clinic factors), social interdependence (e.g., social support/isolation), and individual processes (e.g., adherence self-efficacy), we used a number of scales and questionnaires to assess potential psychosocial factors associated with ART adherence and calculated the reliability of the scales in our study sample. These included the HIV Adherence Self-Efficacy Scale (HIV-ASES) to assess participants' confidence in their own ability to adhere to a treatment plan (Cronbach's α=0.88) (Chesney et al., 2000; Johnson et al., 2007); Beliefs About Medicines Questionnaire (BMQ) (Horne, Weinman, & Hankins, 1999) to assess positive (α=0.77) and negative beliefs (α=0.71) about medicines; HIV Treatment Related Knowledge Scale to measure HIV treatment knowledge about complex treatment issues such as adherence, side-effects, and drug resistance (α=0.82) (Balfour et al., 2007; Wagner, Remien, Dolezal, & Carballo-Dieguez, 2002); the Life Events Questionnaire to assess recent stressful life events (α=0.69) (Kubany et al., 2000; Roohafza et al., 2011); the Perceived Availability of Social Support Scale (Barrera, 1980) to assess participants' perceived availability of someone to provide support for different situations (α=0.79); the Patient Clinic Relationship Scale (Stall et al., 1996) to measure patients' perceived relationship with and perceptions of clinic staff (α=0.91); the Substance Abuse and Mental Illness Symptoms Screener (SAMISS) to assess mental health (α=0.66) and substance use problems (α=0.80) in patients living with HIV (Breuer et al., 2012; Breuer et al., 2014; Whetten et al., 2005); and the Social Impact Scale to assess individuals' perceptions of social rejection (α=0.82), financial hardship (α=0.72), internal shame (α=0.76), and isolation (α=0.89) (Fife and Wright, 2000).

Statistical Analysis

Baseline sociodemographic and psychosocial factors were summarized using means, standard deviations, counts, and percentages as appropriate. To determine which baseline

factors were associated with 6 month adherence, we examined associations between each of the aforementioned sociodemographic and psychosocial factors and adherence (high vs low) using bivariate logistic regression to calculate the unadjusted odds ratios (OR) and their 95% confidence intervals (CI). We examined multicollinearity between variables by conducting bivariate correlations, but no variables were found to be highly correlated. Variables that showed significance at the 0.10 alpha level in the bivariate logistic regression models were included in the initial multivariable model. The model controlled for intervention assignment. For selection of the final model, backward step-wise logistic regression using maximum likelihood estimation was performed with significant variables from the bivariate analysis. Statistical significance in the multivariable analysis was determined using an alpha level of 0.05. All analyses were conducted using SPSS version 24 (Armonk, NY, USA).

RESULTS

Out of 356 participants enrolled at baseline, 324 (91%) had data for self-reported adherence at the 6 month follow-up. There were no significant study group differences between individuals with 6 month adherence data and individuals without 6 month adherence data. Participants were on average 32.9 years old (range: 18–57; SD = 7.57) and most were female (75.3%), reflecting the recruitment clinic population (Table 1). Over two-thirds (70.1%) had less than a matriculation certificate, less than half (43.5%) were employed, nearly half (45.7%) had a monthly income of 1500 ZAR ($100 USD) or less, and the majority were single (67.0%). Two-thirds of participants (66.7%) had previously sought care at the study health clinic. Participants had been living with HIV for an average of 2.53 years (range: 0–19 years; SD=3.31), over a third (35.8%) had been diagnosed with an HIV-related illness or opportunistic infection, with a fifth (19.8%) being treated for TB at the baseline visit. Nearly two-thirds (67.3%) reported 90% or greater adherence at six months.

Bivariate analysis

Higher income (OR: 1.76 [95% CI: 1.10–2.81]), seeking care at the clinic previously (OR: 1.93 [95% CI: 1.19–3.13]), having good/very good health (OR: 2.22 [95% CI: 1.22–4.05]), never having an HIV-related illness (OR: 1.97 [95% CI: 1.22–3.19]), having higher adherence self-efficacy (OR; 1.04 [95% CI: 1.01–1.08]), and having a better patient-clinic relationship score (OR: 1.08 [95% CI: 1.05–1.11]) at baseline were associated with a greater likelihood of having 90% or higher adherence at six months (Table 2). Being currently employed (OR: 1.51 [0.94–2.43], p=0.09), being married or living together with an intimate partner (OR: 1.58 [95% CI: 0.95–2.64], p=0.08), and having higher levels of perceived availability of social support (OR: 1.04 [95% CI: 1.00–1.09], p=0.07) were also marginally associated with higher adherence. Participants with more adverse life events (OR: 0.82 [95% CI: 0.72–0.93]), greater internal shame (OR: 0.93 [95% CI: 0.86–0.92]), a greater social isolation score on the Social Impact Scale (OR: 0.93 [95% CI: 0.87–0.98]), having a drug use problem (OR: 0.57 [95% CI: 0.34–0.91]), and having a mental health problem (OR: 0.57 [95% CI: 0.36–0.91]) were significantly less likely to have 90% or higher adherence at 6 months. The association between greater number of years living with HIV before initiating ART treatment and lower adherence was also marginally significant (OR: 0.94 [95% CI: 0.88–1.01], p=0.08). Age, gender, education, house type, currently being treated for TB,

positive and negative beliefs about medication, HIV treatment related knowledge, financial hardship, and social rejection were not significantly associated with adherence at 6 months.

Multivariable analysis

In the multivariable model, having a better patient-clinic relationship score (AOR: 1.08 [95% CI: 1.05–1.11]) remained significantly associated with having 90% or higher adherence (Table 3). Living with HIV for a greater number of years before initiating ART (AOR: 0.92 [95% CI: 0.86–1.00]), having a drug use problem (AOR: 0.51 [95% CI: 0.29–0.87]), and a higher score on the social isolation scale (AOR: 0.94 [95% CI: 0.88–1.00]) were significantly associated with having less than 90% adherence.

DISCUSSION

First-time ART initiators may be at risk for non-adherence, but not all first-time ART initiators will need additional adherence support. The challenge, particularly in LMIC countries, is to identify people at risk of, and factors likely to affect ART non-adherence so that limited resources can be directed to support them. This paper contributes to the literature by identifying several factors that can predict future adherence problems, but also factors that can predict good adherence.

We found several factors associated with high adherence among this sample of new ART initiators in South Africa. Notably, individuals who had lived with HIV for a greater number of years before initiating ART were significantly less likely to have high adherence 6 months following ART initiation than individuals who had lived with HIV for fewer years before initiating ART, which highlights the importance of early ART initiation. These results lend support to findings from other studies indicating that early ART initiation following an HIV diagnosis dramatically improves HIV-related outcomes compared to deferred initiation (The INSIGHT START Study Group, 2015; The TEMPRANO ANRS 12136 Study Group, 2015). South African guidelines currently recommend that ART be given to all adults with HIV infection, irrespective of CD4 counts (Meintjes, et al., 2017); however, it is unclear the extent to which guideline changes alone will be able to increase early ART initiation in the absence of social and structural changes that remove barriers to ART initiation. Although ART initiation guidelines in South Africa have changed, in practice, preference is still often given to individuals with low CD4 counts due to drug stock-outs, a problem which also affects ART experienced patients (Osler et al., 2018). Additionally, patients face a number of barriers that impede ART initiation, including fear of HIV disclosure, stigma, lack of social support, insufficient economic resources, substance abuse, and presence of co-morbidities (Croome, Ahluwalia, Hughes, & Abas, 2017; Davis, et al., 2018; Kagee, et al., 2011; Sabin et al., 2008). Beyond disseminating policy guidelines, addressing these challenges is critical to improving ART initiation and adherence.

We found that better patient-clinic relationships were predictive of high adherence in this sample. Other studies have shown that supportive and trusting relationships with medical doctors and healthcare staff can promote higher levels of adherence (Altice, Mostashari, & Friedland, 2001; Ingersoll and Heckman, 2005; Russell, Krantz, & Neville, 2005). Although there have been a number of ART adherence interventions developed that target improving

relationships between the patient and healthcare providers and staff (Berghoff et al., 2018; Sandelowski, Voils, Chang, & Lee, 2009), the efficacy of these interventions is mixed and the observed effect sizes are moderate at best (Amico, Harman, & Johnson, 2006; Beach, Roter, Saha, & et al., 2015; Easthall, Song, & Bhattacharya, 2013), indicating that these interventions may not adequately target all relevant aspects of patient and healthcare staff relationships. There are a number of factors that can contribute to poor relationships between patients and clinic staff, including stigma and discrimination by providers, lack of trust between provider and patients, provision of services by lay providers who are not properly trained to communicate with patients, failure to protect patient confidentiality, provider difficulty in dealing with problematic patient behavior, and structural factors (e.g., transportation issues, lack of private rooms, lack of continuity with healthcare providers). Additional research is needed to further explore both clinic and patient expectations of each other in order to develop strategies to improve communication and relationships between patients and clinics.

Similar to studies from other contexts, we also found that individuals who had a substance use problem were less likely to have high adherence six months following ART initiation. As other studies show (Nakimuli-Mpungu et al., 2012; Sabin, et al., 2008), these results highlight the importance of screening for and addressing co-morbid substance use problems in the provision of HIV care in order to improve ART adherence long-term. Substance use problems are highly prevalent among PLWH globally, including in LMICs, and are more prevalent among PLWH compared to individuals without HIV in some studies (Brandt, 2009; Chibanda, Benjamin, Weiss, & Abas, 2014; Remien, 2018). The World Health Organization (WHO) has recommended evidence-based guidelines for the integration of or linkage to substance use services in HIV care settings (World Health Organization, 2016), including the administration of brief interventions for substance use by any clinician and referral to specialized substance use services for individuals who fail to respond to brief interventions. Despite these recommendations, regular screening and linkage to substance use care or treatment of substance use problems in HIV care does not routinely occur, particularly in LMICs with limited resources for related treatment. In a study of screening and treatment for substance use disorders in HIV treatment settings in LMICs within the global International Epidemiology Databases to Evaluate AIDS (IeDEA) consortium (Parcesepe et al., 2018), researchers found that only half of sites screened HIV patients for substance use disorders. Moreover, services to manage substance use disorders were available in less than half of sites (Parcesepe, et al., 2018). Additional research is needed to examine barriers and facilitators of linking patients to substance use treatment or implementing integrated substance use services into HIV care settings in LMICs, as well as to test the effectiveness of linking patients to these services or integrating these services into HIV care.

Individuals who reported higher social isolation scores were significantly less likely to have high adherence six months following ART initiation, highlighting the importance of social support in improving ART adherence. Other studies have also shown that social support can be crucial in improving ART adherence (Avants, Margolin, Warburton, Hawkins, & Shi, 2001; Davis, et al., 2018; Knowlton et al., 2006; Remien et al., 2005). Further research is needed to identify the best, most cost-effective strategies of leveraging social support

to increase ART adherence among first-time ART initiators (El-Bassel and Remien, 2011; Remien et al., 2006; Remien, et al., 2005).

There are several limitations to this study. We used data from participants in a randomized control trial who may be more engaged in care than the general population of PLWH in South Africa. We also relied on a measure of self-reported adherence, which can be subject to recall and social desirability bias. Self-reported data may overestimate adherence; thus, the differences presented in this study may be conservative. However, self-reported adherence using the Wilson et al. scale is inexpensive, places low reporting burden on participants, has been significantly associated with viral suppression rates, and is widely used in both research and clinical settings (Wilson, et al., 2016). Also, measures were translated into isiXhosa, and although we followed standard procedures for translation and back-translation, it is not clear if survey questions were understood by isiXhosa-speaking participants in a similar way to how they were originally validated by English-speaking researchers. Some scales, such as the Life Events Questionnaire and the SAMISS Mental Health scale had fairly low reliability. We believe this may have been due in part to cultural or linguistic differences in understanding of mental health and stressful life events. In addition, we only looked at adherence six months post ART initiation and factors influencing ART adherence over the longer term may differ from factors found significant in this analysis. Future research should examine factors associated with ART adherence over a longer time frame. Finally, 9% of the baseline population did not provide ART adherence data at six months, which may have impacted our results, although we found no significant study group differences between those retained at six months and those lost to follow-up at six months.

CONCLUSION

In conclusion, our results indicate that starting patients on ART earlier, improving patient-clinic relationships and social support, and reducing drug use problems may improve early ART adherence in first-time ART initiators. Efforts should be made to initiate patients on ART immediately following a positive HIV diagnosis. Clinicians should be cognizant of the risk of lowered medication adherence when interruptions or negative changes in the patient-clinic relationship occur. Clinicians themselves can serve as social support for patients by listening to patient concerns, providing encouragement for adhering to treatment, and refraining from judgement. However, it may also be beneficial to link patients to HIV support groups or engage family or friends in patient care to improve adherence. Additionally, results suggest that clinicians should enquire about substance use, which may disrupt medication adherence, and provide referrals to treatment as needed. Integrating regular screenings and referrals for treatment for substance use problems into HIV care may result in longer-term improvements in adherence; however, we recognize that in many areas of LMICs substance use treatment is not available and additional resources will need to be devoted to the healthcare system in order to provide substance use treatment for PLWH misusing substances.

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Table 1:

Baseline Sociodemographic and Psychosocial Characteristics of New ART Initiators in Cape Town, South Africa (N=324)

Continuous Variables[†]	**Mean (SD; Range)**
Age	32.85 (7.57; 18–57)
Years Living with HIV	2.53 (3.31; 0–19)
Adherence Self-Efficacy Scale	67.50 (6.50; 26–70)
Positive Beliefs About Medication	17.53 (2.31; 8–20)
Negative Beliefs About Medication	8.65 (2.88; 5–18)
HIV Treatment Related Knowledge Scale	7.36 (2.96; 0–12)
Life Events Questionnaire Scale	2.11 (1.88; 0–14)
Perceived Availability of Social Support Scale	36.70 (4.96; 13–40)
Patient Clinic Relationship Scale	35.94 (9.26; 12–48)
Social Impact Social Rejection Subscale	12.63 (4.09; 9–26)
Social Impact Financial Hardship Subscale	5.12 (2.28; 3–10)
Social Impact Internal Shame Subscale	10.38 (3.25; 5–20)
Social Impact Isolation Subscale	11.17 (4.08; 7–25)
Categorical Variables	**N (%)**
Intervention Assignment	
Masivukeni	217 (67.0%)
Standard of Care	107 (33.0%)
Clinic	
Mzamomhle	159 (49.1%)
Town II	165 (50.9%)
Gender	
Male	79 (24.4%)
Female	244 (75.3%)
Transgender	1 (0.3%)
Education	
Less than a matriculation certificate	227 (70.1%)
Matriculation certificate or Higher education	97 (29.9%)
Currently working	141 (43.5%)

Continuous Variables†	Mean (SD; Range)
Income	
0–1500 Rand	148 (45.7%)
>1500 Rand	175 (54.0%)
Relationship Status	
Single/Separated/Divorced/Widowed	217 (67.0%)
Married/Living together	107 (33.0%)
House Type	
Shack/Wendy House/Backyard dwelling	175 (54.0%)
Own house/rent a room/hostel	149 (46.0%)
Sought care at this clinic before now	216 (66.7%)
Overall physical health	
Very poor/poor	110 (34.0%)
Fair	105 (32.4%)
Good/Very good	109 (33.6%)
Ever had an HIV-related illness or opportunistic infection	116 (35.8%)
Being treated for TB at baseline visit	64 (19.8%)
Had a drug use problem	103 (31.8%)
Had a mental health problem	135 (41.7%)
Adherence	
90% and above	218 (67.3%)
Less than 90%	106 (32.7%)

†Possible Ranges for the continuous psychosocial variables are: Adherence Self-Efficacy Scale (14–70), Positive Beliefs About Medication (4–20), Negative Beliefs About Medication (5–25), HIV Treatment Related Knowledge Scale (0–12), Life Events Questionnaire (0–14), Perceived Availability of Social Support Scale (8–40), Patient Clinic Relationship Scale (12–48), Social Impact Social Rejection Subscale (9–36), Social Impact Financial Hardship Subscale (3–12), Social Impact Internal Shame Subscale (5–20), Social Impact Isolation Subscale (7–28)

Table 2:

Unadjusted Odds Ratios of Baseline Characteristics Associated with High Adherence at 6 months post ART initiation (N=324)

Variable	UOR [95% CI]	P-value
Clinic		0.00
Mzamomhle	Ref.	
Town II	10.12 [5.66–18.09]	
Education		0.85
High school diploma or higher	1.05 [0.63–1.75]	
Less than a high school diploma	Ref.	
Age	1.02 [0.99–1.05]	0.24
Gender		0.79
Male	1.07 [0.62–1.85]	
Female	Ref.	
Currently employed	1.51 [0.94–2.43]	0.09
Income		0.02
Greater than 1500 Rand	1.76 [1.10–2.81]	
0–1500 Rand	Ref.	
Relationship Status		0.08
Married/Living Together	1.58 [0.95–2.64]	
Single/Divorced/Separated/Widowed	Ref.	
House Type		0.26
Own house/rent a room	1.31 [0.82–2.09]	
Shack/Backyard dwelling/Wendy House	Ref.	
Sought care at clinic before	1.93 [1.19–3.13]	0.01
Years living with HIV	0.94 [0.88–1.01]	0.08
Health Status		
Good/Very Good	2.22 [1.22–4.05]	0.01
Fair	0.89 [0.52–1.54]	0.68
Very poor/poor	Ref.	
Previously had an opportunistic or HIV-related infection	1.97 [1.22–3.19]	0.01
Being treated for TB	1.00 [0.56–1.78]	0.99
Adherence Self-Efficacy	1.04 [1.01–1.08]	0.02
Positive Beliefs About Medication	1.03 [0.93–1.13]	0.61
Negative Beliefs About Medication	0.94 [0.86–1.01]	0.11

Variable		UOR [95% CI]	P-value
HIV Treatment Related Knowledge		0.94 [0.87–1.02]	0.14
Life Events Questionnaire		0.82 [0.72–0.93]	0.00
Perceived Availability of Social Support		1.04 [1.00–1.09]	0.07
Patient Clinic Relationship		1.08 [1.05–1.11]	0.00
SAMISS Drug Use problem (no alcohol)			0.02
	No	Ref.	
	Yes	0.57 [0.34–0.91]	
SAMISS Mental Health problem			0.02
	No	Ref.	
	Yes	0.57 [0.36–0.91]	
Social Impact Financial Hardship subscale		0.95 [0.86–1.06]	0.36
Social Impact Internal Shame subscale		0.93 [0.86–1.00]	0.05
Social Impact Social Rejection subscale		0.99 [0.94–1.05]	0.70
Social Impact Isolation subscale		0.93 [0.87–0.98]	0.01

Table 3:

Adjusted Odds Ratios of Baseline Characteristics Associated with High Adherence at 6 months post ART Initiation (N=324) [†]

Variable		AOR [95% CI]	P-value
Years living with HIV		0.92 [0.86–1.00]	0.05
Patient Clinic Relationship		1.08 [1.05–1.11]	0.00
SAMISS Drug Use problem			0.01
	No	Ref.	
	Yes	0.51 [0.29–0.87]	
Social Impact Isolation subscale		0.93 [0.87–0.99]	0.03

[†]Model controlled for intervention assignment.