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Adherence to antiretroviral medications and medical care in HIV-infected adults diagnosed with mental and substance abuse disorders

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Abstract

This paper examines factors associated with adherence to antiretroviral medications (ARVs) in an HIV-infected population at high risk for non-adherence: individuals living with psychiatric and substance abuse disorders. Data were examined from baseline interviews of a multisite cohort intervention study of 1138 HIV-infected adults with both a psychiatric and substance abuse disorder (based on a structured psychiatric research interview using DSM-IV criteria). The baseline interview documented mental illness and substance use in the past year, mental illness and substance abuse severity, demographics, service utilization in the past three months, general health and HIV-related conditions, self-reported spirituality and self-reported ARV medication use. Among the participants, 62% were prescribed ARVs at baseline ($n=542$) and 45% of those on ARVs reported skipping medications in the past three days. Reports of non-adherence were significantly associated with having a detectable viral load ($p < .01$). The factors associated with non-adherence were current drug and alcohol abuse, increased psychological distress, less attendance at medical appointments, non-adherence to psychiatric medications and lower self-reported spirituality. Increased psychological distress was significantly associated with non-adherence, independent of substance abuse ($p < .05$). The data suggest that both mental illness and substance use must be addressed in HIV-infected adults living with these co-morbid illnesses to improve adherence to ARVs.

¹The presence of anxiety disorders is most likely underestimated due to skip out patterns on our version of the SCID. If criteria for depression were met, questions on generalized anxiety disorder were not asked given the difficulty of differential diagnosis when only a year time frame is used.

Keywords

adherence; mental illness; substance abuse; antiretroviral treatment

Introduction

By the third decade of the HIV epidemic in the US, HIV/AIDS cases have shifted from a high prevalence in men who have sex with men and injection drug users to more socially vulnerable and disenfranchised sub-populations, including those with co-morbid mental illness and/or substance abuse. High rates of substance abuse and mental illness have been found in studies of HIV-infected adults (Bing et al., 2001; Dausey & Desai, 2003; Mellins et al., 2002; Pence, Miller, Whetten, Eron, & Gaynes, 2006; Whetten et al., 2005), with co-morbid substance abuse and mental illness reported in 25_40% of different subpopulations of adults, including injection drug users (Galvan, Burnam, & Bing, 2003; Rabkin & Ferrando, 1997; Turner, Laine, Cosler, & Hauck, 2003). The presence of either mental illness or substance abuse in HIV-infected adults has been significantly associated with non-adherence to antiretroviral (ARV) medications (Ingersoll, 2004; Mellins, Kang, Leu, Havens, & Chesney, 2003; Uldall, Palmer, Whetten, & Mellins, 2004). Some physicians may be reluctant to initiate ARV therapy in patients with histories of psychiatric hospitalizations or alcohol or drug abuse (Bogart, Kelly, Catz, & Sosman, 2000; Wong et al., 2004). Access to clinical trials and other ARV treatment programs is often limited among HIV-infected adults with a mental illness or substance abuse disorder (Bassetti et al., 1999; Chesney, 2003). In a study of HIV-infected drug abusers recruited from streets, housing projects and other non-medical areas, only 22% were receiving Highly Active Antiretroviral Treatment (HAART) (Metsch, Pereyra, & Brewer, 2001).

Not all HIV-infected people suffering from mental illness or substance abuse have been found to be non-adherent, as a high percentage are taking the majority of their medications as prescribed (Chesney et al., 2000; Mehta, Moore, & Graham, 1997; Mellins et al., 2002). There are few studies of adherence to ARV medications in the multiply diagnosed (Uldall et al., 2004). Thus, it is unclear who, among people living with mental illness and substance abuse, is at risk for ARV non-adherence. It is also unclear if the observed physician reluctance to initiate ARV treatment based solely on substance use and mental health problems is warranted.

Utilizing the baseline data from a multisite cohort study of HIV-infected adults diagnosed with a psychiatric and a substance abuse disorder, the purpose of this paper is to examine: 1. The level of adherence to ARV medications in a population of triply diagnosed adults. 2. The association of adherence with specific dimensions of mental illness (e.g. types of psychiatric disorders, level of psychological distress) and/or substance abuse (e.g. type and severity of substance use). 3. The association with adherence of other demographic and service-related barriers and facilitators of adherence found in other populations of HIV-infected adults (Chesney, 2003), such as age, race, education, presence of a partner, employment, housing, income, service use and spirituality. The inclusion of spirituality in this objective is based upon evidence of an association between religious practice or

spirituality and healthier lifestyle practices, including adherence to treatment (Strawbridge, Sherma, Cohen, & Kaplan, 2001). This association is one possible reason that religiosity/spirituality has been associated with reduced risk of mortality in healthy, population-based, prospective studies (Powell, Shahabi, & Thoresen, 2003).

Methods

Sample

Data came from the baseline interview of a federally funded multisite intervention study: The HIV/AIDS Treatment Adherence, Health Outcomes and Cost Study (Cost Study). The Cost Study examined the effects of integrated mental health, substance abuse and HIV/AIDS primary care services on treatment adherence, health outcomes and cost. Participants in the cost study represent a community-based convenience sample of HIV-infected adults with dual diagnosis of psychiatric and substance abuse disorders. Detailed information on the study has been reported (HIV/AIDS Cost Study Group, 2004).

Participants were recruited from sites in the US including, Bronx, NY; Philadelphia, PA; Durham, NC; St. Louis, MO; Seattle, WA; Boston, MA; Chicago, IL; and Detroit, MI. With the exception of North Carolina, which had both urban and rural sub-sites, all sites were located in urban settings. The sites represent a range of clinical care settings (outpatient medical, mental health and substance abuse clinics, social service agencies). Inclusion criteria for participants was presence of (1) both a DSM-IVbased mental health and substance abuse disorder and (2) physician-certified HIV infection. Some study sites added additional inclusion criteria (e.g. individuals not currently in HIV treatment or already involved in residential or methadone treatment).

Recruitment of this convenience sample included a combination of clinician referrals and self-referrals based on flyers and announcements in clinics. Dual diagnosis with a psychiatric and substance abuse disorder was confirmed with a structured interview administered to all prospective participants who provided consent as part of the baseline interview (see Assessment). A total of 1138 participants were enrolled in the study. For this set of analyses, 275 participants, including all participants from the Philadelphia site, were excluded from data analysis as they resided in controlled living situations (e.g. residential treatment facility, nursing home, jail) at the time of their baseline interview and therefore had medication intake directly observed. Of the remaining 863 participants, data for analyses came from all participants prescribed ARV medications at the baseline interview (n=542).

Procedure

Participation in the study was voluntary and all patients gave written informed consent to participate. Each study site obtained local institutional review board approval, as well as a federal certificate of confidentiality. Due to confidentiality issues, data were not collected on people who refused participation. An extensive battery of instruments was administered by centrally trained and certified research staff. The majority of instruments reflect state of the art assessment procedures that have been used reliably with diverse populations, including ethnic minorities and HIV-infected adults.

Assessment

Adherence—Adherence was assessed using a modification of one of the most widely used self-report procedures, developed by Chesney and colleagues for the Adult AIDS Clinical Trials Group (AACTG: Chesney et al., 2000). Participants were first asked if they were currently prescribed ARVs. If yes, they were asked to describe their medication regimen (medicines, number of pills/doses, number of times per day taken) and the number of missed pills/doses for each medication during the past three days. All questions were read to the participants and pictures of medications were used to facilitate recall. A summary score was created based on the percentage of pills taken divided by the total number of pills prescribed over three days. Participants were also asked to report reasons for missed medications (e.g. forgot, overslept, side-effects, etc).

For patients prescribed psychiatric medications, adherence to these medications was assessed using one item: “During the past three days, on how many days have you missed taking any of your psychiatric medications?”

Psychiatric disorders—The Structured Clinical Interview for DSM-IV (SCID-I: First, Spitzer, Gibbon, & Williams, 1996) is a semi-structured clinical diagnostic interview of DSM-IV Axis I diagnoses, including Psychoactive Substance Use Disorders. The following modules were selected based on previous studies of psychiatric functioning in HIV-infected adults (Bing et al., 2001; Mellins, Ehrhardt, & Grant, 1997): Major Depression, Dysthymia, Bi-polar Disorder, Generalized Anxiety Disorder, Panic Disorder, Agoraphobia, Post-Traumatic Stress Disorder and Adjustment Disorders. Two modules from the SCID-II, which assesses Axis II disorders (Borderline Personality Disorders and Antisocial Personality Disorder) were also administered. Previous studies of the SCIDI and SCID-II have indicated good test-retest reliability, including studies of patients with substance use disorders (Ball, Rounsaville, Tennen, & Kranzler, 2001; Lipsitz et al., 1994), as well as adequate validity (www.SCID4.org).

Participants had to meet criteria for a disorder in the past year with experience of at least one symptom in the past month to be eligible for this study. Study variables from the SCID-I and II included specific classes of diagnoses (e.g. mood disorders), presence of Axis I versus Axis II versus both classes of disorders and total number of psychiatric diagnoses.

Psychological distress—The SF-36 (Ware, 1993) consists of 36 questions that yield an 8-scale health profile as well as two composite scores of mental and physical functioning over the past four weeks. Analyses focused on the Mental Health Composite Score, which has demonstrated very good psychometric properties (Ware & Sherbourne, 1992; Ware et al., 1995).

Substance abuse—The SCID-I allows diagnosis of specific substance abuse disorders (e.g. alcohol, other drugs) and specification of abuse versus dependence disorders. A modified version of the Addiction Severity Index (ASI) was also used to assess severity of substance use. The ASI is a semi-structured clinical and research interview with proven reliability and validity that provides an assessment of functioning across multiple domains, including alcohol and drug use, medical, employment, legal, social/family and psychiatric

domains (McLellan, Luborsky, Cacciola, & Griffith, 1985; McLellan et al., 1992; Zanis, McLellan, Cnaan, & Randall, 1994). A shorter version of the ASI (ASI-Lite) was chosen to reduce client burden. Additional questions were added to the ASI-Lite on prescription and over-the-counter medication abuse and the frequency of alcohol or drug use during the past six months. The psychiatric domain was excluded as other measures of mental health were used. Study variables included the ASI composite scores for alcohol use (ASI-Alc) and drug use (ASI-Drug), indicators of specific drug use within the past 30 days (e.g. marijuana, crack) and use of any drugs or alcohol within the past six months and within the past 30 days (current). Psychometric properties for the ASI-Lite have been established (Cacciola, Alterman, McLellan, Lin, & Lynch, 2007).

Health status—Medical data were available for participants who consented for their providers to be contacted and for whom providers responded with the most recent CD-4 (n_327; 60%) and viral load (n_317; 58%) data.

Demographics—Demographics included age, race/ethnicity, education, employment, income sources, health insurance coverage, living arrangements, housing and study site location.

Service utilization—Patient's use of medical, mental health and substance abuse services during the previous three months was self-reported. Medical and mental health services included inpatient and outpatient hospital care, nursing homes, hospice facilities, partial hospitalization programs, outpatient and residential mental health and substance abuse services and visits to community clinics or office-based physicians. The total number of visits for each of three classes of services (medical, mental health and substance abuse) was computed.

Spirituality—Participants rated on a 4-point Likert scale their level of spirituality/religiosity (e.g. do you consider yourself very, somewhat, not very or not at all religious or spiritual). Participants were also asked to identify their religious affiliation.

Statistical methodology

The primary outcome for this study, ARV adherence, was created utilizing data for each ARV pill reported individually; the final percentage of ARV pills taken versus prescribed over the past three days represented a cumulative score for each individual with correlated binary outcomes. Generalized Estimating Equations (GEE) were used to fit binomial logistic regression models of the outcome measure. The GEE method incorporates the inter-correlations among the binary outcomes of each individual (Fleiss, Levin, & Paik, 2003; Horton et al., 1999; Hosmer & Lemeshow, 1980). Two sets of models were estimated. First, a separate model was estimated for each hypothesized covariate. Second, covariates showing significant relationships in these models or of major theoretical importance were combined in several different models to better understand the interrelationships among the covariates and adherence. Site indicators were included in all models as fixed effects to account for site-level variability affecting adherence.

Results

Participant baseline characteristics

Demographics and health—As seen in Table 1, the majority of participants were ethnic minorities, living in poverty with less than a high school education and with long-term diagnoses of HIV/AIDS.

Psychiatric diagnoses—Given study inclusion criteria, all individuals met criteria for a current psychiatric disorder. The most common diagnoses were Depression (52%) and Anxiety Disorders, including Post-Traumatic Stress Disorder (24%); 16% of participants met criteria for a non-mood psychotic disorder. Most participants (64%) presented with two or more diagnoses (mean_2); 44% presented with only Axis I diagnoses; 18% were diagnosed with only an Axis II diagnosis and 38% were diagnosed with both Axis I and Axis II disorders.

Substance abuse diagnoses—Given the inclusion criteria, all participants presented with a substance abuse disorder in the past year or were in drug treatment (e.g. methadone maintenance). Forty percent met SCID criteria for both drug and alcohol abuse/dependence, 46% met the criteria for drug use only and 14% reported alcohol use only. Lifetime experience of injection drug use was reported by 49% of the participants, with the majority of these participants injecting heroin alone or heroin and cocaine mixed. Eighty-one percent of the sample reported using drugs during the past 30 days, primarily cannabis (42%), cocaine (35%) and/or crack (36%), while 64% reported using alcohol during that same time period.

ARV medication use—At baseline, 53% of participants reported taking one or more protease inhibitors (PIs); 96% reported taking Nucleoside/Nucleotide Reverse Transcriptase Inhibitors (NRTIs) and 61% reported taking one or more Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs). Most commonly reported regimens included: one PI and either an NNRTI or NRTI (20%); one PI and at least two NRTIs (16%); one NNRTI and two NRTIs (12%); and three NRTIs (3%).

ARV adherence—Complete adherence to ARVs in the past three days was reported by 298 (55%) participants. The most commonly cited reasons for missed medications were participant was sleeping (49%); too busy (45%); forgot (44%); away from home (43%); or had a change in daily routine (39%). Distinct side effects or other negative aspects of the medication itself (felt drug was unhelpful) were also reported to a lesser degree (15_29%). Forty-four percent of participants reported taking psychiatric medication. Among these participants, 62% reported 100% adherence in the past three days.

Service utilization—Ninety-three percent reported attending at least one doctor's appointment in the preceding three months. The average number of doctor visits during this three month period was 3.8; 42% percent reported attending at least one substance abuse treatment appointment (average number of visits_5.5) and 38% reported attending at least one mental health treatment visit (average number of visits_2.8).

Spirituality/religiosity—Eighty-four percent of the sample reported being “somewhat to very” religious or spiritual (29%_“very religious or spiritual”; 55%_“somewhat religious or spiritual”). Also, 85% reported a religious affiliation (e.g. Protestant, Jehovah’s Witness).

Factors associated with adherence; bivariate analyses

Demographic and health correlates of ARV adherence—None of the demographic variables, with the exception of age, were associated with ARV adherence (Table 2 shows significant results). The odds of adherence to ARVs increased with increasing participant age.

Viral load was associated with ARV adherence. Participants with detectable viral loads were nearly twice as likely to report missing pills, validating in part the self-reports of adherence. Antiretroviral adherence was not significantly associated with CD-4 count, type of ARV regimen or number of pills.

Psychosocial predictors of adherence—Table 2 also presents significant results of bivariate analyses examining the association of psychosocial correlates of adherence, controlling for site. Almost all of the substance abuse variables were associated with adherence. Increased severity of alcohol abuse and drug abuse, current use of several specific drugs (marijuana, cocaine, crack), current (past-month), past-6-month alcohol use and lifetime drug use were all associated with decreased odds of adherence. Current drug use and drug use over the past six months were not associated with adherence.

A global measure of psychological distress severity (SF-36 Mental Health Composite Score) was highly related to adherence. However, the presence or absence of particular mental health disorders (e.g. depression or anxiety; Axis I versus Axis II diagnosis) and the number of psychiatric disorders on the SCID were not associated with adherence. Also, although being prescribed psychiatric medication by itself was not associated with ARV adherence, adherence to prescribed psychiatric medications was associated with improved ARV adherence. Other psychosocial variables that were associated with better adherence included the number of mental health visits, keeping at least one medical appointment in the past three months and increased spirituality. There were no significant associations between attendance to substance abuse or caseworker appointments and medication adherence.

Multivariate analyses

Table 3A presents a summary model examining the relationship between global indicators of substance use and mental illness and ARV adherence. This model was developed by focusing first on substance use and mental health status as covariates, and then adding factors that exhibited significant relationships with adherence beyond its relationship with substance abuse and mental illness. Among the drug and alcohol measures, the ASI drug and alcohol composite scores exhibited the strongest relationships with adherence (Table 2).

While several more covariates were significantly related to adherence in bivariate analyses (Table 2), these variables were no longer significantly related in a model including substance use and mental illness. Thus, they were not included in the final multivariate model (e.g. participant age and number of substance abuse treatment visits in the past three months).

The results presented in Table 3A indicate that alcohol and drug abuse as measured globally by the ASI composite scores are no longer related to ARV adherence when mental health status is also in the model. Thus, mental health status is related to ARV adherence beyond its co-occurrence with substance use. Also, medical visits and spirituality remained significant predictors of adherence.

Although the ASI composite score is no longer related to ARV adherence when mental health status is in the model, use of specific drugs in the past 30 days is, in that recent use of crack or marijuana is significantly associated with a decrease in adherence (Table 3B). A similar relationship is demonstrated for the use of alcohol in the past 30 days, although it is of marginal significance.

Table 4A illustrates the importance of adherence to psychiatric medications in predicting ARV adherence. This model is estimated for a smaller sample than for the previous models as only 282 participants were prescribed both ARVs and psychiatric medications. Associations among global measures of substance use and mental illness and ARV adherence are similar to those in the larger sample presented above. However, when the relationship of specific drugs and ARV adherence in light of adherence to psychiatric medications is modeled (Table 4B), alcohol use in the past 30 days is again a significant predictor, while use of marijuana is no longer important. The use of crack during the past 30 days does continue to be associated with decreased adherence.

Discussion

The HIV/AIDS cost study was the first national study to focus on a large sample of people living with HIV and co-occurring psychiatric and substance abuse disorders. Using a broad range of measures, the study allowed a more refined examination of factors associated with non-adherence. The results of this study indicate rates of non-adherence (45%) in this population that are higher than those reported in many other studies of HIV-infected adults, confirming previous findings of higher rates of non-adherence in individuals with substance use or mental health problems (Mellins et al., 2002; Uldall et al., 2004). Conversely, it is important to note that more than half of the sample reported taking 100% of their medications over the past three days and 17% reported never missing ARV medications. Participants with a detectable viral load were nearly twice as likely to report missing pills than participants who never missed. These findings underscore the importance of determining not only the most critical barriers to adherence, but also the facilitators of adherence within this population as such data are critical for developing effective interventions for non-adherence in the triply diagnosed.

Those patients at the greatest risk for ARV nonadherence in this study were those who reported current alcohol, marijuana or crack use and psychological distress. These results concur with other studies that have identified use of crack cocaine as a major barrier to adherence (Ingersoll, 2004; Johnson et al., 2003). These findings suggest that brief, focused screening measures targeting current substance use, use of specific drugs and psychological distress, should be utilized to identify those at highest risk for non-adherence, thus facilitating more effective treatment planning.

Correlates of better adherence in this study population included attending medical appointments, increased spirituality, older age and adherence to psychiatric medications. Unfortunately, the crosssectional data analysis did not allow us to determine the causal priority of study variables. However, the data do suggest that there are variables that might improve adherence in the context of substance use and mental illness. In other studies, coping and social support have been important protective factors in examining adherence (Remien & Mellins, 2007). Spirituality or religion has been associated with a significant reduction in mortality risk, which was largely, but not entirely, accounted for by healthier lifestyle factors, including adherence to medical appointments (Powell, Shahabi, & Thoresen, 2003). It may be that the item included in this study which asked “Do you consider yourself very, somewhat, not very or not at all religious or spiritual?” assessed a factor in this sample that is related to engaging in positive health practices, including adherence.

It is also worth noting that the primary reasons participants provided for missing medications were very similar to those found in other populations (too busy, forgot, change in daily routine) (Chesney, 2000). The need to develop alternative pharmacological solutions to ARV treatment that are less disruptive to patients’ lives is critical.

There are a number of limitations to this study in addition to those previously described. We used self-report measures of adherence, substance abuse and mental illness, which may be influenced by patient recall and social desirability. Self-reported adherence in our study was significantly related to laboratory reports of viral load, in part validating our procedures. However, the results may still have been influenced by social desirability, reading ability and health literacy, etc. (Chesney, 2003). Furthermore, the majority of the study sites recruited patients presenting for care, which may not be reflective of the larger population of triply diagnosed people, including those who are homeless, avoidant of care or who lack access to care. We also did not have data on participation in Directly Observed Therapy (DOT), although anecdotal evidence from sites suggests DOT was not part of the programs.

Nonetheless, the results have some important ramifications for healthcare providers. First, our data suggest that there are adults coping with HIV, mental illness and substance use who can adhere to ARV medications and, thus, considerations about initiating ARV treatment should not be based on presence of substance abuse or mental illness alone. However, the data also suggest that HIV-infected patients coping with mental illness and substance abuse are at heightened risk for sub-optimal adherence, particularly in the context of current substance use and psychological distress. Several studies of HIV-infected adults document an association between psychological distress, particularly depression and poor health outcomes (Ickovics et al., 2001; Pieper & Treisman, 2005), highlighting the need for therapeutic interventions.

Despite the increasing appreciation of the need for multidisciplinary services for this patient population, many patients fail to access mental health and drug treatment services. In our study population, significantly less than half of the participants at the baseline phase had accessed mental health or substance abuse treatment services in the last three months, in spite of the fact that all participants had at least one psychiatric diagnosis. Although we

cannot prove a causal association, our finding of a relationship between adherence to psychiatric medications and adherence to ARVs, underscores the importance of access to appropriate mental health services. Clearly, more work is necessary to increase access to mental health and substance abuse treatment for this vulnerable and complex population. Given the lack of utilization of such services in our triply diagnosed population, we believe that service models that effectively identify drug and alcohol use and mental health symptoms and integrate mental health and substance abuse treatment with healthcare will be most effective in engaging this often disenfranchised population.

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Table 1

Demographic Characteristics

Demographic Variable	Categories	%
Gender	Male	60
	Female	39
	Transgender	1
Race	White	25
	Black	63
	Asian	<1
	Native American / Alaskan Native	2
	Other	10
Ethnicity	African/African American	57
	Latino, Hispanic	16
	None	14
	European	6
	Native American / Alaskan Native	3
	Other	4
Employment	Unemployed	84
	Employed (part-time, irregularly or full time)	16
Poverty Level	Below poverty level	73
	Above minimum poverty level	27
Health Insurance *	Private	6
	Medicaid/Medicare/VA	91
	Other	22
Education	None	10
	Less than high school	43
Marital/partner Status	Completed high school	57
	Married/partner	13
Living arrangements	Separated/divorced/ widowed/ never married	87
	Live alone	31
Age	Live with others including partner and children or other family members or friends	69
CD4 Cell Counts	Mean=41 Range= 21–66	
	Mean=343	
	Median=294	
HIV/RNA viral load values	Range= 2–294	
	Mean=49,981	
	Median=1166	
	Range= 1–1,250,000	

* Multiple responses possible

Table 2

Significant predictors of adherence.*

Predictor	Participants on ARV and NOT in a controlled living situation (n=542) Odds Ratio	Lower CL	Upper CI	p
Continuous participant age	1.03	1.01	1.06	0.01
ASI Drug Composite Score	0.13	0.03	0.67	0.01
Whether used drugs in life	0.30	0.12	0.78	0.01
Whether used marijuana in past 30 days	0.54	0.36	0.81	0.00
Whether used cocaine in past 30 days	0.49	0.33	0.75	0.00
Whether used crack in past 30 days	0.39	0.26	0.60	0.00
# days in past 30 used marijuana	0.98	0.96	1.00	0.01
# days in past 30 used crack	0.95	0.93	0.98	0.00
ASI Alcohol Composite Score	0.32	0.13	0.77	0.01
Whether used alcohol in past 30 days	0.45	0.29	0.70	0.00
Whether used alcohol in past six months	0.46	0.26	0.81	0.01
Whether used alcohol to intoxication in past 30 days	0.56	0.37	0.86	0.01
SF-36 Mental Health Composite Score	1.02	1.01	1.04	0.01
Whether adhere to prescribed psychiatric medications**	2.16	1.07	4.37	0.03
# of mental health visits in past three months	1.03	1.00	1.05	0.02
# of medical/doctor visits in past three months	1.05	1.00	1.11	0.04
Whether any medical/doctor visits in past three months	2.65	1.35	5.21	0.01
Whether any substance abuse treatment visits in past three months	1.95	1.11	3.42	0.02
Spirituality scale	1.47	1.14	1.88	0.00

* Each predictor was examined in its own model, which also included site indicator variables. Only predictors significantly related to adherence with an associated p-value ≤ 0.05 are included in this Table. A total of 90 variables were examined in their own models; thus, expected 4.5 tests to have significant p-values by chance alone.

** Sample size for this analysis is smaller since it represents the number of participants prescribed psychiatric meds.

Table 3

A. A summary model examining the relationship between global indicators of substance use and mental illness and ARV adherence (n=542).				
	Odds Ratio	Lower CL	Upper CI	p
SF-36 Mental Health Composite Score	1.02	1.00	1.04	0.02
ASI Alcohol Composite Score	0.46	0.18	0.19	0.11
ASI Drug Composite Score	0.33	0.06	1.86	0.21
Spirituality	1.48	1.12	1.94	0.01
Whether any medical/doctor visits in past three months	2.80	1.12	4.55	0.02

B. A summary model examining the relationship between substance use and mental illness and ARV adherence using specific drugs (marijuana and crack) and alcohol in past 30 days (n=542).				
	Odds Ratio	Lower CL	Upper CI	p
SF-36 Mental Health Composite Score	1.02	1.00	1.04	0.02
Use of marijuana in past 30 days	0.64	0.42	0.97	0.04
Use of crack in past 30 days	0.49	0.32	0.76	0.00
Use of alcohol in past 30 days	0.63	0.40	1.00	0.05
Spirituality	1.50	1.13	1.99	0.00
Whether any medical/doctor visits in past three months	2.54	1.22	5.29	0.01

Table 4

A. Multivariate analyses of psychiatric medication adherence using global substance use scores (n=282).				
	Odds Ratio	Lower CL	Upper CI	p
SF-36 Mental Health Composite Score	1.05	1.02	1.08	0.00
ASI Alcohol Composite Score	0.80	0.13	4.92	0.81
ASI Drug Composite Score	0.18	0.01	2.82	0.22
Spirituality	1.82	1.22	2.73	0.00
Whether adhere to prescribed psychiatric medications *	2.39	1.24	4.62	0.01

B. Multivariate analyses of psychiatric medication adherence using specific drugs (marijuana and crack) and alcohol in past 30 days (n=282).				
	Odds Ratio	Lower CL	Upper CI	p
SF-36 Mental Health Composite Score	1.05	1.02	1.09	0.00
Use of marijuana in past 30 days	0.72	0.40	1.33	0.30
Use of crack in past 30 days	0.44	0.21	0.92	0.03
Use of alcohol in past 30 days	0.42	0.20	0.89	0.02
Spirituality	1.92	1.30	2.84	0.00
Whether adhere to prescribed psychiatric medications *	2.26	1.18	4.35	0.01

* Sample size for this analysis is smaller since it represents the number of participants prescribed psychiatric medications.