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Medication Adherence in People Dually Treated for HIV Infection and Mental Health Conditions: Test of the Medications Beliefs Framework

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Abstract

Beliefs about medication necessity and concerns predict treatment adherence in people with a wide-array of medical conditions, including HIV infection. However, medication beliefs have not been examined in people dually treated with psychotropic medications and antiretroviral therapy. In the current study, we used a prospective design to investigate the factors associated with adherence to psychotropic medications and antiretrovirals among 123 dually treated persons living with HIV. We used unannounced phone-based pill counts to monitor adherence to psychiatric and antiretroviral medications over a 6-week period. Hierarchical regression models included demographic, health and psychosocial characteristics as predictors of adherence followed by medication necessity and concerns beliefs. Results showed that medication necessity beliefs predicted both antiretroviral and psychiatric medication adherence over and above established predictors of adherence. Medication concerns also predicted psychotropic adherence, but not antiretroviral adherence. These models accounted for 31% and 22% of the variance in antiretroviral and psychotropic adherence, respectively. Findings suggest that the necessity-concerns medication beliefs framework has utility in understanding adherence to multiple medications and addressing these beliefs should be integrated into adherence interventions.

Introduction

Mental health conditions, particularly mood disorders, are well-established risk factors for contracting HIV infection, and are therefore prevalent among people living with HIV (Angelino & Treisman, 2008; Walkup et al., 2008). Psychiatric conditions further complicate HIV disease progression through multiple mechanisms (Leserman, 2008; Leserman, Ironson, O'Cleirigh, Fordiani, & Balbin, 2008; Sikkema et al., 2010), perhaps most significantly the interplay between psychiatric symptoms, substance use, and HIV treatment adherence (Belenky et al., 2014). Emotional distress and substance use disrupt daily living, and result in sub-optimal medication adherence across diverse patient populations (Chapman & Horne, 2013; Huang, Wei, Wu, Chen, & Guo, 2013; Sublette, Douglas, McCaffery, George, & Perry, 2013), including people living with HIV (Mayston, Kinyanda, Chishinga, Prince, & Patel, 2012; Springer, Dushaj, & Azar, 2012).

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Psychiatric symptoms are associated with poor medication adherence to both psychotropic and antiretroviral therapy. For example, greater depressive symptoms are associated with poorer psychotropic and antiretroviral adherence, with greater adherence to psychotropics predicting better adherence to antiretrovirals (Cruess et al., 2012). Compared to persons with either HIV infection or psychiatric conditions, dually diagnosed individuals are less likely to fill prescriptions for psychotropics and antiretroviral (Lee, Rothbard, Noll, & Blank, 2011). Substance use is one factor that may influence adherence to both classes of medications (Chitsaz et al., 2013). However, research suggests that the association between substance use and non-adherence is moderated by severity of depressive symptoms, such that substance use is associated with non-adherence in individuals with lower levels of depression, while the association is not significant among the more severely depressed (Newville, Berg, & Gonzalez, 2014). Thus, while psychotropic and antiretroviral non-adherence may share common factors, these relationships are likely complex and may be less predictive in the context of co-morbidity. Identifying common underlying predictors of non-adherence in co-morbid treatment of mental illness and HIV infection may help guide interventions to improve treatment and clinical outcomes in this growing patient population.

Individual differences in treatment motivations, specifically beliefs about the effects and efficacy of medications, may account for variations in adherence across patient populations and medication regimens. While non-adherence can be unintentional, such as forgetting or misplacing medications, non-adherence can also be intentional, such as skipping doses or taking drug holidays (Horne, 2011; Jonsdottir et al., 2009). Motivational factors, particularly beliefs regarding medications, likely contribute significantly to intentional non-adherence. Taking a cost-benefit approach, Horne and collaborators (Horne, Parham, Driscoll, & Robinson, 2009) have proposed a framework that emphasizes patient beliefs about the necessity of medications to directly improve health, and beliefs regarding concerns over costs and adverse effects. The Necessity—Concerns beliefs Framework predicts medication adherence across medical conditions, including studies of people with HIV infection as well as research with psychiatric populations (Horne et al., 2013). One study, for example found that necessity beliefs regarding antiretroviral medications predicted better adherence, while greater medication concerns predicted poorer adherence. In these models, negative affect did not predict antiretroviral adherence and the final model accounted for approximately 24% of the variance in HIV treatment adherence (Gonzalez et al., 2007). These findings suggest that beliefs about medication necessity and concerns may provide a unifying framework for improving adherence to multiple medications in treating co-morbid conditions. We are not aware of any study to date that has investigated medication necessity and concerns beliefs in relation to psychotropic and antiretroviral treatment adherence in a co-morbidly treated population.

The purpose of the current study was to examine medication necessity and concerns beliefs as predictors of psychotropic and antiretroviral adherence in a sample of dually treated patients. For these analyses, we included all participants who were being treated with psychotropic medications that required daily dosing and daily antiretroviral therapy. We tested hierarchical models that included necessity and concerns beliefs as well as multiple established predictors of adherence to serve as control variables, including active substance abuse, symptoms of depression, emotional distress, and social support (De Socio, Fanelli,

Longo, & Stagni, 2004; Nel & Kagee, 2011). Using a prospective study design, we predicted that necessity and concerns beliefs would predict adherence to both psychotropic and antiretroviral medications over and above common predictors of adherence.

Methods

Participants

Participants were 78 men and 45 women receiving treatment for both mental health conditions and HIV infection. Participants were recruited from AIDS community services and infectious disease clinics during a 12-month period between 2013 and 2014. The site of the study was Atlanta, Georgia, a city with an annual HIV incidence of 30.3 per 100,000, which exceeds the 19.6 per 100,000 population rate of HIV in major US cities. Eligible participants were age 18 or older, HIV positive, treatment experienced and currently taking at least one daily-dosed psychiatric medication and antiretroviral therapy.

Measures

Participants provided four sources of data: (a) audio-computer assisted self-interviews (ACASI) to assess demographic and behavioral characteristics; (b) a urine specimen for illicit drug use screening; (c) unannounced pill counts to monitor medication adherence; and (d) HIV RNA (viral load) and CD4 cell counts from medical records. The specific measures are described below.

Computerized (ACASI) interviews

Upon enrollment, all participants completed computerized interviews that included demographic information and measures focused on health and psychosocial characteristics that previous research has shown to predict adherence.

Demographic Characteristics—Participants were asked their gender, age, years of education, income, ethnicity, employment status, and the year that they first tested HIV positive.

HIV symptoms and medication side-effects—The number of HIV symptoms experienced by participants was assessed by a 14-item scale (Kalichman, Rompa, & Cage, 2000). We calculated a composite score using the summation of all 14 symptoms, alpha = .70. Medication side-effects were measured using 11 common ailments attributable to medications, responses made on a 4-point scale, 0 = *not experiencing* to 3 = *severely experiencing*, with items summed for a composite score that was internally consistent, alpha = .83 (Carrieri et al., 2007).

Alcohol use—To assess global alcohol use we administered the Alcohol Use Disorders Identification Test (AUDIT), a 10-item scale designed to measure alcohol consumption and identify risks for alcohol abuse and dependence (Saunders, Aasland, Babor, DeLaFuente, & Grant, 1993). Scores on the AUDIT range from 0 – 40 and the AUDIT has demonstrated acceptable reliability and validity, with specificities between .80 and .90 (Maisto, Conigliaro, McNeil, Kraemer, & Kelley, 2000).

Depression symptoms—The Centers for Epidemiological Studies Depression scale (CESD) was used to assess symptoms of depression (Van Dam & Earleywine, 2011). Participants completed the full 20-item CESD, alpha = 0.87. Items focused on how often a participant had specific thoughts, feelings and behaviors in the past seven days, with responses of *0 = 0 days, 1 = 1–2 days, 2 = 3–4 days, 3 = 5–7 days*. Scores range from 0 to 60 and values greater than 16 indicate possible depression, alpha = .89.

Stressful events and stress experienced—Participants were asked whether they experienced 18 stressful life events in the previous month. Stressors were related to social relations (e.g., starting and ending relationships, disclosing HIV status), life circumstances (e.g., financial problems, transportation, having a place to stay), and health concerns (e.g., being hospitalized, experiencing an illness, starting a new medication). These stressors have been reported in previous studies (Chesney, Folkman, & Chambers, 1996; Kalichman, DiMarco, Austin, Luke, & DiFonzo, 2003). Stressors were responded to dichotomously for having occurred or not (yes/no). We computed a stress index by summing the number of stressors reported for the previous month. For each stressful event endorsed, participants also rated the amount of distress they attributed to the experience using a 3-point scale, 0 = No stress, 1 = *Little stress*, 2= *Lot of stress*. Distress severity ratings were summed to create a mean distress score, alpha = .75.

Social support—Social support was assessed through a14-item scale of tangible, emotional, and informational support (Brock, Sarason, Sarason, & Pierce, 1996). Example items include “I feel a strong emotional bond with at least one other person” and “There is someone I can turn to for advice about handling problems with my family”. Responses were *1 = Completely true, 2 = Mostly true, 3 = Mostly false and 4 = Completely false*, with higher scores indicating greater social support, alpha = .88.

Medication necessity-concerns beliefs—We used the Beliefs About Medicines Questionnaire to assess participant’s view of their medications as necessary and medication concerns (Horne et al., 2004; Horne, Cooper, Gellaitry, Date, & Fisher, 2007). The medication necessity scale consists of five items reflecting the perceived benefits of medications in direct relation to health; example items include “My health, at present, depends on my medicine”, “My life would be impossible without my medicine”, and “My medicines protect me from becoming worse”. The five item medication concern scale reflects the potential adverse effects and costs of medications; example items include “Having to take my medicines worries me”, “My medicines disrupt my life”, and “I sometimes worry about the long-term effects of my medicines”. Items are responded to on a 5-point scale, 1 = *Strongly agree*, 5 = *Strongly disagree*. As was the case in scale development, the necessity and concerns scales are independent in the current sample, r (121)= .01, ns. The medication necessity and concerns scales were both internally consistent, alphas = .78 and .81, respectively.

Urine screening for drug use

For drug screening we conducted a multi-panel urine dip-test to detect illicit drugs that are commonly misused. This test strip uses a lateral flow chromatographic immunoassay for

qualitative detection of 12 drugs and drug metabolites (Redwood Toxicology Labs - Reditest-12). These tests are FDA approved and are reliable and valid for initial drug screening.

Medication adherence

Participants consented to three unannounced telephone-based pill counts that occurred over a six-week prospective period. Unannounced pill counts are reliable and valid in assessing medication adherence when conducted in homes (Bangsberg, Hecht, Charlebois, Chesney, & Moss, 2001) and on cell-phones (Bangsberg & Deeks, 2002; Kalichman et al., 2008; Kalichman et al., 2007). In this study we performed unannounced phone-based pill counts for all antiretroviral and psychiatric medications prescribed for daily dosing. Participants were given free cell phones for assessments. Following an office interview that included a full accounting of all prescription medications and training in the pill counting procedure, participants were called at three unscheduled times over the subsequent 45 days. The first of the three pill counts established the initial number of pills in possession with the following two pill counts allowing for calculation of adherence, defined as the ratio of pills counted relative to pills prescribed, taking into account the number of pills dispensed.

Chart abstracted HIV viral load and CD4 cell counts

We used a participant assisted method for collecting chart abstracted viral load and CD4 cell counts from participants' medical records. Participants were given a form that requested their doctor's office to provide results and dates of their most recent, and not older than 3-months, viral load and CD4 cell counts. These data were therefore obtained directly by the participant from their HIV care provider. The form included a place for the provider's office stamp or signature to assure data authenticity. HIV RNA below detection was defined as less than 100 copies/mL for uniformity across providers.

Procedures

Men and women living with HIV were recruited through targeted community sampling with both venue recruitment and snowball sampling techniques. Venue recruitment relied on responses to brochures placed in waiting rooms of HIV service providers and infectious disease clinics throughout Atlanta, GA. At an initial office assessment, participants were provided with informed consent, completed the computer-assisted interview (Gribble et al., 2000; Morrison-Beedy, Carey, & Tu, 2006), were trained to conduct phone-based unannounced pill counts, screened for drug use, and asked to obtain their most recent HIV viral load and CD4 cell count results from their medical provider. Participants then completed three unannounced phone-based pill counts to determine ART adherence over the next six weeks. Participants were reimbursed $145 for completing all measures and providing all data. The university Institutional Review Board approved all procedures.

Data Analyses

Because the sample was recruited from the community and were being treated for mental health problems, we first examined the descriptive characteristics of the sample by comparing participants with CESD depression scores below and above 16, the clinical cut-

off for probable depression. Comparisons were made using contingency table chi-square tests for categorical variables and independent t-tests for continuous variables. We also tested for within-subjects differences in adherence to psychotropic and antiretroviral medications and within-subjects differences for medication necessity and concerns beliefs scores using dependent paired t-tests.

The main study hypotheses were tested using hierarchical regression analyses. Examination of the regression residuals in the antiretroviral medication model indicated that the distributions did not diverge significantly from normal (skewness = −0.305, se = 0.226, kurtosis = −0.643, se = 0.449, Kolmogorov-Smirnov test for normality = 0.07, p = .162. Visual inspection of the distributions did not show outliers. Inspection of the scatterplot between predicted values of adherence and the standardized residuals met the homoscedasticity assumption. Furthermore, the variables met the independence assumption, Durbin-Watson statistic = 2.18. Thus, assumptions of linear regression were met for analyzing ART adherence.

For the analysis of psychiatric medication adherence, the regression residuals indicated that the distributions did not diverge significantly from normal (skewness = −0.619, se = 0.226, kurtosis = 0.126, se = 0.449, Kolmogorov-Smirnov test for normality = 0.06, p = .20. Inspection of the distributions also did not show any outliers. The scatterplot between predicted values of adherence and the standardized residuals also met the homoscedasticity assumption. Furthermore, the variables met the independence assumption, Durbin-Watson statistic = 2.08. Thus, assumptions of linear regression were met for analyzing psychiatric medication adherence.

We first examined the prospective bivariate relationships among participant characteristics collected at the initial assessment and antiretroviral and psychotropic adherence assessed over the following six weeks. Next, we constructed hierarchical multiple regression models to test predictors of adherence over the six-week observation period. The models included demographic and health characteristics that were significantly correlated with either antiretroviral or psychotropic medication adherence in bivariate analyses, as well as factors previously shown to be associated with adherence. Statistically redundant factors, such as stressors and distress, were not both included in the models to avoid multi-co-linearity. Demographic and health characteristics were entered in the first block, followed by psychosocial variables in a second block of the regression model, and finally medication necessity and concerns beliefs were entered in the third block. Regression models therefore examined independent predictors of adherence to test the hypothesis that medication beliefs would predict adherence to antiretroviral and psychotropic medications over and above the other factors relevant to adherence.

Results

The average age of the sample was 46.9 (SD = 8.7) and the mean number of years since testing HIV positive was 14. 5 (SD = 8.4). Nearly one in five participants (N = 23, 19%) had detectable HIV viral loads (>100 copies/ml), and 19 (15%) had CD4 cell counts under 200 cells/mL, indicating advanced damage to the immune system. Half of participants (N = 62,

50%) reported alcohol use in the previous month and 70 participants (57%) tested positive for at least one drug on the urine-screening test. Overall, the average CESD-depression score was 15.9 (SD= 9.8), with 52 (42%) participants demonstrated potential depression. Table 1 shows the demographic, health, and psychosocial characteristics of participants with lower and elevated CESD-depression scores. Men were significantly more likely to have elevated depression scores than women. In addition, greater depression symptoms were associated with greater HIV symptoms, medication side-effects, and poorer antiretroviral as well as poorer psychotropic adherence. Participants with elevated depression scores reported more alcohol-related problems, more stressors and distress, less social support and higher medication concerns scores. As shown in Table 2, anti-depressants were the most frequently prescribed psychotropic medications in the sample.

Antiretroviral adherence was significantly correlated with psychotropic adherence over the six week observation period, $r(121)=.76$, $p < .01$. Paired t-test comparisons showed that participants were significantly more adherent to their antiretrovirals than their psychiatric medications, $t(df=121) = 5.6$, $p < .01$, and medication necessity scores were significantly greater than medication concerns scores, $t(df=121) = 14.8$, $p < .01$.

Antiretroviral adherence

Table 3 shows the correlations between participant characteristics and antiretroviral medication adherence. Greater adherence was associated with older age, higher income, and having been diagnosed with HIV for more years. As would be expected, greater antiretroviral adherence correlated with lower HIV viral load and higher CD4 cell counts. Greater adherence was also related to more social support and higher medication necessity scores.

Multiple regression models for antiretroviral adherence are shown in Table 4. Demographic and health characteristics were entered in the first block of the model (Model 1), with age and income significantly predicting adherence and accounting for 14% of the variance. Psychosocial characteristics were entered in the second block (Model 2), with social support predicting adherence and significantly adding 9% to the explained variance. Results of the final model (Model 3) indicated that age, income, social support and medication necessity beliefs were independently associated with greater antiretroviral adherence over and above the other participant characteristics included in the model, $F(12,101) = 3.69$, $p < .01$, accounting for 31% of the variance in antiretroviral adherence.

Psychotropic adherence

Bivariate correlations showed that greater psychotropic adherence was significantly correlated with older age, higher income, and more years since testing HIV positive. (see Table 3) In addition, greater psychotropic adherence was significantly related to lower HIV viral load and higher CD4 cell counts. Finally, greater psychotropic adherence was related to lower depression scores, greater social support, higher medication necessity and lower medication concerns scores.

Multiple regression models for psychotropic adherence are shown in Table 5. Demographic and health characteristics entered in the first block (Model 1) of the regression model showed that participant age significantly predicted adherence. In the second block (Model 2) that entered psychosocial characteristics, social support added to the 19% of the variance explained in adherence, although the change was not significant. Results of the final model (Model 3) indicated that only medication necessity and medication concerns beliefs were independently associated with greater psychotropic adherence over and above the other participant characteristics. In the final regression model participant age and social support were no longer significant and medication beliefs therefore solely significantly predicted adherence to psychiatric medications, $F(12,101) = 2.97$, $p < .01$, accounting for 26% of the variance.

Discussion

The current study is the first that we are aware of to test the medication necessity-concerns beliefs framework in individuals dually treated for HIV infection and mental health conditions. We found that motivational beliefs predicted antiretroviral and psychotropic medication adherence over and above multiple factors that are commonly found associated with adherence including age, side-effects, substance use, stress and social support. For antiretroviral adherence, medication necessity beliefs predicted adherence and for psychotropic medications both necessity and concerns beliefs predicted adherence. Overall, we found that psychosocial factors and medication beliefs accounted for 31% and 26% of the variance in antiretroviral and psychotropic adherence, respectively.

Participants in our study were most often treated for an affective condition and the sample average CESD score indicated high-levels of depression symptoms. All of the study participants were being treated for co-morbid psychiatric conditions and HIV infection. Higher depression scores in our sample were associated with poorer adherence to antiretroviral and psychotropic medications as well as greater alcohol use, greater stress, and more concerns about medications. Given that medication concerns also predicted psychiatric medication adherence in the regression models, interventions aimed to improve psychotropic medication adherence should directly address concerns about medications. With respect to antiretroviral adherence, we found that only medication necessity beliefs predicted adherence, suggesting that interventions focus on educating patients about the efficacy of treatment on suppressing HIV and improved immune system functions. While providers may already emphasize the importance of taking ART for the health of their patients, routinely repeating, reinforcing, and explaining this information may help sustain long-term adherence.

These findings should be interpreted in light of the study limitations. First, we relied on a convenience sample that cannot be considered representative of people living with HIV infection. The sample also came from a wide-range of providers that likely varied in their methods for diagnosing and treating mental health problems. In addition, because our sample was recruited from community services, we do not know their clinical psychiatric diagnoses, duration of mental health problems, or duration of mental health treatment. We also used self-report measures to assess alcohol use, stress, and other socially sensitive

behaviors that can be under-reported. We also administered the Medications Beliefs Questionnaire with reference to each class of medications currently being taken. Necessity and concerns beliefs specific to each class medication, as well as each medication within a type, were not discernable in our study. In addition, we did not have information available regarding participant mental health conditions, duration of psychiatric diagnosis or duration of psychiatric treatment.

Results may also have been moderated by factors that our sample size precluded us from testing. For example, depression symptoms, stressors and distress were not significantly associated with antiretroviral adherence in this study. While this finding parallels some previous research that has also failed to find associations between negative mood states and HIV treatment adherence, the relationship may also have been moderated by substance use (Gonzalez et al., 2007). Similarly, failing to find an association between substance use and adherence in our sample is consistent with past research that found a moderating effect of depression on the relationship between substance use and adherence, such that the association was not present for patients with elevated depression (Newville et al., 2014). These studies suggest complex relationships among affect, substance use and adherence that we were unable to test because of a lack of statistical power. With these limitations in mind, we believe that our findings have implications for improving medication adherence among people dually treated for HIV infection and mental health conditions.

Individual abilities and motivations are critical to medication adherence even with the least burdensome medication regimens (Chapman & Horne, 2013). Individualized interventions that emphasize the clear benefits of medications, while also addressing legitimate concerns that patients may have will likely offer the greatest impact on adherence. Participants in our study held strong beliefs that their medications are necessary and these beliefs predicted adherence to both their antiretroviral and psychotropic medications. Adherence counseling that repeatedly reinforces the necessity of adherence in order to experience the benefits of treatment may therefore prove particularly effective for people receiving both psychotropic and antiretroviral medications. Explaining the association between ART and viral suppression along with feedback from patient viral load testing may further bolster adherence. However, medication concerns beliefs appear important to directly address with regard to psychiatric medications. Adherence interventions often focus on strategies and techniques to remove structural barriers to adherence without addressing perceptions, beliefs, and motivations. Medication concerns may not be spontaneously offered by patients and should therefore be actively probed by providers. Necessity and concerns beliefs are uncorrelated and therefore do not allow clinicians to infer that just because patients may see their medications as necessary they will not have concerns. Directly assessing and addressing medication concerns among patients who believe their medications are necessary or not will likely have a direct effects on improving adherence. Our results encourage augmenting adherence interventions to routinely reinforce medication necessity beliefs and selectively addressing medication concerns to enhance motivation prior to building adherence skills, offering adherence devices and strategies, and alleviating structural barriers to adherence.

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Table 1

Descriptive characteristics of people living with HIV receiving psychotropic and antiretroviral medications who scored lower and higher on the CESD depression scale.

	CESD Score < 16 (N = 71)		CESD Score ≥ 16 (N = 52)		
Characteristics	**N**	**%**	**N**	**%**	**X^2**
Male	40	56	38	73	3.6*
Female	31	44	14	27	
African American	64	90	43	83	2.8
Income < $10,000	48	68	38	73	0.4
Unemployed	63	89	47	90	0.5
Antiretroviral adherence < 85%	26	37	31	61	6.6**
Viral load undetectable	60	87	40	78	1.5
Viral load detectable	9	13	11	22	
CD4 < 200 cell/mL	8	12	11	22	2.0
Current alcohol use	30	42	32	61	4.5*
Screened positive for drug use	39	56	31	62	0.5
	M	SD	M	SD	t
Age	47.6	8.2	46.0	9.34	0.9
Years of education	12.5	1.8	12.5	1.9	0.1
Years since HIV diagnosis	14.37	8.31	14.1	8.9	0.3
HIV symptoms	2.8	2.5	5.8	3.6	5.3**
Medication side effects	4.0	3.2	8.3	5.4	5.2**
Antiretroviral medication adherence	80.8	24.3	72.1	25.9	1.9+
Psychiatric medication adherence	73.2	31.7	52.7	39.4	3.2**
CD4 cell count	610.6	603.9	449.5	297.7	1.7
AUDIT Alcohol score	2.6	4.4	5.6	7.4	2.7**
Depression (CESD) score	9.1	4.2	25.2	7.6	n/a
Number of stressors	2.9	2.2	4.3	3.1	2.8**

	CESD Score < 16 (N = 71)		CESD Score ≥ 16 (N = 52)		
Characteristics	**N**	**%**	**N**	**%**	**X^2**
Distress	2.1	2.2	5.4	4.9	4.8**
Social support score	30.4	8.2	22.4	7.7	5.4**
Medication necessity beliefs score	21.7	3.1	21.1	3.5	0.8
Medication concerns beliefs score	12.7	4.5	15.1	4.3	2.8**

Note:

+ p = .06

* p < .05

** p < .01

Table 2

Frequencies of psychotropic medications taken by people living with HIV receiving psychotropic and antiretroviral medications.

Psychotropic Medication	N	%
Selective serotonin reuptake inhibitors	32	26
Serotonin-norepinephrine reuptake inhibitors	12	10
Noradrenergic and specific serotonergic antidepressants	28	23
Norepinephrine-dopamine reuptake inhibitors	25	20
Tricyclic antidepressants	3	2
Mood stabilizers	7	6
Antipsychotics	16	13

Table 3

Correlations between participant characteristics and adherence to antiretroviral and psychiatric medications.

	Antiretroviral Adherence	Psychiatric adherence
Characteristics	**r**	**r**
Age	.35**	.32**
Gender	.17	.13
Ethnicity	−.09	−.08
Education	.03	.14
Income	.24**	.19*
Employment	.05	0.8
Years since HIV diagnosis	.20*	.30**
HIV symptoms	−.01	−.10
Medication side effects	−.01	−.12
Viral load (log)	−.40**	−.45**
CD4 count	.22**	.29**
Audit Score	.08	.03
Drug use	−.02	.02
Depression (CESD)	−.12	−.21**
Number of stressors	.02	−.05
Stress experience	−.02	−.09
Social support	.29**	.30**
Medication necessity	.32**	.26**
Medication concerns	−.17+	−.27**
Antiretroviral medication adherence		.76**

Note:

+ p = .06

* p < .05

** p < .01

Table 4

Regression models predicting antiretroviral adherence over a six-week period.

	Model 1				Model 2				Model 3			
	B (se)	**β**	**R^2**	**F for R^2 Δ**	**B (se)**	**β**	**R^2**	**F for R^2 Δ**	**B (se)**	**β**	**R^2**	**F for R^2 Δ**
Age	.007 (.003)	.25**			.008 (.002)	.28**			.005 (.002)	.19*		
Gender	.068 (.044)	.14			.067 (.044)	.14			.047 (.043)	.10		
Income	.099 (.047)	.20*			.105 (.047)	.21**			.094 (0.46)	.18*		
HIV symptoms	.002 (.008)	.03			.006 (.008)	.08			.004 (.008)	.06		
Medication side effects	−.002 (.005)	−.03			−.004 (.006)	−.09			−.002 (.006)	−.04		
Model 1 Summary F(5,108)=3.5**			.14	3.5**								
Alcohol use					.004 (.102)	.10			.002 (.004)	.06		
Drug use					−.013 (.021)	−.06			−.015 (.020)	−.06		
Depression (CESD)					.002 (.003)	.10			.002 (.003)	.06		
Stress experienced					.002 (.007)	.04			.007 (.007)	.11		
Social Support					.008 (.003)	.31**			.007 (.003)	.27**		
Model 2 Summary F(10,103)=3.1**							.23	2.6**				
Medication concerns									−.006 (.005)	−.12		
Medication necessity									.019 (.006)	.27**		
Model 3 Summary F(12,101)=3.7**											.31	5.1**

Note:

* p < .05

** p < .01

Table 5

Regression models predicting psychiatric medication adherence over a six-week period.

	Model 1				Model 2				Model 3			
	B (se)	**β**	**R^2**	**F for R^2 Δ**	**B (se)**	**β**	**R^2**	**F for R^2 Δ**	**B (se)**	**β**	**R^2**	**F for R^2 Δ**
Age	.009 (.004)	.22*			.010 (.004)	.24**			.007 (.004)	.16		
Gender	.095 (.068)	.12			.086 (.069)	.11			.065 (.068)	.09		
Income	.123 (.073)	.16			.125 (.074)	.16			.113 (0.72)	.15		
HIV symptoms	−.003 (.009)	−.02			.004 (.013)	.04			.002 (.012)	.02		
Medication side effects	−.009 (.008)	−.11			−.007 (.010)	−.09			−.005 (.009)	−.06		
Model 1 Summary F(5,108)=2.8*			.12	2.8**								
Alcohol use					.006 (.006)	.09			.004 (.006)	.07		
Drug use					.018 (.033)	.05			.013 (.032)	.04		
Depression (CESD)					−.001 (.005)	−.03			−.001 (.005)	−.03		
Stress experienced					.001 (.012)	.01			.007 (.011)	.07		
Social Support					.010 (.004)	.26**			.008 (.004)	.19		
Model 2 Summary F(10,103)=2.4**							.19	1.9				
Medication concerns									−.016 (.008)	−.21**		
Medication necessity									.024 (.010)	.22**		
Model 3 Summary F(12,101)=2.9**											.26	4.7**

Note:

* p < .05

** p < .01