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Implications of apathy and depression for everyday functioning in HIV/AIDS in Brazil

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Abstract

Background—Brazil accounts for the largest number of HIV+ persons in Latin America, and this epidemic poses a significant public health burden in this country. Little is known about the neuropsychiatric and functional consequences of HIV infection in this population.

Methods—Participants were 43 HIV+ and 29 HIV- individuals who underwent a neuropsychological, psychiatric and neurological evaluation that included self-report measures of mood (Beck Depression Inventory-II; BDI-II), neurocognitive complaints (Patient's Assessment of Own Functioning Inventory) and declines in instrumental activities of daily living (Activities of Daily Living questionnaire). The MINI-Plus generated Major depressive disorder (MDD) diagnoses. Apathy, defined as social withdrawal, decision-making difficulty, loss of interest and pleasure, was measured using items from the BDI-II and the neurological evaluation.

Results—When compared with seronegative participants, HIV+ individuals endorsed higher levels of apathy spectrum symptoms. After adjusting for mood and other covariates, apathy significantly predicted worse everyday functioning.

Limitations: The small sample size, along with the self-report measures used to evaluate apathy and functional difficulties limit the inferences that may be drawn from our findings.

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Contributors

Drs. Ellis, de Almeida, de Pereira, Rebeiro, and Barbosa designed the study serve as PIs of the parent study. Ms. Kamat completed the literature search, statistical analyses, and wrote the drafts of the manuscript. Drs. Morgan, Cherner, and Marcotte reviewed manuscript drafts and provided feedback. Dr. Atkinson provided input on psychiatric data and reviewed manuscript drafts. Ms. Badiee and Ms. Maich assisted with data acquisition and manipulation. All authors contributed to and have approved the final manuscript.

Conflict of interest

The authors have nothing to disclose regarding relationships that could be interpreted as a conflict of interest.

Conclusions—Our Brazilian HIV+ cohort endorsed apathy and depression as well as significant functional complaints. Although correlated with depression, apathy was uniquely associated with functional difficulties. Clinical attention to apathy and depression in HIV-infected Brazilians may help identify patients at risk for functional difficulties who may benefit from additional support to maintain independence.

Keywords

HIV/AIDS; Activities of Daily Living; Apathy; Depression; Brazil; Everyday functioning

Introduction

The neurobehavioral consequences of the HIV pandemic have mostly been studied in North American and European cohorts. Thus, the neuropsychiatric correlates of HIV infection are relatively unknown in resource-limited parts of the world (Fleischer, Fernald, & Hubbard, 2007; Maj et al., 1994 a, b). Importantly, the sociocultural contexts of HIV infection may vary across countries, which may impact the expression of HIV-associated neuropsychiatric sequelae (e.g., Atkinson et al., 2011; Jin et al., 2006). As such, it is unclear to what extent findings from resource-rich contexts can be generalized to developing countries, where the epidemic is centered. This suggests a need for direct characterization of HIV-associated neuropsychiatric conditions within those countries that are significantly impacted by HIV disease.

For example, within Latin America, which ranks third among global regions affected by the HIV/AIDS epidemic, Brazil is currently estimated to have the largest number (approximately 600,000) of HIV+ persons (OPAS, 2001). Although there were early pioneering efforts in the 1990s demonstrating that HIV+ persons may experience greater psychiatric distress as well as cognitive, and functional impairment compared to seronegative counterparts (Maj, Satz, et al., 1994; Maj, Janssen, et al., 1994), relatively few subsequent studies have characterized the neuropsychiatric correlates of HIV infection in this country. Notably, the socio-demographic context of HIV infection in Brazil differs from that in North America and Europe in that the majority of cases are due to heterosexual exposures (32%) followed by homo/bisexual (23%), and intravenous drug use (21%) exposures. Furthermore, Brazil has experienced a rapid increase in the female HIV epidemic, with the male/female ratio of AIDS cases reaching 1.5:1 in 2008 (Boletim Epidemiológico Brasil, 2008). While the neurobehavioral consequences of HIV infection in this population have not been studied extensively as yet, the WHO Neuropsychiatric AIDS Study demonstrated that, relative to seronegative controls, the prevalence of mood disorders was higher in HIV+ patients (18% in asymptomatic subjects and 22% in symptomatic subjects) in Sao Paulo, Brazil (Maj, Janssen, et al., 1994). Recent preliminary estimates of depression in HIV-infected Brazilians vary from 21 – 37% across a broad range of HIV+ cohorts including patients on antiretroviral therapy (ART) and those who were ART-naïve (Anastos et al., 2000; Mello, Segurando, & Malbergier, 2010; Silveira et al., 2012). These findings are generally consistent with lifetime MDD prevalence rates of approximately 40% in North American cohorts (e.g., Atkinson et al., 1988; Bing et al., 2001; Ciesla & Roberts, 2001).

Apathy has long been recognized as a clinical manifestation of HIV-associated neurobehavioral disturbance (e.g., Navia et al., 1986), but has only recently received increasing empirical attention (e.g., Castellon et al., 1998; Castellon et al., 2000; Kamat et al., 2012; Paul, Flanigan, et al., 2005; Rabkin et al., 2000). Although apathy among HIV+ Brazilians has not yet been evaluated, considerable evidence from North American populations underscores the importance of examining apathy among HIV+ individuals in

Brazil. Approximately 30-50% of HIV-infected individuals demonstrate clinically significant apathy symptoms (e.g., Castellon et al., 1998; Rabkin et al., 2000), which include reduced self-initiated, goal-directed behavior, and a lack of motoric, emotional, and cognitive motivation (Marin, 1997). There is growing evidence to support the correspondence between apathy and HIV-associated neural injury to frontostriatal circuits including the nucleus accumbens (Paul, Brickman, et al., 2005) and medial frontal white matter tracts (e.g., corpus callosum and corona radiata; Hoare et al., 2010).

Apathy and depression, often characterized by symptoms of dysphoria and anhedonia, frequently co-occur in HIV infection (e.g., Castellon et al., 1998; Rabkin et al., 2000). However, within HIV+ cohorts, there is evidence demonstrating that apathy ratings do not co-vary with depressed mood (e.g., Paul, Brickman, 2005; Paul, Flanigan, et al., 2005); thus suggesting that there may not be a one-to-one correspondence between the two constructs. This is further supported by neuroimaging findings across clinical groups (including HIV+ patients), which indicate that left prefrontal and limbic system dysregulation is associated with depression, whereas apathy appears to be driven by medial prefrontal and deep subcortical pathology (Hoare et al., 2010; Paul, Brickman et al., 2005; Starkstein et al., 1992).

Although the current body of literature indicates that both depression and apathy are prevalent in HIV infection and are associated with HIV-related neural injury to frontostriatal circuits, these two psychiatric constructs appear to be separable from neurocognitive functioning. For example, there is consistent evidence that HIV-associated NP impairment is not affected by comorbid depression (e.g., Cysique et al., 2007; Millikin et al., 2003). With regard to apathy, its association with neurocognitive abilities is generally reported to be small and non-significant (Rabkin et al., 2000; Robinson-Papp et al., 2008, cf Castellon et al., 1998, 2000; Paul, Flanigan et al., 2005). It is important to note however, that poor functional status (e.g., instrumental activities of daily living, medication adherence, and quality of life) in HIV+ patients is independently associated with depressed mood (e.g., Cysique et al., 2007; Thames et al., 2011) and apathy (Barclay, Hinkin, and Castellon, 2007; Kamat et al., 2012; Rabkin et al., 2000; Tate et al., 2003), suggesting that even though these two neuropsychiatric disturbances are not primary sources of NP impairment in HIV infection, they should be considered in the assessment of everyday functioning declines and diagnosis of HIV-associated neurocognitive disorders (HAND).

Approximately 35 – 50% of individuals with HAND experience significant functional impairments (e.g., Heaton et al., 2004). The prevalence of everyday functioning difficulties has seldom been systematically studied in international cohorts of HIV+ individuals. One notable example was the WHO Neuropsychiatric AIDS Study completed in 1991 that reported worse everyday functioning in symptomatic HIV+ Brazilian individuals compared to seronegative controls (Maj, Satz, et al., 1994). While this early study demonstrated the association between global neuropsychological impairment and poor everyday functioning performance (Maj, Satz, et al., 1994), it is unknown whether psychiatric symptoms, which are known to be notable predictors of functional deficits in American HIV+ cohorts, are similarly important across cultures.

Since it is unclear whether North American findings pertain to Brazil, neuroAIDS teams at the HIV Neurobehavioral Research Program (HNRP) at the University of California, San Diego (UCSD), and the Hospital de Clinicas da Universidade Federal do Parana and the Ministry of Health in Brazil conducted a neurocognitive feasibility study in Curitiba, a city in southern Brazil, in 2007. The aim of the present study was to investigate depression, apathy and their association with daily functioning declines in HIV-seropositive and seronegative participants. We hypothesized that (1) the level of depressive symptomatology

as well as apathy would be significantly higher in HIV-infected subjects relative to the HIV-negative comparison group; (2) these psychiatric symptoms would be significantly associated with more impaired daily functioning, independent of HIV disease characteristics.

Methods

HIV neurobehavioral feasibility study in Curitiba, Brazil

The parent study was launched in southern Brazil, given the dearth of systematic studies of HIV-1 clades or neuropsychological manifestations of the disease in this population. The preparatory work included selection and construction of neurobehavioral assessments, translation and back-translation of English instruments, modification of culturally inappropriate items, and the training of examiners in Curitiba, Brazil. The Institutional Review Boards (IRBs) from both the Brazilian government and UCSD approved the study. Written informed consent was obtained from all participants following the explanation of the study procedure.

Participants

All HIV+ participants were recruited from the Rede Nacional de Genotipagem, National Genotyping Network, and ARV resistance testing site. The seronegative comparison group was recruited via word of mouth, posted announcements, and referrals from the seropositive participants. Subjects were reimbursed for their travel and meal expenses. Exclusion criteria included neurocognitive morbidity unrelated to HIV illness (e.g., head injury, seizure disorder), severe psychiatric disorder (e.g., schizophrenia), heavy substance use within the past six months, medical confounds (e.g., cardiac failure), education less than 4 years, and inability to provide informed consent. HIV status was determined by enzyme-linked immunosorbent assays and was confirmed by a western blot test. We present data on 29 HIV- and 43 HIV+ participants who completed the relevant neurocognitive and psychiatric assessments. The demographic, clinical, neurocognitive, and psychiatric characteristics of the sample are displayed in Table 1. Participants were well matched on demographic variables ($p > .10$). The seronegative group had lower rates of major depressive disorder, and neuropsychological impairment ($p < .05$).

Procedure

Participants underwent a comprehensive neurocognitive evaluation, structured psychiatric examination, and assessment of daily functioning. They were administered the Mini International Neuropsychiatric Interview-Plus (MINI-Plus; Sheenan et al., 1998) and the Beck Depression Inventory-II (BDI-II; Beck 1996). Additional information regarding apathy symptomatology was obtained from a neurologist-administered neuromedical interview. Specifically, participants were asked to describe the extent of their social withdrawal on a scale of 0 (normal, as good as always) to 4 (severe, little or no contact with others). Based on the literature, we created an apathy index z-score, utilizing the abovementioned clinician-administered apathy item and three BDI-II items (i.e., #4: loss of pleasure; #12: loss of interest; and #13: ability to make decisions) that are common symptoms of apathy. Marin and colleagues (1994), Castellon et al. (2006) and Rabkin et al. (2000) have previously demonstrated the relatedness of the chosen self-reported depression symptoms with the construct of apathy. An examination of the correlation between the four items used to generate our apathy index suggested good internal consistency (Cronbach's $\alpha = .80$). Severity of current depressive symptoms was obtained from an adjusted BDI-II score that excluded the three apathy-associated items. The MINI-Plus generated current and lifetime diagnoses of major depressive disorder.

All participants completed a Portuguese version of the Lawton and Brody (1969) Activities of Daily Living scale, which was modified to enable the detection of temporal changes in ADL dependence at a cross-sectional visit by requiring subjects to rate their “current” and “best” prior level of functioning on numerous daily tasks (e.g., grocery shopping, managing finances, housekeeping; see Heaton et al., 2004). The primary dependent variable of interest was the total number of declines reported in current versus past functioning on all of the IADL items [possible range=0 (no decline) - 13 (increased dependence in all activities)]. Participants were also administered the Patient's Assessment of Own Functioning Inventory (PAOFI; Chelune, Heaton, & Lehman, 1986). This 41-item questionnaire elicits the frequency of difficulties with memory, language and communication, use of hands, sensory-perception, higher level cognitive and intellectual functions, work and recreation. The total number of cognitive complaints (possible range of 0–33) was used as the dependent variable.

A standardized neuropsychological battery was administered in Portuguese, which included tests of executive functions, learning, memory, speed of information processing, verbal fluency, motor skills, and working memory (see Table 2 for tests in each domain). Raw scores were converted to demographically adjusted T-scores using the Brazilian seronegative participant group's performance as the standard. These T-scores were converted to deficit scores (range= 0 [T > 39] to 5 [T < 20]), which were then averaged to generate the Global Deficit Score (GDS; Carey et al., 2004). Detailed neurocognitive findings will be presented elsewhere.

Data analysis

To characterize the sample, demographic, neurocognitive, psychiatric (i.e., apathy and depression scores), and daily functioning factors were compared across HIV+ and seronegative groups using Student's *t*-tests. Next, within the HIV+ cohort, partial correlations were conducted between the apathy index score and self-reported everyday functioning complaints after adjusting for depression (i.e., non-apathy BDI-II score). Finally, multivariable analyses were conducted to evaluate apathy as a unique predictor of functional outcomes when considered alongside possible confounding variables (i.e., lifetime MDD diagnosis, current CD4 count, AIDS status, and global cognitive impairment). Of note, results were unchanged when the current MDD diagnosis was included in the models instead of lifetime MDD. For this study, alpha was set at .05 to determine significance for all analyses.

Results

Sample characteristics

As shown in Table 1, the HIV+ and HIV- groups were comparable with regard to demographic factors, whereas elevated neurobehavioral and everyday functioning difficulties were apparent among the HIV+ group relative to the HIV- participants. HIV disease characteristics are also presented in Table 1.

Frequency of apathy and depression

The majority of HIV-seronegative comparison subjects endorsed minimal apathy, with 1 of 29 participants (3%) obtaining an apathy z-score higher than 1 standard deviation above the mean of the whole sample. In contrast, 16 of 43 HIV+ individuals (37%) had an apathy z-score greater than 1 standard deviation. Student's *t*-test revealed that relative to comparison subjects, HIV+ persons endorsed higher levels of apathy spectrum symptoms ($t(70) = 5.34$, $p < .001$). Similarly, severity of depressive symptoms (as measured by the adjusted BDI-II score) and syndromic depression (as measured by the MINI-Plus) were more prominent in

the HIV+ group than in the control group. Compared to HIV-participants, HIV+ individuals endorsed a higher number of depressive symptoms on the BDI-II ($t(70) = 5.83, p < .001$). Furthermore, 72% of seropositive participants presented with a lifetime (i.e., current and past) history of MDD, compared to 14% of seronegative comparison subjects ($p < .001$, Fisher's Exact Test).

Within the HIV+ group, neither apathy nor non-apathy related depressed mood was associated with CD4 count, AIDS status, nor global cognitive impairment (all p 's $> .1$).

Relationship of apathy and depression among HIV-seropositive subjects

Pearson product-moment correlations were calculated for apathy and adjusted BDI-II scores. Apathy was moderately correlated with current depressive symptoms ($r = .6, p < .001$). Higher levels of apathy were reported by HIV+ individuals who had a lifetime history of MDD ($t(37) = 3.72, p < .001$). Together, these associations suggest that in this sample of Brazilian HIV+ individuals, apathy and depression are related, but not collinear, psychiatric constructs.

Relationship of apathy and depression with everyday functioning difficulties

Relative to seronegatives, HIV+ individuals reported significantly greater levels of impairment in activities of daily living ($p < .001$) as well as higher order cognitive functions ($p < .001$). As shown in Table 3, the highest rates of dependence were reported in the domains of work, grocery shopping, social activities, and housekeeping (cleaning). Small sample sizes precluded nominal regression analyses to examine whether apathy or depression was associated with declines in individuals domains of everyday functioning.

Next, within the HIV-infected group, we tested the association between neuropsychiatric symptoms and declines in ADLs. In our Brazilian cohort, adjusted BDI-II scores were significantly correlated with cognitive complaints ($r = .51, p < .001$), but not increased dependence in daily activities ($r = .25, p = .1$). Partial correlation analyses adjusting for depressive symptoms demonstrated that apathy scores were significantly associated with IADL difficulties ($r = .48, p < .001$) as well as cognitive complaints ($r = .49, p < .001$).

To evaluate the association between apathy and everyday functioning complaints in the context of various confounding variables, multiple regression analyses were conducted. Total number of PAOFI complaints and total IADL declines were the criterion variables in two separate multivariable models, while the predictors included apathy and possible confounding variables (i.e., global neurocognitive impairment, lifetime MDD diagnosis, AIDS status, and current CD4). As shown in Table 4, the model predicting IADL complaints was significant (adjusted $R^2 = .23, F(5,32) = 3.21, p = .02$) and revealed that apathy ($\beta = .49, p < .01$) was the only significant predictor of self-reported everyday functioning difficulties. Similarly, the model with the PAOFI score as the criterion was also significant (adjusted $R^2 = .41, F(5,29) = 5.72, p < .001$). Apathy ($\beta = .35, p = .04$) and global neurocognitive impairment ($\beta = .45, p < .01$) were the only significant, independent predictors of subjective cognitive complaints. These results are also presented in Table 5.

Discussion

From an “emic” perspective, cultural factors are expected to play an important role in the expression and manifestation of psychiatric disturbance, and therefore findings from studies conducted in North America may not generalize to diverse international settings (e.g., Weiss & Klienman, 1998). Although it has long been known that the prevalence of HIV-associated mental disorders diverges across cultures (e.g., Maj, Janssen, et al., 1994), critical aspects of the neurobehavioral sequelae of HIV infection in resource-limited settings still require

investigation. Accordingly, the present study was conducted to characterize the psychiatric symptoms associated with HIV infection in a Brazilian cohort, and to examine their impact on everyday functioning. Consistent with research in North American cohorts (e.g., Atkinson et al., 2008; Castellon et al., 1998), findings from this investigation revealed significantly higher symptoms of apathy and depression among persons living with HIV infection when compared with seronegative subjects. Extending the nascent literature on the consequences of HIV infection in Brazil, we observed a higher number of functional complaints in HIV+ participants, particularly in the domains of employment, grocery shopping, social activities, and housekeeping. Consistent with our hypothesis, we observed a significant role of apathy and depression in determining the magnitude of functional impairments. As such, the high frequency of apathy and depression in this cohort of Brazilian HIV+ individuals warrants attention to these neuropsychiatric symptoms for their role in poor everyday functioning outcomes. Not only do these functional difficulties pose public health concerns, but they also contribute to decreased quality of life for patients (Wilson & Cleary, 1995).

Consistent with our expectations, depression was associated with increased impairment in everyday cognitive and functional tasks. These findings are commensurate with similar North American studies of HIV cohorts that have demonstrated a positive relationship between severity of depressive symptoms and disability in domains of everyday functioning such as employment (e.g., Rabkin et al., 2004), laboratory-based functional assessments (e.g., Heaton et al., 2004), and self-reported complaints (e.g., Heaton et al., 2004; Cysique et al., 2007). The clear clinical relevance of this finding is bolstered by the high frequency of major depressive disorder observed in this sample, with 72% of the HIV+ individuals in our cohort meeting criteria for a lifetime MDD episode.

Adding to the growing body of literature for HIV-associated apathy, we observed that our HIV+ Brazilian cohort endorsed significantly more apathy spectrum symptoms compared to the seronegative group. Participants with higher levels of apathy reported experiencing greater declines in their functional status, both in terms of everyday functioning difficulties as well as higher order cognitive tasks. A similar positive relationship between apathy and everyday functioning difficulties as well as subjective cognitive complaints has been reported across patient groups of individuals with HIV infection or mild cognitive impairment (Barclay et al., 2007; Kamat et al., 2012; Robert et al., 2006).

Apathy appeared to be independently associated with daily functioning even after controlling for other important covariates. One such critical cofactor is depression, which overlaps with apathy but has been shown to be dissociable from it (e.g., Paul, Brickman et al., 2005; Paul, Flanigan et al., 2005; Tate et al., 2003). We observed that apathy ratings and depressive symptoms were significantly associated with each other, a finding that is consistent with data from North American cohorts (Castellon et al., 1998; Rabkin et al., 2000). To establish the independence of apathy from depression in the present study, we examined partial correlations of apathy and functional outcomes after adjusting for depressed mood. Despite the strong univariate effects of depressive symptoms on ADL difficulties and cognitive complaints, there was a unique association between apathy and functional status. In addition to MDD, functional impairment in HIV infection is also related to global neurocognitive impairment (Heaton et al., 1995; Hinkin et al., 2002; Martin et al., 2001), CD4 cell counts (e.g., Becker et al., 1997), and AIDS status (e.g., Basso & Bornstein, 2000; Heaton et al., 1995). Even after the inclusion of these critical factors, apathy accounted for unique variance in IADL dependence and cognitive complaints. These findings suggest that relative to other predictors, apathy captures unique aspects of everyday functioning difficulties, thereby supporting its clinical utility. It is likely that screening for

apathy in primary care settings may permit detection of HIV+ patients who are at risk for functional decline and may benefit from assistance in their daily activities.

The parent study, of which the current retrospective cross-sectional study is a part, aimed to demonstrate the feasibility of performing neurobehavioral evaluations in Curitiba, Brazil. The present study is not without limitations. Inferences regarding the true prevalence of depression and apathy in Brazilians with HIV are limited by sampling issues, such as sample size and generalizability of our participant group. The cultural validity of the instruments used requires further investigation before conclusive estimates of neurobehavioral impairment in Brazil are available. Apathy and functional difficulties were assessed using self-report measures, which may be susceptible to biased perception, as often noted with depressed mood. A clinical interview and items from the BDI-II were used to generate the apathy index, as a formal questionnaire of apathy was not employed. As such, the present results suggest that future studies should replicate these findings with formal apathy assessments.

To our knowledge, this is the first study to examine the relationship between HIV-associated psychiatric disturbance and functional impairment in a Brazilian cohort. Our findings support the closer examination of depression and apathy in this population. Particular attention should be paid to the elucidation of the biologic, social, and cultural mechanisms that are unique to Brazil and may be involved in the expression and maintenance of these disorders in the HIV+ population there. For example, in China, social stigma, limited access to welfare and healthcare, and misperception of HIV infection as a terminal infection are posited to contribute to high depression rates within HIV+ cohorts (e.g., Jin et al., 2006). Whether similar factors are relevant for Brazil's HIV+ population is as yet unknown, but deserve empirical attention from a psychiatric assessment and intervention standpoint. Our finding that apathy and depression are predictors of everyday function reinforces the importance of detecting and treating psychiatric symptoms in the comprehensive care of HIV infected patients.

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Table 1

Sample demographic and clinical characteristics

	HIV- (n=29)	HIV+ (n=43)
<i>Demographic variables</i>		
Age, years	44.4 (11.90)	42.4 (9.51)
Education, years	7.9 (4.80)	9.4 (4.35)
Sex (% men)	55	51
<i>Psychiatric characteristics</i>		
Lifetime (current and past) Major depressive disorder (%) ^{***}	14	72
Apathy z-score ^{***}	-1.1 (.54)	.88 (1.93)
BDI-II Total score ^{***}	3.72 (4.03)	16.70 (11.5)
BDI-II non-apathy score ^{***}	3.27 (3.43)	14.0 (9.70)
<i>Neuropsychological and Functional outcome variables</i>		
Global deficit score ^{***}	.25 (.26)	.86 (.74)
IADL complaints, total [*]	.10 (.33)	1.40 (2.24)
PAOFI score, total [*]	2.32 (5.89)	4.56 (5.04)
<i>HIV disease characteristics</i>		
HIV RNA log ₁₀ for ARV-naïve participants (median, IQR)	-	3.8 [3.1– 4.4]
Plasma viral load for ARV-naïve participants (% undetectable)	-	10%
HIV RNA log ₁₀ for participants on HAART (median, IQR)	-	1.7 [1.7– 2.0]
Plasma viral load for participants on HAART (% undetectable)	-	73%
Nadir CD4 count (median, IQR)	-	92 [41 – 266]
Current CD4 (median, IQR)	-	379 [204 – 507]
Proportion on HAART (%)	-	70
Proportion with AIDS (%)	-	83
Proportion with HIV-clade B	-	37
Proportion with HIV-clade C	-	40

^{**}p<.01^{*}p< .05^{***}p<.001

Table 2

Neuropsychological test battery administered to the HIV seronegative and seropositive groups

<i>Language</i>
Word Sound Fluency
Category Fluency (Animals, Action)
<i>Motor</i>
Grooved Pegboard (Dominant and Nondominant)
<i>Screening for Effort</i>
Hiscock Digit Memory Test
<i>Speed of Information Processing</i>
WAIS-III Digit Symbol
WAIS-III Symbol Search
Trail Making Test Part A
<i>Attention/Working Memory</i>
Paced Auditory Serial Addition Test
WMS-III Spatial Span
<i>Abstraction/Executive Functioning</i>
Wisconsin Card Sorting Test (64-item version)
Color Trails Test
Stroop Color Word Test
Category Test – computer version
<i>Learning and Delayed Recall (2 domains)</i>
Hopkins Verbal Learning Test, Revised
Brief Visuospatial Memory Test, Revised

Table 3

Frequency of self-reported declines from “best” to “now” in activities of daily living and number of complaints in domains of cognitive functioning in 43 individuals with HIV infection.

Activities of Daily Living	% declined
Work	23
Grocery shopping	23
Social Activities	21
Housekeeping (cleaning)	20
Home repairs	18
Cooking	18
Financial management	18
Comprehension of reading/ TV materials	13
Laundry	8
Shopping	8
Transportation	8
Medication management	5
Telephone use	5
Bathing	0
Dressing	0
Cognitive Complaints	Median [IQR]
Memory	3 [1, 6]
Language	1 [0, 5]
Motor	1 [0, 1]
Sensory	0 [0, 1]
General cognition	2 [0, 4]

Table 4

Clinical predictors of decline in activities of daily living in the HIV+ sample (N = 43)

Variable	Model	B	B 95% CI	Parameter (β)	p-value
Adjusted R^2	.23				
F	3.21				.02
Apathy z-score		.53	.15, .91	.50	<.01
LT-MDD		.21	-.59, 1.03	.09	.60
Global deficit score		.67	-.31, 1.65	.21	.17
AIDS status		.15	-1.14, 2.24	.05	.51
Current CD4 count		9.62e ⁻⁴	-.003, .001	-.13	.39

LT-MDD Lifetime Major Depressive Disorder diagnosis

Table 5

Clinical predictors of cognitive complaints in the HIV+ sample (N = 43)

Variable	Model	B	B 95% CI	Parameter (β)	p-value
Adjusted R^2	.41				
F	5.72				.016
Apathy z-score		1.39	.07, 2.71	.35	.04
LT-MDD		-1.13	-4.10, 1.85	-.13	.45
Global deficit score		5.59	2.10, 9.08	.45	<.01
AIDS status		-2.34	-6.28, 1.60	-.17	.23
Current CD4 count		3.16e ⁻⁴	-.07, .94	-.01	.94

LT-MDD Lifetime Major Depressive Disorder diagnosis