

Risk and Protective Factors for Retention in HIV Care

Drenna Waldrop-Valverde · Ying Guo ·
Raymond L. Ownby · Allan Rodriguez ·
Deborah L. Jones

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Abstract Retention in care for HIV is essential for effective disease management; however, factors that may confer risk or protection for adherence to regular HIV care are less well understood. This study tested whether HIV-associated cognitive impairment (CI) and low health literacy reduced adherence to routine HIV medical and phlebotomy visits and if social support and patient-provider relationship conferred a protective effect. Participants were 210 HIV-infected patients enrolled in outpatient care and followed for 28-weeks. Results showed that those attending >75 % of phlebotomy visits were more likely to be virally suppressed. Health literacy was unassociated with adherence to medical or phlebotomy visits. CI was not directly related to medical or phlebotomy visit adherence; however those with CI and greater use of social support were less likely to miss medical visits. Utilizing social support may be an effective means of managing visit adherence, especially among patients with CI.

Resumen La retención en el cuidado médico del VIH es esencial para la gestión eficaz de la enfermedad, sin embargo, los factores que pueden conferir riesgo o protección para la adhesión al cuidado médico regular del VIH son menos conocidos. Este estudio examinó si el deterioro cognitivo asociado al VIH y la poca competencia en la utilización de información sobre la salud redujeron la adhesión a cuidado médico de rutina y usos de servicios de laboratorios asociados al VIH, y si el apoyo social y la relación paciente-proveedor otorgaban un efecto de protección. Los participantes fueron 210 pacientes infectados con VIH inscritos en atención ambulatoria y seguidos durante 28 semanas. Los resultados mostraron que los participantes que atendieron >75 % de las citas de laboratorio eran más propensos a tener una carga viral del VIH indetectable.

Keywords Retention in care · Neurocognition · Health literacy · HAND · Visit adherence

D. Waldrop-Valverde (✉) · Y. Guo
Nell Hodgson Woodruff School of Nursing, Emory University,
1520 Clifton Road NE, Atlanta, GA 30342, USA
e-mail: drenna.waldrop-valverde@emory.edu

R. L. Ownby
Department of Psychiatry & Behavioral Medicine, School of
Osteopathic Medicine, Nova Southeastern University, Fort
Lauderdale, FL, USA

A. Rodriguez
Division of Infectious Diseases, Department of Medicine,
University of Miami, Miller School of Medicine, Miami, FL,
USA

D. L. Jones
Department of Psychiatry & Behavioral Sciences, University of
Miami, Miller School of Medicine, Miami, FL, USA

Introduction

Poor retention in HIV care is an important intermediate factor affecting health status in HIV infection. Regular attendance at routine HIV care visits is critical to reduce the risk for opportunistic infections, to attain and maintain viral suppression, and to improve rates of survival for those infected with HIV [1–6]. Missed visits may in part, also explain greater rates of virologic failure among African American HIV patients [7]. The identification of risk factors for poor retention in HIV care is thus essential to develop targeted interventions to improve utilization of routine clinical HIV care.

Studies to date have identified risk factors for poor visit adherence in HIV infection including minority race/ethnicity [3, 8, 9], younger age [8–10], female gender, lack of private insurance [3], lower income and identifying oneself as heterosexual [9]. HIV disease severity has also been associated with no-shows such that those with less advanced disease were more likely to miss appointments [8] as were those not taking antiretroviral medications (ART) [11]. Less is known however, about individual or relational characteristics that may better lend themselves to intervention.

Health literacy—the ability to obtain, process, and make use of health related information [12] has emerged as an influential predictor of healthcare utilization [13]. In particular, low health literacy predicted increased hospitalizations [14], reduced knowledge of the use of medical services such as mammography [15] and cervical cancer screenings [16]. In terms of routine, preventive care, some have found a positive relationship between health literacy and preventive health care use [17] while others have found no differences in health services use (based on cost differentials) by health literacy level [18]. These findings however, are limited due to the cross-sectional nature of the studies, the lack of validation of self-reported information through medical records, and failure to measure scheduled versus missed physician visits.

The role that health literacy may have in adherence to routine medical care remains unclear. Modifiers of the relationship between health literacy and utilization of care have not been fully examined and may account for the current inconsistency in findings. A comprehensive framework for understanding the effects of health literacy on utilization of routine HIV care may require a broader understanding of the individual patient within his or her contextual environment. Patients with low health literacy possess personal capabilities (e.g., neurocognitive functioning), communicate with healthcare providers, and make use of resources in their community for accessing care (e.g., social support), all of which affect how they utilize healthcare.

Neurocognitive impairment is a common feature of HIV disease. Although the incidence of the most severe form of HIV Associated Neurocognitive Disorders (HAND), HIV Associated Dementia (HAD), has decreased with the use of potent antiretroviral medications, recent estimates indicate that nearly 50 % of patients treated with ART for prolonged periods continue to experience neurocognitive impairment [19]. Cognitive deficits associated with HIV infection disrupt fronto-striatal circuits which are responsible for working memory, information processing speed and other higher order cognitive functions requiring organization, planning and sequencing [20]. The very cognitive skills disrupted in

HIV infection are the same needed for appointment making and keeping. Moreover, several studies [21, 22] illustrate the shared nature of cognitive and health literacy skills, further underscoring the need to evaluate health behaviors in relation to these common constructs. Particularly, in a disease such as HIV/AIDS with a substantial prevalence of cognitive impairment (CI), incorporating cognitive assessments to better understand health literacy becomes even more important.

As research and common sense suggests, patients are not mere “passive actors”, constrained by low health literacy in efforts to obtain care for their health but instead may utilize resources available to them to solve problems [23]. The National Adult Literacy Survey (NALS) found that on average, 9–12 % of adults received “lots of help from family members or friends” with printed information and filling out forms. Others have found similar results with up to 25 % of respondents in the lowest literacy levels reporting the same kind of assistance from others [24]. Social support, defined as resources provided by a network of individuals and social groups [25], has long been identified as a major form of coping behavior [26–28] and shows both direct and moderating effects on health status and health services utilization [29, 30]. Social support may impact health behaviors and utilization through such tangible means as having someone to urge and to take one to the doctor [31, 32], by setting normative behavior through group membership for management of one’s health [33, 34], by having another make medical decisions [35], and through the alleviation of distress (such as that caused by the shame of low literacy) so that one is more likely to seek medical help [36, 37]. In HIV, social support has been repeatedly associated with adherence to HIV medications [38–40], and also to medical appointments [8, 11]. Social support may have particular relevance for those with low health literacy by facilitating the acquisition and comprehension of medical information and aiding in negotiation of the health care system [23].

Interactions with the healthcare environment are critical in HIV since treatment is a lifelong endeavor making providers and other medical personnel integral elements of the patient’s social network. Positive patient-provider relationships and trust in one’s provider [41, 42] have been related to higher adherence to HIV medications and outpatient HIV clinic appointments. In qualitative interviews, provider behaviors characterized as “engaging, validating and partnering” were reported by patients to facilitate engagement and retention in HIV care whereas provider behaviors described as “paternalistic” reportedly served as barriers to care [43]. Flickinger et al. [44] reported greater HIV visit attendance for patients who conveyed their provider treated them with dignity and respect, listened to them, explained things in an

understandable manner, and knew them as a person. Retrospective analysis of the same study sample used herein showed that positive attitudes toward HIV care providers in combination with knowledge of one's personal CD4 count or HIV viral load value was related to a better CD4 cell count [45]. While no study has evaluated if positive patient-provider relationships may be especially important for HIV visit adherence among low-health literate patients, the extant literature suggests that patient-provider relationships can be an essential element in the care of HIV-infected patients.

Both satisfaction with HIV care providers and social support are linked to better appointment-keeping behavior in HIV and may confer protection against the potential effects of poor literacy and CI on missed visits. This study therefore prospectively tested the hypothesis that low health literacy and CI would predict lower levels of adherence to routine HIV care visits and further evaluated whether patient-provider relationship or social support conferred protection against the potential negative effects of low literacy and CI on visit adherence. Additional demographic and disease-related factors identified in the literature as relevant to visit adherence were also considered. Outcomes measures included the proportion of scheduled visits kept for routine medical and phlebotomy visits.

Methods

HIV-infected patients from the Special Immunology clinics affiliated with the University of Miami, Jackson Memorial Hospital and the Borinquen Community Health Center in South Florida were recruited for this study through flyers, referral from clinic personnel, and word of mouth. Inclusion criteria included attending at least one routine medical care appointment 28-weeks prior to baseline, not being enrolled in a pharmacological trial for antiretroviral treatment, ability to communicate fluently in English, no psychotic illness, and no reported episodes of loss of consciousness more than 30 minutes. After prescreening and provision of informed consent, eligibility criteria were verified via medical records. Data were collected from August 2009 to May 2011. Due to the likelihood of CI and low literacy among the study population, participants were required to complete a consent post-test prior to study enrollment. All study materials (consent form, questionnaires, etc.) except the measure of health literacy (described below) were read aloud to participants. Study visits consisted of a baseline visit and a second visit, 28-weeks post baseline. The study was approved by the University of Miami's Institutional Review Board (IRB).

Measures

Independent Variables

Health Literacy

The Short Test of Functional Health Literacy in Adults (S-TOFHLA) [46] measured health literacy and contains two prose passages and four numeracy items. The two passages measure reading comprehension and the four numeracy items assess ability to comprehend directions for taking medicines, monitor blood glucose, and keep clinic appointments. The S-TOFHLA is scored as percent correct for both the reading comprehension plus the numeracy portions. Cut-offs for inadequate, marginal and adequate health literacy are also provided. Cronbach's alpha for the reading comprehension subscale in the present sample was 0.943 and 0.531 for the numeracy subscale.

Patient-Provider Communication

The 19-item Attitudes toward HIV Healthcare Providers Scale [11] examines a patient's attitude toward his or her medical team, taking into consideration such factors as HIV-related stigma. Items are rated on a 6-point Likert scale (ranging from strongly agree to strongly disagree). The scale is divided into two factors: emotional support and professionalism. Scores are summed with higher scores indicating a more positive attitude. The 13-item Engagement with Healthcare Provider Scale [47], asked patients to rate the nature of their interactions with providers on a scale where 1 = always true and 4 = never true. The scale was developed for use with HIV positive patients and shows good reliability [47]. In this sample, the Cronbach's coefficient alpha for the Attitude toward Healthcare Providers scale and the Engagement with Healthcare Provider scale was 0.879 and 0.897, respectively.

Social Support

Social Support was measured using the Social Support Questionnaire [48]. This scale consists of eight items that assess four types of support one may have received since becoming HIV positive. For each category of support, the person states how (1) desirable you believe this type of help/support would be for you at this time in your life, (2) how available this type of help/support would be if you wanted it, (3) how often you have experienced this type of help/support since you were diagnosed HIV+, and how useful this type of help/support has been when you did receive it. Items are rated from 1 "not at all" to 5 "very much, constantly". For this study, the primary variable of

interest was how often participants experienced social support since learning of their HIV diagnosis. The scale showed good reliability in the current sample (Cronbach's $\alpha = 0.809$).

Neurocognitive Functioning

The domains of *executive functioning*, measured by the Trail Making Test [49], Rey Complex Figure Test [50] Category Test [51] and the Digit Span test [52]; *verbal memory*, measured by the California Verbal Learning Test [53]; *psychomotor speed*, measured by the Symbol Digit Modalities test [54] and the Grooved Pegboard Test [55]; and *reaction time*, measured by the California Computerized Assessment Package (CalCAP) [56] were assessed at baseline. Normative data for each test were used to calculate an overall composite score of neurocognitive functioning, the NPZ-8 score, which represents the average z-score for the eight tests above. The NPZ-8 score retains the same psychometric properties of a z-score (mean = 0; SD ± 1).

Variables Considered for Confounding/Covariance

Demographic characteristics such as age, gender, sexual orientation, and marital status, as well as variables that may impact motivation/ability to attend medical appointments including level of pain (measured with a visual analog scale) and time required to travel to appointments were assessed. In addition, whether the participant and his or her provider were of the same race/ethnicity was also assessed as a potential confounder and covariate.

Disease status has been associated with visit adherence [8, 11] and was measured via HIV viral load copies/mL obtained from electronic medical records (EMR) at baseline and at 28-weeks. The EMR value reported within the closest time from baseline and 28-week follow-up was selected, not to exceed 2 months (i.e., the lab values selected were ± 2 months from the baseline and follow-up visit). The two-month window was chosen to provide a window of opportunity to reduce missing data since missed phlebotomy results were anticipated.

Since depression and substance use are consistently associated with medication adherence in HIV, these variables were also measured for their association with visit adherence. Depressive symptoms were assessed using the Center for Epidemiological Studies—Depression 10 (CES-D10) [57] scale, derived from the CES-D20 [58]. Item responses are rated using a Likert scale ranging from 0 “rarely or none of the time” to 3 “all of the time”. Scores range from 0 to 30, a score of ≥ 10 is indicative of significant depressive symptoms. The CES-D has very high internal consistency, adequate test-retest reliability ($r = 0.71$) and well established validity across a wide

variety of demographic characteristics in the general population [57]. In this sample, internal consistency reliability was adequate (Cronbach's $\alpha = 0.709$). Alcohol and drug use was assessed using the Addiction Severity Index (ASI) [59]. The ASI assessed the number of days of alcohol and drug use for all classes of drugs in the past 30 days. Use of any alcohol or drugs over the 28-week study period was also assessed and coded “yes/no”.

Dependent Variables

Attendance at Scheduled HIV Care Outpatient Visits

Over the 28-week data collection period, information on the number of scheduled clinic visits and the status of each visit were gathered from patient medical records. Visits for routine HIV medical care were calculated separately from visits for phlebotomy work. We chose to evaluate phlebotomy visits independently since results from phlebotomy visits provide valuable information to medical providers on the patient's disease status. In this study setting, phlebotomy visits refer to visits not completed at the time of the doctor's visit. Most patients in the recruiting clinics have lab visits scheduled 2–4 weeks prior to their next scheduled routine medical visit. Phlebotomy visits are infrequently scheduled on the same day as the medical visit (and do not receive a separate appointment code in the medical records). Scheduled appointments that were coded as a “no-show” were counted as missed. Appointments that were cancelled and rescheduled were not counted as missed. The number of visits kept divided by the number of visits scheduled was calculated separately for medical visits (scheduled visits with physician or advanced practice nurse) and phlebotomy visits to derive a measure of the proportion of scheduled visits kept, or visit [60] adherence.

Statistical Analysis

Because the distributions of medical and phlebotomy visit adherence were left-skewed, cubic transformations were performed prior to the analysis. Multiple linear regression (MLR) models were used to evaluate the effect of low health literacy and neurocognitive functioning on medical and phlebotomy visit adherence and to test whether patient-provider relationship or social support may confer protection against the potential negative effects of poor literacy and cognition on visit adherence. MLR models also included significant confounding variables as covariates in order to test the effects of the independent variables (health literacy and neurocognitive functioning) on visit adherence, controlling for other contributing factors of visit adherence. A general model selection procedure [61] was

used to identify significant variables for the MLR models. After testing the main effects of the independent variables on visit adherence, two-way interaction effects between the independent variables (health literacy and neurocognitive functioning) and potential moderators of interest (patient-provider relationship and social support) were examined.

The possible effects of missing observations for viral load were evaluated by sensitivity analysis that compared the results of the model using all available data and using data that included imputed values for missing viral loads (derived using next-and-last imputation methods with viral load data gathered from participants' longitudinal medical records) [62]. Imputed values were used in subsequent analyses.

Sensitivity analyses were also performed to guard against undue influence by extreme observations in measurements such as NPZ-8 score. Outliers identified as observations at least three standard deviations from the mean level were replaced by the mean level \pm 3 standard deviations. We then compared the results based on the original data with the results after the replacement of outliers to examine their effects.

Statistical analysis was performed using SAS (version 9.2; SAS Institute, Cary, NC) and SPSS 20.

Results

A total of 210 participants were enrolled in the study. EMR data were available for 206 participants. Of these 206, HIV viral load reports were available for 192 cases. Sensitivity analyses showed similar results between analyses using all available data and with imputations of missing viral loads. Demographic and clinical characteristics of the study participants are presented in Table 1. As can be seen in Table 1, most participants were African American and reported being heterosexual. Just over half of the sample were women (53 %) and 57 % of the sample had never been married or were single. The age of the participants ranged between 24 years and 70 years with a mean (SD) of 47.8 (7.4). Participants had been diagnosed with HIV an average of 12.7 years and 95 % were prescribed ART at the time of enrollment. More than half (53 %) of the participants had undetectable viral load at baseline. Few patient visits during the 28-week period were classified as "new"; only 2 patients were scheduled for "new patient" medical visits. The median time in care for patients was estimated at 10.5 years although this estimate does not account for significant gaps in care. Eighty percent of the participants had adequate literacy according to S-TOFHLA. The mean (SD) of NPZ-8 z-score was -1.92 (1.42).

Median adherence to medical visits and phlebotomy visits was 83 and 82 %, respectively. As there is as yet no

Table 1 Demographic and clinical characteristics for study participants ($N = 210$)

	<i>N</i>	%
Gender		
Male	97	46.19
Female	111	52.86
Transgender	2	0.95
Marital status		
Never married/single	119	56.67
Married	19	9.05
Divorced/separated	61	29.05
Widow/widower	10	4.76
Race		
White/non-Hispanic	9	4.29
Hispanic	22	10.48
Black or African American	174	82.86
American Indian or Alaska Native	2	0.95
Other	3	1.43
Sexual orientation		
Gay	20	9.57
Heterosexual	172	82.3
Bisexual	16	7.66
Other	1	0.48
Currently taking antiretroviral therapy		
No	11	5.31
Yes	196	94.69
Baseline viral load		
Undetectable	101	52.60
Detectable	91	47.40
S-TOFHLA		
Inadequate health literacy	30	14.29
Marginal health literacy	13	6.19
Adequate health literacy	167	79.52
	Mean	SD
Age (years)	47.08	7.39
Engagement with Healthcare Provider Scale	17.41	5.92
Center for Epidemiologic Studies Short Depression Scale (CESD-10)	10.76	6.65
Short Test of Functional Health Literacy (STOFHLA)—numeracy total	3.02	1.07
Short Test of Functional Health Literacy (STOFHLA)—reading total	29.17	7.69
NPZ-8 (cognitive functioning)	-1.92	1.42
Experienced social support	30.18	7.73
Attitude toward healthcare provider	105.99	12.91
Pain	28.94	31.54
Time (minutes) to travel to HIV clinic	49.12	40.52

standard for a clinically meaningful amount of visit adherence, we present adherence data in three groups: 0–50, 51–75, 76–100 % in Table 2. In general, adherence

Table 2 Number of participants in each adherence group attending scheduled medical and phlebotomy visits

Phlebotomy visit adherence	Medical visit adherence			Total
	0–50 %	51–75 %	76–100 %	
0–50 %	17	18	18	53
51–75 %	2	8	35	45
76–100 %	13	27	68	108
Total	32	53	121	206

to medical visits was superior to that of phlebotomy visits. Men and women attended both medical and phlebotomy visits at similar rates ($p > 0.05$). Significant differences in age among the three groups of medical visit adherence were noted ($p = 0.04$); the mean ages were 44.7, 46.0 and 48.0 for the 0–50, 51–75, 76–100 % groups respectively indicating subjects with higher medical visit adherence were older than those with lower adherence. No differences in phlebotomy visit adherence by age were found ($p > 0.05$). When considering perfect visit adherence, 49 % of participants attended all phlebotomy visits whereas 32 % attended all medical visits. Men were significantly more likely than women to attend all of their medical visits (61 % men, 39 % women; $X^2(1) = 6.70$, $p = 0.01$).

To characterize the sample and to assess whether medical and phlebotomy visit adherence may relate to HIV medical outcomes, we analyzed the relationship of visit adherence to HIV viral loads and to changes in viral suppression over the 28-week study period. This association was tested with the Breslow–Day test which accounts for the subject's baseline viral load status. For phlebotomy visits, odds of a detectable viral load were quite similar for those attending 0–50 and 51–75 % of appointments; we therefore collapsed these groups into one binary classification (attended 0–75 % = '0'; attended 76–100 % = '1'). Table 3 shows a significant difference in the change in viral suppression between patients who had above 75 % adherence for phlebotomy visits and those with less than 75 % ($X^2(1) = 3.79$, $p = 0.05$). Viral suppression was achieved for 55 % of participants over the 28-week study period for persons attending ≥ 75 % of phlebotomy visits whereas only 38 % of subjects attending < 75 % of phlebotomy visits achieved viral suppression (i.e., moved from a detectable HIV viral load to undetectable HIV viral load over 28-weeks). Overall, a greater proportion of participants who attended more than 75 % of phlebotomy visits either maintained an undetectable HIV viral load or moved from a detectable to an undetectable viral load over the 28-week study. Similarly, when considering phlebotomy visits adherence as a continuous variable, we also found a significant association between phlebotomy visit adherence

Table 3 Association between phlebotomy visit adherence and change in HIV viral suppression over the 28-week study period

Baseline VL	Change in VL status at 28 weeks		Total
	No	Yes	
Phlebotomy visit adherence ≤ 75 % ^a			
Undetectable	28 (70 %)	12 (30 %)	40
Detectable	32 (61.54 %)	20 (38.46 %)	50
Phlebotomy visit adherence > 75 % ^a			
Undetectable	49 (80.33 %)	12 (19.67 %)	61
Detectable	17 (44.74 %)	21 (55.26 %)	38

^a There was a significant difference in change in VL suppression between phlebotomy visit adherence > 75 % and less than 75 % ($X^2(1) = 3.79$, $p = 0.05$)

Table 4 Final multivariate model for medical visit adherence

Variable	Parameter estimates ^a	t-Statistic	p value
Time in care	−15.14	−1.64	0.102
Number of scheduled visits	−20.84	−2.37	0.019
Age	20.34	2.52	0.013
Marital status			0.0002
Never married/single	39.31	1.17	0.242
Married	−66.28	−3.45	<0.001
Divorced/widow/living with partner	0.00	−	−
Time to travel to clinic	12.51	3.50	<0.001
Social support experienced	6.15	0.04	0.970
Cognitive functioning (NPZ-8)	55.84	2.04	0.043
Social support experienced xNPZ_8	−17.74	−2.02	0.045

^a Parameter estimates were transformed back to the original percentage scale (100 %)

and the change in viral suppression. No association with medical visit adherence and change in viral suppression was found.

Results for medical visit adherence show that neither health literacy nor neurocognitive functioning had significant direct effects (see Table 4). A significant interaction between cognitive functioning (NPZ-8 score) and experience of social support ($p = 0.045$) was found. Greater social support was associated with higher medical visit adherence ($p = 0.002$) among those with CI (defined as 2SDs below the normative mean). Figure 1 illustrates the association between medical visit adherence and social support by CI. The final MLR model of medical visit adherence also showed that the percentage of medical visit adherence was significantly lower among patients who were younger ($p = 0.011$), took less time to travel to the

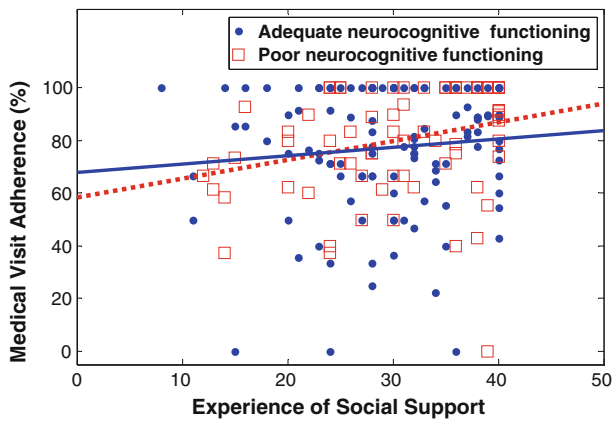


Fig. 1 Association between social support and medical visit adherence for patients with poor neurocognitive functioning and patients with adequate neurocognitive functioning. (The red square/dotted line represents patients with poor neurocognitive functioning defined as an NPZ-8 score 2 standard deviations below the mean. The blue filled circles/solid line represents patients with adequate neurocognitive functioning defined as an NPZ-8 score ≥ 2 standard deviations above the mean) (Color figure online)

HIV clinic ($p = 0.001$), and were married ($p = 0.001$). The final MLR model also adjusted for the estimated time in care and the number of scheduled visits.

Results show that neither health literacy nor neurocognitive functioning had significant effects on phlebotomy visit adherence and neither patient-provider relationship nor social support was a moderator of the effects of health literacy and neurocognitive functioning on phlebotomy visit adherence.

Discussion

Retention in care for HIV is an essential component for effective management of this long-term disease. Although the importance of retention is well recognized, factors that may confer risk for or protection from non-adherence to regular HIV care are less well understood. For this reason, the present study tested the effects of health literacy, neurocognitive functioning, social support and patient-provider relationship on adherence to HIV medical care visits. Greater medical visit adherence was associated with older age and traveling a shorter distance to the clinic. Greater use of social support was protective for those with poorer neurocognitive functioning, such that those who were cognitively impaired but used more social support had higher medical visit adherence; the less one used social support, the more negative the impact of neurocognitive functioning on medical visit adherence. Since data gathered from phlebotomy visits provides essential clinical information for providers, we also evaluated predictors of phlebotomy visit adherence. Neither health literacy nor

neurocognitive functioning was related to adherence to phlebotomy visits. This is the first study to our knowledge to evaluate adherence to phlebotomy and HIV medical care and to associate these with neurocognitive functioning and health literacy. Although neurocognitive impairment has long been linked to reduced medication adherence among HIV patients [63–69], no studies to date have identified the role CI may have in visit adherence. Though there was not a direct relationship between cognitive functioning and medical visit adherence, those with CI and greater use of social supports were less likely to miss appointments. This finding suggests that developing and using social support is an effective means of managing visit adherence and may be especially valuable for patients with cognitive dysfunction. With the recently reported high rates of HIV associated CI of about 50 % [19], approaches to increase retention among this group are essential and social support represents an important strategy.

Our findings support those of others who also found that older HIV-infected patients attend more routine medical visits [9] and that social support improved retention [8, 11, 38]. Being closer to the clinic was also associated with better appointment attendance indicating that convenience may also play a role in engagement in care.

The results of the study indicate the effect of health literacy, cognitive dysfunction, and patient-provider communication on retention in HIV care are not uniform across all patients but rather may be moderated by patients' clinical characteristics and social support resources. The findings from the present study should be interpreted with consideration of its limitations. Participants were recruited from a narrowly-defined geographical region in South Florida and therefore are not representative of the larger US population of HIV/AIDS patients who access care at publicly funded health facilities. This study focused on individual-level predictors of visit adherence and did not assess potentially important clinic and service-related characteristics that may also impact turnout at scheduled appointments. Recently, Traeger et al. [70] reported that greater self-efficacy for attending medical visits among a sample of HIV infected MSM was significantly associated with better visit adherence. The present study did not assess self-efficacy and so the additional contribution that appointment-keeping self-efficacy may have provided to the study findings cannot be determined. Importantly, this study did not include individuals who had never accessed HIV care since participants were recruited directly from HIV clinics. Findings therefore should not be applied to those persons never-in-care or who have fallen out of care. We also used a global measure of neurocognitive functioning. Future studies that evaluate separate domains of functioning (e.g., working memory, executive functioning, prospective memory) may provide more refined results.

The cognitive scores were quite low for some participants and may also reflect an impoverished background and/or overall low IQ; the impact of these factors on retention in HIV care requires further exploration. The follow-up time of 28-weeks (7 months) was less than optimal but was limited by the grant mechanism under which the study was conducted. Future studies that include longer follow-up and additional measures of retention such as visit constancy and gaps in care would also be of benefit.

Despite these limitations, the results of the present study of a group of mostly African American, HIV-infected men and women have important implications. Findings demonstrate differential predictors of medical visit adherence, and that better phlebotomy visit adherence was associated with undetectable viral load. An intervention to enhance social support among those with poor cognitive functioning may be especially useful to improve visit adherence. Future studies could build upon these findings through developing social support based interventions to improve engagement and retention in HIV care among those who may be at particular risk for visit non-adherence.

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