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ORIGINAL ARTICLE

Differential Predictors of Medication Adherence in HIV: Findings from a Sample of African American and Caucasian HIV-Positive Drug-Using Adults

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Abstract

Modest or even occasional nonadherence to combined antiretroviral therapy (cART) can result in adverse clinical outcomes. African Americans demonstrate lower rates of adherence than Caucasians or Latinos. Identifying factors that influence medication adherence among African Americans is a critical step toward reducing HIV/AIDS disease progression and mortality. In a sample of 181 African American ($n=144$) and Caucasian ($n=37$) HIV-positive drug-using individuals [age (M=42.31; SD=6.6) education (M=13.41; SD=2.1)], we examined the influence of baseline drug use, literacy, neurocognition, depression, treatment-specific social support, and patient satisfaction with health care provider on medication adherence averaged over the course of 6 months (study dates 2002–2006). Our findings suggest differential baseline predictors of medication adherence for African Americans and Caucasians, such that patient satisfaction with provider was the strongest predictor of follow-up medication adherence for African Americans whereas for Caucasians depressive symptoms and treatment-specific social support were predictive of medication adherence (after controlling for duration of drug use).

Introduction

Advances in HIV treatment have remarkably decreased morbidity and mortality rates among HIV-infected individuals. However, the effectiveness of combined antiretroviral therapy (cART)—in particular protease inhibitor (PI)-based regimens—is contingent upon near-perfect rates of medication adherence (i.e., 90–95%).[1] ARTs such as non-nucleoside reverse transcriptase inhibitors (NNRTIs) have demonstrated effectiveness at even modest levels of adherence (approximately 75%), however, resistance mutations are more likely to occur using NNRTIs versus PI-based therapies, except among patients who maintain high levels of adherence.[2] Therefore, suboptimal adherence can lead to a host of clinically significant health-related setbacks. Hence, identifying key factors related to medication adherence among HIV-positive patients is critical to ensuring optimal patient outcomes. The literature on medication adherence has identified several variables, including demographic characteristics (e.g., ethnicity, education, socioeconomic status [SES]), substance abuse, cognitive and psychiatric functioning, and psychosocial factors (e.g., treatment-specific social support, satisfaction with health care provider)[3–8] that influence rates of adherence among a wide range of medical conditions, including HIV.

Medication Adherence Among African Americans

Among patients with a variety of medical illnesses (e.g., heart failure and diabetes), African Americans have been found to demonstrate lower medication adherence rates than Caucasians or Latinos, and are more likely to discontinue treatment shortly after initiation.[9] This is particularly concerning given that African Americans are disproportionally represented among people with HIV in the United States, with 10 times the infection rate and higher morbidity and mortality rates than Caucasians.[10] While medication adherence failures

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among African Americans may be partially explained by racial disparities in HIV treatment, access to health care, health literacy, and financial burdens, there is reason to suspect that the relationship between ethnicity and medication adherence may involve other factors not entirely influenced by SES (e.g., satisfaction with health care provider, depression).

A recent study found that despite similar reports of SES levels and health care access, lower medication adherence rates among African Americans persists, and suggested that research efforts be directed toward identifying other types of psychosocial factors that can contribute to lower adherence rates among African Americans.[11] For the purposes of the current investigation, our review is focused on a subset of factors that have been consistently linked to medication adherence in HIV.

Drug Abuse

The relationship between substance use and adherence is equivocal. A recent meta-analysis of 88 studies demonstrated that individuals who use substances manage to maintain adequate levels of adherence.[12] A study of injection drug users with HIV/AIDS identified both structural (stable housing, medical coverage) and individual (patient–provider engagement, more HIV primary care visits, not currently using drugs, and a positive attitude about ART benefits) predictors of medication adherence at a 6-month follow-up.[13] In a qualitative study of 80 seropositive African Americans on ART, variations in rationales for explaining adherence were identified, suggesting heterogeneity within the African American culture regarding reasons for adherence.[14]

Drug abuse, in particular stimulant abuse, has been linked to nonadherence in HIV-positive individuals.[15] In a longitudinal study of predominately African American HIV-positive individuals, drug users were over four times more likely to show suboptimal levels of adherence compared to non-drug users.[15] Substance use has been demonstrated to impact adherence in a number of ways, including the development of neurocognitive deficits,[16] psychosocial impairments,[17] and exacerbation of psychiatric dysfunctions.[18] In studies of HIV-positive methamphetamine users, long periods of drug use made it difficult to maintain the rigorous demands of HIV medication adherence regimens, resulting in a discontinuation of the medication during those periods.[17] These findings suggest that drug abuse duration, rather than mere drug use, may exert a stronger influence on medication adherence. The discordant findings in the literature may be explained, at least in part, by differences in the measurement of antiretroviral adherence behavior across studies. Self-report of medication adherence level was the index used in most studies failing to find a relationship between drug use and adherence behavior.[19] Conversely, computerized assessment of medication adherence (e.g., medication event monitoring system [MEMS]) was used in those investigations reporting significant relationships.[15,20]

Cognitive and Psychiatric Factors

Neurocognition

A high proportion of patients with HIV/AIDS will experience some form of cognitive decline during the course of their illness.[21] Cognitive deficits have been consistently documented in domains of attention, learning and memory, and executive and motor functions.[22] The negative effects of impaired cognition have been documented in studies focused on functional outcomes such as medication adherence and medication management.[15,22,23] Albert and colleagues[24] found that HIV-positive cognitively impaired adults performed more poorly than cognitively unimpaired adults on a performance-based task of medication management. Similarly, Hinkin and colleagues[25] found that cognitively compromised participants were twice as likely to fail to adequately adhere to their medication regimen (assessed by electronic confirmation of medication container use) than cognitively normal participants, and that neuropsychological deficits in executive functioning and verbal memory were significantly associated with poor adherence. These authors also found that cognitive compromise interacted with regimen complexity to increase the likelihood of suboptimal adherence. Consequently, cognitively impaired participants who were on complex dosing regimens were much more likely to be poor adherers.

More recently, Ettenhofer and colleagues[26] applied path analyses to better understand the direction of the relationship between neurocognition and medication adherence in HIV. They found that the relation between cognition and medication adherence in HIV was reciprocal, with executive functioning and learning and memory predicting medication adherence and medication adherence predicting improvements in processing speed, attention, executive functioning, and motor functioning. Together, these studies suggest that intact cognition, particularly domains of executive functioning and learning and memory, is important for medication management and adherence and vice versa.

Literacy

Literacy is a key indicator of an individual's ability to understand the HIV medication regimen.[27] In particular, reading skills have been identified as a key component to understanding prescription instructions. Low-education (i.e., having less than 12 years of education) and low levels of literacy have been linked to skipping medications and trouble accessing appropriate health care.[28,29] Medication management depends on the ability to read, write and comprehend treatment instructions. This is likely to be difficult for individuals with low literacy skills, and healthcare providers may not adequately explain treatment options.[28] A study that assessed self-reported adherence to ART medications found that health literacy mediated the effects of race on medication adherence. In particular, African American patients were more likely to be classified as nonadherent. Once literacy was factored into the model, racial contributions to adherence were no longer significant.[30]

Depression

HIV-positive patients are twice as likely to be diagnosed with a major depression compared to healthy individuals.[31] Studies of HIV patients suggest that 20–37% of infected individuals meet diagnostic criteria for depression.[32–34] Depression has long been determined to have deleterious effects on medication adherence, resulting in lower adherence and earlier discontinuation of cART treatment.[35] Interestingly, however, findings across studies vary considerably, with

some reporting that depressed individuals are more than 5 times less likely to adequately adhere to treatment[36,37] while other studies documenting no relationships.[38,39] Methodological inconsistencies between studies may explain some of this variability (i.e., objective versus subjective measures of adherence, length of adherence measurement, different measures of depression).

Psychosocial Predictors of Medication Adherence

Social support

Social support has been consistently linked to medication adherence in HIV. It has been suggested that assessing social support that is specific to the particular illness or treatment regimen under study rather than examining general measures of support might result in stronger associations between social support and adherence.[40] In a sample of predominately African American drug-using HIV-positive men, adherence was associated with treatment-related social support and reciprocity of support.[41] Among alcohol and other drug Caucasian ($n=105$) and African American ($n=67$) samples, treatment-specific rather than general social support moderated the effects of medication adherence.[42] Health care providers working with HIV-positive individuals can benefit from understanding an individuals treatment-specific social support networks, and how these networks can facilitate the maintenance of HIV treatment.

Patient–provider relationship

Studies have demonstrated that African American patients in particular express lower levels of trust in health care providers than Caucasian patients, which in turn results in fewer HIV-related health care visits and lower medication adherence rates.[43,44] It is thought that increasing trust in the health care provider may help improve medication adherence for African Americans.[44]

The patient–provider relationship has also been shown to be a significant predictor of medication adherence in studies examining other diseases, such as cancer and multiple sclerosis. Patients who are dissatisfied with the their medical care are less likely than other patients to comply to treatment recommendations.[45] Past research has identified that the perception of interpersonal care (i.e., the patient–provider relationship) is a significant factor in regard to intentions to adhere to recommended treatments in patients with diabetes and hypertension.[46,47] Health beliefs have long been documented to affect medication adherence[48] and the patient–provider relationship has been directly linked to these health beliefs[49] in HIV. In one study, 22% of African Americans believed that new HIV medications resulted from government conspiracies and 17% believed that the medications were poisonous.[50] Beliefs or suspicions about treatment have been associated with adherence to antiretroviral therapy.

While there have been previous studies that have examined various psychosocial factors (i.e., social support) in the general medical population, there is limited research investigating whether predictors of medication differ as a function of ethnic minority status. Many existing studies on adherence have been conducted on predominately Caucasian samples, and even fewer have compared neuropsychological and psychosocial factors in predicting adherence. Considering that African Americans account for more AIDS diagnoses and HIV-related deaths than any other racial/ethnic group in the United States, it is paramount that research efforts be directed toward identifying factors specific to this population related to medication adherence. Understanding the degree to which various baseline predictors influence downstream medication adherence is an important first step to providing culturally-tailored treatment interventions for increasing adherence rates and thereby reducing racial disparities in HIV-related health outcomes.

Methods

Participants

Participants consisted of 181 HIV-positive African American ($n=144$) and Caucasian ($n=37$) individuals drawn from a larger study examining neuropsychological and psychosocial predictors of medication adherence in a drug abusing HIV-positive cohort (study dates 2002–2006). Participants were recruited through advertisements posted at university-affiliated infectious disease clinics, as well as through community based HIV/AIDS organizations in the Los Angeles area. Participants were already prescribed a regimen of cART prior to study entry. Exclusionary criteria included current diagnosis of psychotic spectrum disorder, seizure disorder, stroke, closed-head injury with loss of consciousness in excess of 30 minutes, or any other neurologic disease, central nervous system (CNS) opportunistic infection, or neoplasm. See Table 1 for participant demographics.

Participants were expected to be seen a total of seven times over a 6-month period (baseline and six monthly follow-up visits).

Measures

Medication Adherence. Medication adherence was assessed over the course of the study using medication event monitoring system (MEMS) caps, which use a pressure-activated microprocessor in the medication bottle cap that automatically records the date, time, and duration of bottle opening. Data were retrieved from the cap using a specially designed communication module connected to a personal computer. Participants were instructed to take their MEMS-monitored medication as prescribed by their physician, not to open the bottles for any reason other than removing a dose, and to refill the bottle at a time when they ordinarily took a dose. They were also cautioned against pocket dosing (i.e., removing more than one dose at a time for later use), Data was downloaded from the MEMS cap and reviewed at each of the six monthly return visits. Adherence rates were calculated by dividing actual dose events by prescribed doses during the 1-month period between visits. At each visit, participants were asked if they pocket dosed any of their medications. If MEMS cap openings exceeded the prescribed dosages, then the excess openings were subtracted from the total. The overall adherence rate was 66% across all participants for the 6-month study.

Participants underwent urine toxicology screens at each visit. Seventy-eight percent (78%) of African Americans and 52% of Caucasians tested positive for illicit drugs at some point during the six-month study. Given this high frequency, drug abuse duration was included in the regression model.

TABLE 1. DEMOGRAPHIC, NEUROCOGNITIVE, AND TREATMENT COMPARISONS BETWEEN RACIAL GROUPS

Variables	*African Americans* (n=144)	*Caucasians* (n=37)
Age	41.8 (6.7)	42.9 (7.5)
Education[a]	12.0 (1.7)	14.0 (1.7)
Am-NART (premorbid IQ estimate)[a]	102.5 (8.8)	110.9 (9.0)
Gender (percent male)	80%	86%
Recent CD4 count	459.3 (321.6)	489.03 (302.6)
Nadir CD4 count	211.91 (193.84)	193.38 (175.12)
Length of HIV infection	12.01 (2.3)	13.21 (1.2)
% Undetectable viral load	57%	62%
Neurocognitive performance		
Learning and memory T-score	40.26 (8.9)	45.80 (2.6)
Executive functioning T-score	41.18 (7.2)	45.82 (6.2)
Regimen complexity		
Number of medications and type		
1	**5%**	**3%**
% med 1 type	*100% (NRTI)*	*100% (NRTI)*
2	**12%**	**0**
% med 1 of 2 type	*76.7% (NRTI)*	*N/A*
	10.0% (NNRTI)	*N/A*
	13.3% (PI-based)	*N/A*
% med 2 of 2 type	*18.2% (NRTI)*	*N/A*
	45.5% (NNRTI)	*N/A*
	4.2% (NtRTI)	*N/A*
	31.3% (PI-based)	N/A
3	**46%**	**57%**
% med 1 of 3 type	*60.0% (NRTI)*	*33.3% (NRTI)*
	8.6% (NNRTI)	*22.2% (NNRTI)*
	2.9% (NtRTI)	*0 (NtRTI)*
	28.6 (PI-based)	*44.4% (PI-based)*
% med 2 of 3 type	*42.9% (NRTI)*	*55.6% (NRTI)*
	20% (NNRTI)	*11.1% (NNTRI)*
	11.4% (NtRTI)	*11.1% (NtRTI)*
	11.4 (PI-Based)	*0 (PI-based)*
	14.3% (No response)	*22.2% (No response)*
% med 3 of 3 type	*28.6% (NRTI)*	*33.3% (NRTI)*
	8.6% (NNRTI)	*11.1% (NNRTI)*
	8.6% (NtRTI)	*22.2% (NtRTI)*
	11.3% (PI-based)	*0*
	42.9% (no response)	33.3% (no response)
4	**37%**	**40%**
% med 1 of 4 type	*48.0% (NRTI)*	*28.6% (NRTI)*
	16.0% (NNRTI)	*28.6% (NNRTI)*
	8.0% (NtRTI)	*14.3% (NtRTI)*
	28.0% (PI-based)	*28.6% (PI-Based)*
% med 2 of 4 type	*32.0% (NRTI)*	*57.1% (NRTI)*
	16.0% (NNRTI)	*28.6% (NNRTI)*
	8.0% (NtRTI)	*0 (NtRTI)*
	32.0% (PI-Based)	*0 (PI-Based)*
	40.0% (no response)	*14.3% (no response)*
% med 3 of 4 type	*36.0% (NRTI)*	*28.6% (NRTI)*
	8.0% (NNRTI)	*71.4% (no response)*
	12.0% (PI-based)	
	44% (no response)	
% med 4 of 4 type	*8.0% (NRTI)*	*10% (NRTI)*
	4.0% (NNRTI)	*90% (no response)*
	8.0% (NtRTI)	
	80% (no response)	
Times per day		
1	27%	27%
2	72%	72%
3	1%	0

(continued)

TABLE 1. (CONTINUED)

Variables	*African Americans (n=144)*	*Caucasians (n=37)*
Required # of pills each time		
1	66%	51%
2	10%	11%
3	13%	20%
4 or more	8%	16%
SES-related variables		
Household income		
5000 or less	16%	18%
5001 to 10,000	41%	46%
10,001 to 15,000	26%	9%
15,001 to 20,000	7%	13%
20,001 to 30,000	3%	6%
30,001 to 40,000	3%	3%
40,000 or more	3%	3%
Number of dependents supported		
1	75%	87%
2	14%	12%
3	4%	0
4 or more	6%	0
Employment status		
Part-time	8%	3%
Full-time	6%	6%
Retired	2%	6%
Disability	58%	62%
Welfare	16%	12%
Other	5%	3%
Health care facility type		
Private doctor	2%	0
Community clinic	64%	45%
Community hospital	33%	55%

[a]Statistically significant group differences at $p < 0.05$

NRTI, nucleoside reverse transcriptase inhibitor; PI, protease inhibitor; NNRTI, non-nucleoside reverse transcriptase inhibitor; SES, socioeconomic status.

Neurocognition. Participants completed a comprehensive battery of neuropsychological (NP) tests at baseline that assessed attention and working memory (WAIS-III digit span, WAIS-III letter-number sequencing, PASAT), speed of information processing (WAIS-III digit symbol, WAIS-III symbol search, Trails A), learning and memory (CVLT, BVMT learning and delay trials), verbal fluency (Controlled Oral Word Association Test), executive functioning (Trails B, Stroop interference, WCST), and motor speed (Grooved Pegboard). Test scores were converted to demographically-corrected T scores using published normative data and grouped by neurocognitive domain.[21] Domain T scores were obtained by calculating the mean T score for all tests comprising a given domain. A global T score was calculated by summing individual test T scores and dividing by the number of tests administered. For the current study, we focused on Executive Functioning and Learning and Memory performance since these domains have been consistently associated with medication adherence.

Reading ability/literacy. Reading ability, a proxy for literacy was based upon performance on the American National Adult Reading Test (AMNART[51]). The AMNART consists of 50 irregularly pronounced English words. The participant is required to read each word and the number of correct words is recorded. The AMNART is a widely used measure of premorbid ability and rests upon the assumptions that reading ability (of irregular words) is relatively insensitive to the effects of most CNS disease and that it is a strong predictor of intelligence in the normal population.

Depressive symptoms. Participants were given the Beck Depression Inventory-2 (BDI-II[52]) to assess current level of depression.

Social Resources and Support Questionnaire. The SRSQ[53] was revised by Myers et al.[53] for use with diverse populations. There are 12-items that assess treatment-specific social support, which were of primary interest in the current study (e.g., "There are people I can talk to about my health"; "There is someone I can count on to help me with my HIV treatment"). Respondents are asked the extent to which they agree with these above statements, with 4-point Likert Scale responses ranging from 1 (strongly disagree) to 4 (strongly agree). Higher scores represent greater perceived support. The scale demonstrated adequate reliability (Cronbach $\alpha = 0.84$).

Patient satisfaction with health care provider. Patient satisfaction was measured based upon the Patient Satisfaction Questionnaire (PSQ-18[54]). The PSQ is an 18-item self-report measure that yields a total score of overall patient satisfaction with his/her health care provider.

Statistical analytic procedures

Analytic procedures were as follows (1) racial groups (African American and Caucasians) were compared on demographic, HIV-disease variables, and primary study variables of interest (i.e., duration of drug use, executive function, learning and memory, depression, AMNART performance, treatment-specific social support, and patient satisfaction with provider with health care provider; (2) considering the unequal number of participants between racial groups, scatterplots for each predictor variable of interest were inspected for normality, linearity, and outliers within each group; (3) stepwise hierarchical regression models were conducted for each ethnic/racial group to determine if there were unique factors that predicted overall medication adherence. The following variables were entered into the regression: drug abuse duration, executive and learning/memory T score, literacy, depression, provider satisfaction, treatment-related social support. We examined the significant R^2 change to determine the predictive value of each variable after controlling for other relevant predictor variables.

Results

Demographic and disease variables

African Americans reported significantly less years of education than Caucasians (M = 12; SD = 1.7 versus 14; SD = 1.7). Ethnic groups did not differ on current or nadir CD4 count, viral load, SES-related variables (household income, number of dependents, government assistance, health care facility-not described in measures), and regimen complexity. Overall, the sample was of lower SES (Table 1).

Current drug use

African Americans were more likely to test positive for illicit drugs at the time of assessment than were Caucasians (78% versus 52%; χ^2 (174) = 10.450, $p = 0.002$). Cocaine and marijuana were the most commonly flagged substances in the toxicology screens. There were no significant differences in drug abuse duration between ethnic/racial groups ($p > 0.05$).

Medication adherence

Overall medication adherence (across 6 months) was significantly lower in the African American sample (65%) compared to Caucasians (74%), t (179) = −2.095, $p = 0.037$. As can be demonstrated in Table 2, ethnic differences emerged between visits 4–6. Ethnic differences in medication adherence remained when analyses were re-run excluding those who tested positive at the time of assessment (Adherence rates: African Americans [70%]; Caucasians [80%]).

Table 2. Medication Adherence Rates for Both Ethnic Groups (Across 6 months)

Months	*African Americans* (n = 144)	*Caucasians* (n = 37)
1	73%	78%
2	67%	77%
3	65%	75%
4[a]	62%	74%
5[a]	58%	70%
6[a]	55%	69%

[a]Significant at $p < 0.05$

Neurocognitive performance and reading ability (proxy for literacy)

African Americans scored significantly lower on measures of learning and memory, t (179) = −4.096, $p < 0.001$, Executive Functioning, t (179) = −2.860, $p = 0.005$, and reading ability, t = (179) = −4.428, $p < 0.0001$ than Caucasians. Once controlling for reading ability, ethnic differences in executive functioning and learning and memory were no longer significant, $F(1, 178) = 2.53$, $p = 0.113$.

Depression

There were no statistically significant differences in current level of depression between racial/ethnic groups (African Americans [M = 13.14; SD = 9.4] and Caucasians [M = 14.7; SD = 8.1]).

Patient satisfaction with provider

There were no statistically significant differences in patient-provider satisfaction between African Americans and Caucasians t (179) = 0.150, $p = 0.881$.

Treatment-related social support

There were no statistically significant differences between African Americans ($M = 36.44$; $SD = 6.2$) and Caucasians ($M = 36.76$; $SD = 5.5$) in their level of perceived social support related to health care and treatment.

Predictors of medication adherence

For both African Americans and Caucasians, drug abuse duration was significantly predictive of medication adherence. Patient satisfaction with provider was predictive of medication adherence for African Americans but not for Caucasians and current level of depression and treatment-specific social support was significantly predictive of medication adherence for Caucasians, but not African Americans. These variables remained predictive of medication adherence after controlling for drug use duration. Executive functioning (EF), learning and memory, and reading ability were not significantly predictive of medication adherence for either group (See Table 3 for results).

Discussion

This study examined differential predictors of medication adherence among a cohort of HIV-positive drug using African American and Caucasian adults. Overall, African Americans demonstrated lower rates of medication adherence over the course of the study, which is consistent with other studies examining ethnic differences in HIV medication adherence.[55–57] Results of previous studies assessing racial differences in HIV medication adherence have focused on socioeconomic factors that may moderate this relationship. However, there is more recent evidence to suggest that these factors alone do not eliminate disparities between racial groups on medication adherence.[58] Hence, research efforts have been directed toward the role of the patient-provider relationship in studies of medication adherence among ethnic minorities.

TABLE 3. PREDICTORS OF MEDICATION ADHERENCE (STRATIFIED BY ETHNICITY)

Variable	R^2	β	*F Change*	p *Value*
African Americans (n=144)				
Duration of drug use	0.061	−16.20	9.60	0.002[a]
Reading ability/literacy	0.063	0.147	0.342	0.559
Executive function & learning and memory	0.087	0.629	1.968	0.143
Depression	0.087	0.032	0.17	0.896
Provider satisfaction	0.142	0.717	9.12	0.003[a]
Treatment-specific Social support	0.151	0.465	1.59	0.209
Caucasians (n=37)				
Duration of drug use	0.227	−20.15	10.01	0.003[a]
Reading ability/literacy	0.264	−0.464	1.66	0.207
Executive function & learning and memory	0.294	−0.164	0.642	0.533
Depression	0.456	−1.026	8.926	0.006[a]
Provider satisfaction	0.456	0.066	0.041	0.841
Treatment-specific Social support	0.529	0.688	4.323	0.047[a]

[a]Statistically significant at $p<0.05$.

Our sample of African Americans and Caucasians reported receiving similar types of health care, regimen complexity, and SES. As such, we are less concerned that the racial group differences observed in medication adherence resulted from solely socioeconomic differences. A major strength of the current study was repeated use of objective measures of medication adherence use over a period of 6 months.

Drug use

Considering that we found ethnic differences in current drug use, we conducted analyses with and without current drug users and African Americans still continued to demonstrate lower adherence rates (70% versus 80%). Therefore, the racial differences observed in the current study are less likely attributable to disproportionate number of African Americans drug users.

Duration of drug use was strongly predictive of medication adherence for both African American and Caucasian patients, which is consistent with the current literature on substance abuse on medication adherence among ethnically diverse samples. Considering that a majority of our sample tested positive for both cocaine and marijuana, we did not treat type of drug as a covariate in the regression analyses.

Provider satisfaction and treatment-specific social support

Satisfaction with health care provider emerged as a particularly strong indicator of medication adherence for African Americans, in particular and remained significant after controlling for other critical variables such as current drug use. This is consistent with other studies documenting racial/ethnic group differences in medication adherence as a result of the patient-provider relationship. Of particular interest is that despite both racial groups reporting similar levels of satisfaction with health care provider, it was only predictive of adherence for African Americans, suggesting that the patient–provider relationship may be a unique influence for African Americans. Medication adherence typically involves a decision-making process (weighing the costs and benefits of taking medication) and may reflect knowledge, attitudes, or lay health beliefs that influence medication decisions, resulting in skipping or altering doses. Interpersonal aspects of the patient–provider relationship may influence attitudes toward taking medications, health beliefs related to HIV, and perceived benefits of medical outcomes.[59] It is well-documented that individuals' beliefs about their susceptibility to illness and HIV and medication efficacy play a crucial role in adherence. As mentioned previously, one critical aspect related to racial disparities in HIV medication adherence is trust. Racial differences in mistrust are believed to stem from perceived and actual racial discrimination in prior interactions with health care providers,[60] racial discordance with health care providers,[61] and HIV conspiracy beliefs.[58] Therefore, given that the quality of the patient–provider relationship is predictive of medication adherence, providers can play an important role in addressing the patients' treatment-related concerns, dispelling inaccurate information, and addressing issues of trust; thereby, attenuating some of the negative connotations that African Americans associate with taking medications. Overall, increasing patient satisfaction with provider may help to reduce racial disparities in cART adherence, and ultimately improve long-term survival.

The current study did not track provider race or account for whether patient satisfaction with provider increased in the presence of patient–provider racial concordance. Future researchers in this area may want to examine specific factors involved in how patient satisfaction with provider affects medication adherence among African American HIV-positive individuals, including racial concordance, patient–provider communication, distrust of health care providers versus distrust of health care institutions and other specific health-related beliefs held by African American patients.

Interestingly, treatment-specific social support was significantly predictive of medication adherence for Caucasians, but not for African Americans. While this seems counterintuitive, it may actually reflect the fears of stigmatization

within the African American community.[62] African Americans carry the additional burden of dealing with the negative effects associated with the stigma of HIV, which may become particularly salient among larger support networks. For example, in a study of African American cancer survivors, although participants reported having support networks, when support was not forthcoming, participants feared that it was a result of negative beliefs.[63] It is important to note that we only assessed whether our participants perceived support in relation to their HIV status and treatment. We did not assess the quality of support or assistance that they actually received, or if support was forthcoming. Therefore, it is possible that the support networks among our African American sample differed from our Caucasian sample in terms of stigma, distrust toward health care in general, and literacy. This is a complex topic that warrants further study.

Depression

Our results suggest that the effects of depression on medication adherence may vary by ethnicity as well, with depression impacting medication adherence among Caucasians. We find this of particular interest given that both groups reported equal levels of depressive symptoms. In review of several studies on depression and medication adherence, the majority of those reporting significant relationships studied predominantly Caucasian samples,[64] whereas several studies that were unable to document relationships reported predominantly African American samples.[39] In studies using multivariate analyses, the effects of depression no longer remained statistically significant once other factors were considered, such as demographic factors.[19] Future studies are needed to confirm whether there is indeed a differential effect of depression on medication adherence based on ethnicity, or whether psychosocial factors (e.g., spirituality) may attenuate the deleterious effects of depression on medication adherence for African Americans.

Literacy and cognition

Contrary to expectations, cognition and reading ability were not significantly predictive of medication adherence. The reasons for this are not entirely clear, but may be due to our sample's overall performance on both cognitive and literacy tests. Although there were ethnic differences in performance, both groups performed in the average range on all measures, suggesting adequate literacy levels and intact cognition. Perhaps once literacy and cognitive ability fall below a certain threshold, it plays a more pertinent role in medication adherence.

It is important to highlight the overall low adherence rates across both ethnic groups over the course of this study. The highest adherence rate documented (i.e., 78%) among our Caucasian participants is still considerably low. While more recent research has demonstrated that adherence rates of approximately 75% to NNRTI-based regimens are associated with maintained virologic suppression, most of our participants' adherence rates were well below this cutoff. While we recognize that unequal sample sizes between our ethnic groups is a considerable limitation to the current study, the distribution of African Americans and Caucasians in our study reflect that of the HIV/AIDS population, where blacks are disproportionately infected. Considering that our predictor variables of interest did not violate statistical assumptions, and the effect sizes for our predictor variables were notably different between groups, we are less concerned that the lack of statistical power in the Caucasian group suppressed the predictive power of the variables under study.

Another limitation to the current study is that our sample in general was of low socioeconomic status and current drug users. Therefore, we must caution the reader that these results are only generalizable to HIV-positive individuals from lower SES backgrounds. Future research looking at racial/ethnic differences in medication adherence should include individuals from higher SES backgrounds to further tease apart factors that may impact African Americans from various SES backgrounds.

Conclusions

Our findings suggest that for African Americans, enhancing patient satisfaction with provider may also positively impact other factors related to medication adherence, since highly satisfied patients may be more willing to follow their physicians' advice regarding risky behaviors. Strengthening and promoting bonds between physicians and HIV/AIDS patients should be an absolute priority, at both the interpersonal level of physician–patient interactions but also at the organizational level.

Acknowledgments

This study was funded by the National Institute of Mental Health (RO1 MH58552) awarded to Charles Hinkin, Ph.D. Dr. Thames is supported under a National Institute of Mental Health training grant (T32 19535; PI: C. Hinkin).

Author Disclosure Statement

No competing financial interests exist.

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Wyatt, Gail

To: Nina Harawa
Cc: Danielle Campbell
Subject: RE: White paper submission

Healing Our Women: Addressing Sexual violence and HIV Risks

The talk will be based on our NIMH funded intervention for HIV positive women with histories of sexual abuse

Gail W

Gail E. Wyatt, Ph.D.
Professor, Dept. of Psychiatry & Biobehavioral Sciences UCLA Semel Institute for Neuroscience and Human Behavior Director, UCLA Sexual Health Program Director, Center for Culture, Trauma and Mental Health Disparities Associate Director, UCLA AIDS Institute Director, UCLA HIV/AIDS Translational Training Program (HATT) Clinical Psychologist Sex Therapist Senior Cobb Fellow in Health Disparities Author, "Stolen Women: Reclaiming Our Sexuality, Taking Back Our Lives, John Wiley & Sons, 1997 With Dr. Lewis Wyatt, Jr., "No More Clueless Sex", John Wiley & Sons, 2004

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-----Original Message-----
From: Nina Harawa [mailto:ninaharawa@cdrewu.edu]
Sent: Tuesday, September 11, 2012 3:07 PM
To: Wyatt, Gail
Cc: Danielle Campbell
Subject: RE: White paper submission

Hi Gail,

We are excited to have just received the notice of award from the AIDS Institute. Thank you so much for helping to support Breaking the Silence this year!

We also learned last week that Cookie Johnson is going to speak. Each of you will have about 20 minutes as part of the closing session. Can you please provide a title for your talk? Again, we were asking you to address the linkages between sexual abuse and women's sexual risk -- information that would encourage women in the audience to deal proactively with abuse if they (or their children) have experienced it. Your talk might also address reasons why issues related to sexual trauma are silenced in Latino and Black communities.

We expect about 300 attendees for this closing session for the adult Breaking the Silence program.

Danielle will be following up with you to obtain some information about you for the website and the program, along with a title for your talk.

Thank you again,

Nina Harawa

Nina T. Harawa, MPH, PhD
Associate Professor
College of Medicine
Charles Drew University (CDU)
323 563 - 5899 o
323 563 - 4945 f
Adjunct Faculty
UCLA School of Public Health

Studies/Projects:
www.breakingthesilenceevent.com OR http://www.facebook.com/BTSEvent www.femaales.org www.maales.org

-----Original Message-----
From: Wyatt, Gail [mailto:GWyatt@mednet.ucla.edu]
Sent: Monday, August 20, 2012 1:08 PM
To: Nina Harawa
Subject: RE: White paper submission

Not unless you want to call Eso Won and have them get some.

Gail E. Wyatt, Ph.D.
Professor, Dept. of Psychiatry & Biobehavioral Sciences UCLA Semel Institute for Neuroscience and Human Behavior Director, UCLA Sexual Health Program Director, Center for Culture, Trauma and Mental Health Disparities Associate Director, UCLA AIDS Institute Director, UCLA HIV/AIDS Translational Training Program (HATT) Clinical Psychologist Sex Therapist Senior Cobb Fellow in Health Disparities Author, "Stolen Women: Reclaiming Our Sexuality, Taking Back Our Lives, John Wiley & Sons, 1997 With Dr. Lewis Wyatt, Jr., "No More Clueless Sex", John Wiley & Sons, 2004

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-----Original Message-----
From: Nina Harawa [mailto:ninaharawa@cdrewu.edu]
Sent: Monday, August 20, 2012 12:58 PM
To: Wyatt, Gail
Cc: Danielle Campbell
Subject: RE: White paper submission

Wonderful! Please let us know if you would like us to have a table for your books. I am ccing Danielle, an MPH student who is coordinating the program. She will provide you with additional details as the date nears. Thank you, Nina

-----Original Message-----
From: Wyatt, Gail [mailto:GWyatt@mednet.ucla.edu]
Sent: Monday, August 20, 2012 12:44 PM
To: Nina Harawa
Subject: RE: White paper submission

Okay. I will do it.

Gail Wyatt

Gail E. Wyatt, Ph.D.
Professor, Dept. of Psychiatry & Biobehavioral Sciences UCLA Semel Institute for Neuroscience and Human Behavior Director, UCLA Sexual Health Program Director, Center for Culture, Trauma and Mental Health Disparities Associate Director, UCLA AIDS Institute Director, UCLA HIV/AIDS Translational Training Program (HATT) Clinical Psychologist Sex Therapist Senior Cobb Fellow in Health Disparities Author, "Stolen Women: Reclaiming Our Sexuality, Taking Back Our Lives, John Wiley & Sons, 1997 With Dr. Lewis Wyatt, Jr., "No More Clueless Sex", John Wiley & Sons, 2004

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-----Original Message-----
From: Nina Harawa [mailto:ninaharawa@cdrewu.edu]
Sent: Monday, August 20, 2012 12:44 PM
To: Wyatt, Gail
Subject: RE: White paper submission

2:30 pm on Saturday 10/13.

-----Original Message-----
From: Wyatt, Gail [mailto:GWyatt@mednet.ucla.edu]
Sent: Monday, August 20, 2012 12:15 PM
To: Nina Harawa
Subject: RE: White paper submission

Nina,

Sorry, I am in grant mode.

What time is your activity?

Gail Wyatt

Gail E. Wyatt, Ph.D.
Professor, Dept. of Psychiatry & Biobehavioral Sciences UCLA Semel Institute for Neuroscience and Human Behavior Director, UCLA Sexual Health Program Director, Center for Culture, Trauma and Mental Health Disparities Associate Director, UCLA AIDS Institute Director, UCLA HIV/AIDS Translational Training Program (HATT) Clinical Psychologist Sex Therapist Senior Cobb Fellow in Health Disparities Author, "Stolen Women: Reclaiming Our Sexuality, Taking Back Our Lives, John Wiley & Sons, 1997 With Dr. Lewis Wyatt, Jr., "No More Clueless Sex", John Wiley & Sons, 2004

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-----Original Message-----
From: Nina Harawa [mailto:ninaharawa@cdrewu.edu]

Sent: Thursday, August 16, 2012 12:28 PM
To: Wyatt, Gail
Subject: RE: White paper submission

Gail,

Thank you for submitting the paper. I wanted to f/up to see if you were available to speak at the event:

Saturday 10/13/2012
Time: 2:30 pm.

--Nina

-----Original Message-----
From: Wyatt, Gail [mailto:GWyatt@mednet.ucla.edu]
Sent: Sunday, August 12, 2012 7:37 PM
To: Nina Harawa
Subject: Re: White paper submission

Nina, thank you. I am in Virginia and will submit Tuesday.
Gail Wyatt
Sent from my Verizon Wireless BlackBerry

-----Original Message-----
From: Nina Harawa <ninaharawa@cdrewu.edu>
Date: Sun, 12 Aug 2012 19:20:46
To: Wyatt, Gail<GWyatt@mednet.ucla.edu>
Cc: Mutepfa, Kieta D. MRS<KMutepfa@mednet.ucla.edu>; Lake, Jordan M.D.<JLake@mednet.ucla.edu>
Subject: White paper submission

Hi Gail ,

Please see attached for the revised White Paper for the 2012 Breaking the Silence Conference.

I have taken into account your suggestions and the changes we discussed and incorporated them under #2 and 3.

Please let me know if you need any additional information or suggest additional changes.

Nina

Nina T. Harawa, MPH, PhD
Associate Professor
College of Medicine
Charles Drew University (CDU)
323 563 - 5899 o
323 563 - 4945 f
Adjunct Faculty
UCLA School of Public Health

Studies/Projects:
www.breakingthesilenceevent.com OR http://www.facebook.com/BTSEvent www.femaales.org www.maales.org

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