

Functional Status and Overall Quality of Life in a Multiethnic HIV-Positive Population

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ABSTRACT

The objective of this study was to examine the sociodemographic and behavioral variables associated with quality of life (QOL) among multiethnic, economically disadvantaged patients with HIV/AIDS. A cross-sectional survey was conducted in a large inner-city HIV/AIDS clinic serving medically indigent residents of Houston, Texas, and the surrounding area. On arrival at the clinic, patients were systematically approached and asked to complete a questionnaire, offered in both English and Spanish. Demographic characteristics, stage of disease, and behavioral variables were assessed in addition to work-role functioning and overall health-related QOL. Multiple regression analysis was conducted to assess the relationships between the variables of interest. Of 617 patients approached and asked to participate in the study, 385 (62.4%) consented to complete the questionnaire. Demographic composition of the sample was as follows: 78% male, 25% white, 44% black, and 29% Hispanic. Forty-five percent of the participants were infected through men having sex with men (MSM), 35% through heterosexual contact, and 11% through injection drug use. Racial/ethnic minorities reported significantly ($p < 0.05$) poorer physical functioning and work-role functioning. Participants with higher nadir CD4 cell counts (> 500 per cubic millimeter), MSM HIV exposure, and more education (beyond high school) reported better physical functioning and work-role functioning. Overall QOL and work-related functioning were significantly impaired in this patient population. The impaired functional status findings hold for every social, demographic, and behavioral subgroup examined. Findings suggest that the influence of social inequality persist even among a universally disadvantaged population.

INTRODUCTION

THE INTRODUCTION OF highly active anti-retroviral therapy (HAART) has dramatically changed the prognosis of patients with HIV/AIDS. Disease progression followed by death is no longer the inevitable outcome.¹ As patients with HIV/AIDS continue to live

longer their quality of life (QOL) and other important health-related outcomes need to be thoroughly studied.

While attempts have been made to explore QOL in patients with HIV/AIDS, symptom status is the usual focus. The current literature indicates that patients with more severe symptoms have poorer QOL;²⁻⁴ however, much has

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been left unexplored. A more complete understanding of the social and behavioral factors that influence the health outcomes of patients with HIV/AIDS is also needed. HIV/AIDS is a disease that disproportionately affects socially marginalized populations (e.g., racial/ethnic minorities, low socioeconomic status (SES), and homosexuals).⁵⁻⁷ To date, research efforts have focused primarily on white homosexual males.^{3,4} Most likely, health disparities do not stop with HIV/AIDS diagnosis. Limited evidence does suggest that among HIV-positive populations, those with low SES and members of minority populations may have poorer QOL.⁸⁻¹³ Additional efforts are needed to investigate health disparities within HIV/AIDS populations and to understand the factors that are associated with health disparities.

The purpose of the current study is to examine the numerous sociodemographic and behavioral variables associated with QOL among multiethnic, economically disadvantaged patients with HIV/AIDS. By gaining a more complete understanding of the factors associated with QOL in patients with HIV/AIDS, it will be possible to understand and ultimately meet the needs of this growing patient population better through the design of targeted educational and behavioral change interventions. Improved QOL may also improve adherence to AIDS/HIV treatment regimens, which may lead not only to a continued reduction in mortality, but may also prevent the development of drug resistant virus.¹⁴

METHODS

The study was conducted at the Thomas Street Clinic (TSC) of the Harris County Hospital District (HCHD). TSC provides comprehensive HIV/AIDS care (e.g., primary care, chemotherapy, pharmacy, and physical therapy) to a diverse population of indigent residents of Houston, Texas, and the surrounding area.¹⁵ Data were collected in the fall of 2000 from patients visiting a primary care clinic located within the TSC complex. Each patient was systematically approached on registration and asked to complete a questionnaire while waiting to be seen by their physician.

Questionnaires, which were offered in both English and Spanish, were designed to assess demographic characteristics, stage of disease, and behavioral variables in addition to functional status and QOL outcomes. All information collected in this study was participant self-reported. The institutional review board of The University of Texas Health Science Center at Houston approved the study protocol.

Measures

Demographic variables included age, gender, ethnicity, level of education, marital status, work status, and HIV risk category. Disease severity variables included most recent CD4 cell counts, nadir CD4 cell counts, and AIDS status. Behavioral variables (i.e., smoking status and alcohol use) were assessed from items adapted from the Behavioral Risk Factor Surveillance System-BRFSS.⁵ Current illicit drug use was also assessed.

Functional status was assessed with the use of two measures: the Work Role Functioning (WRF) questionnaire and the Medical Outcomes Study 12-Item Short Form Health Survey (SF-12). The WRF is a 27-item questionnaire designed to measure work role limitations. It consists of 5 scales: work scheduling (Scheduling), physical demands (Physical), mental demands (Psychological), social demands (Social), and output demands (Output). Scores of the various scales of the WRF range from 0 to 100, with higher scores representing better functioning. Reliability of the WRF is good with α coefficients ranging from 0.80 to 0.92 for the various scales.¹⁶

Overall QOL was assessed with the SF-12. This short scale yields two summary scales: the physical component score (PCS) and the mental component score (MCS). These two summary scores are readily comparable to the summary scores calculated from the longer SF-36.¹⁷ Both of these summary scales are scored normatively (mean = 50 standard deviation [SD] = 10).¹⁷ This scale has also been shown to be a valid measure of QOL when used in an HIV-positive population.¹⁸

Scores of the WRF and the SF-12 were generated only for those participants who completed two thirds or more of scale items. A re-

sponse of “does not apply to me” was coded as missing. This scoring technique resulted in various sample sizes for the various QOL/functional status outcomes. As the WRF was only administered to participants who had worked in the 4 weeks period prior to assessment, *n* sizes for the WRF outcomes are considerably smaller than for the SF-12.

Analyses

Descriptive statistics (means, medians, and frequencies) were generated for demographic factors, behavioral variables, and functional status/QOL outcomes (SF-12 and WRF). Unadjusted associations between the various QOL/functioning scales and demographic variables (race/ethnic group, HIV risk group, gender, and age) as well as behavioral variables (alcohol use and smoking status) were assessed with simple regression analysis. All independent variables were categorized to ease data interpretation and facilitate comparisons with other studies using similar categories.⁸ Exactly *k*-1 dummy variables were constructed for each independent variable with *k* categories. Reference cell coding was used, in which each variable is coded as “1” (indicating group membership) or “0.”¹⁹

The adjusted associations between the various QOL/functional status scores and the sociodemographic and behavioral variables were then assessed by performing ordinary least squares multiple regression analysis. Separate models were generated for each of the QOL/functional status outcomes. Variables with a *p* value of 0.2 or greater from the unadjusted analysis were selected for inclusion in a full multiple regression model. After construction of each full multiple regression model, variables with *p* values greater than 0.1 were sequentially removed (variables with the highest *p* values were removed first). After completion of this step, excluded variables were individually reintroduced in the model to ensure that important variables were not eliminated. Because the existing literature suggests a clear association between SES, disease stage, and QOL outcomes among patients with HIV/AIDS, nadir CD4 cell count and level of education were retained in each multiple re-

gression model regardless of *p* value. Interactions between markers of disparity were assessed by introducing interaction terms into the model (e.g., ethnicity * level of education and ethnicity * nadir CD4 cell count). Linear regression diagnostics were conducted to assess assumptions on each final model. Tests of normality of residual distribution, heteroscedasticity, and multicollinearity were performed. As all independent variables used in the current analyses were categorical, other diagnostics procedures, such as detection of influential data, were not relevant. All statistical analyses were performed with Stata, version 6.0 (Stata Corporation, College Station, TX).

RESULTS

Of 617 patients approached and asked to participate in the study, 385 (62.4%) consented to complete the questionnaire. Race/ethnicity was significantly associated with participation. Black patients were less likely to participate than white patients (odds ratio [OD] = 0.52, 95% confidence interval [CI] 0.34–0.80). Gender was not associated with willingness to participate.

Three hundred forty-eight of the 385 (90.4%) of those participants who consented to participate returned their questionnaires. Neither gender nor ethnicity was associated with returning a questionnaire. Ages of participants ranged from 21 to 60 years with a mean (standard deviation [SD]) of 40.2 years. The study sample was 78% male, 25% white, 44% black, and 29% Hispanic. The HIV risk profile was as follows: 46% MSM, 35% heterosexual contact, 11% injection drug use (IDU), and 8% other/unknown. This demographic is comparable to that attained by Visnegarwala and colleagues,²⁰ suggesting the sample is representative of the TSC patient population (Table 1).

A majority of the participants in the sample (58%) had a high school education or less. Only 8% reported earning a 4-year college degree or more. Approximately one third (34%) of the sample reported working full or part time, while 54% reported being disabled (inability to work because of health-related problems). In response the question, “Do you have AIDS?”

TABLE 1. DEMOGRAPHIC, DISEASE STATUS, AND BEHAVIORAL CHARACTERISTICS OF HIV/AIDS PARTICIPANTS FROM THOMAS STREET CLINIC, HOUSTON, TEXAS, FALL 2000 ($n = 348^a$)

<i>Variable</i>	<i>Subgroup</i>	<i>Number (percent)</i>
Race/ethnicity	White	88 (25.4)
	Black	152 (43.8)
	Hispanic	101 (29.1)
	Other	6 (1.7)
Gender	Female	75 (21.9)
	Male	268 (78.1)
Age (years)	20–29	27 (8.0)
	30–39	132 (39.1)
	40–49	138 (40.8)
	≥ 50	41 (12.1)
Education level	High school or less	188 (57.9)
	Some college	110 (33.9)
	Bachelor's degree or more	27 (8.3)
Work status	Working full- or part-time	112 (34.1)
	Not working or unemployed	40 (12.2)
	Disabled ^b	176 (53.7)
In a relationship	No	81 (23.7)
	Yes	261 (76.3)
HIV risk group	MSM	149 (45.7)
	Heterosexual contact	113 (34.7)
	IDU	37 (11.4)
	Other	27 (8.3)
AIDS status	No	161 (51.0)
	Yes	155 (49.0)
Most recent CD4 count (per cubic millimeter)	≥ 500	80 (24.1)
	200–499	193 (58.1)
	50–199	41 (12.4)
	0–50	18 (5.4)
Nadir CD4 count (per cubic millimeter)	≥ 500	16 (4.8)
	200–499	102 (30.7)
	50–199	137 (41.3)
	0–50	77 (23.2)
Smoking status	Nonsmoker	172 (53.1)
	Smoker	152 (46.9)
Heavy drinker ^c	No	248 (84.1)
	Yes	47 (15.9)
Current illicit drug use ^d	No	270 (77.6)
	Yes	78 (22.4)

^aCell sizes vary because of missing data.

^bDisability defined as inability to work because of health-related problems.

^cHeavy drinker defined as consuming 5 or more drinks on at least one occasion in the past 30 days.

^dUse of an illicit drug on at least one occasion in the past 30 days.

MSM, men who have sex with men; IDU, injection drug use.

49% of the sample reported “yes.” However, approximately 65% reported having had a nadir CD4 cell count of less than 200 per cubic millimeter. A most recent CD4 cell count of less than 200 per cubic millimeter was reported by 17.8%. Forty-seven percent of the sample reported current smoking on some or most days, 16% reported drinking 5 or more alcoholic beverages on at least one occasion in the previous 30 days, and 22% reported use of an illicit drug on at least one occasion in the previous 30 days.

Overall QOL, as measured by the Physical Component Summary (PCS) and the Mental Component Summary (MCS), for the sample was significantly poorer than population norms (Table 2). The unadjusted analyses revealed few significant ($p < 0.05$) associations between PCS and MCS and sociodemographic variables. Hispanics reported significantly ($p = 0.04$) poorer physical functioning than whites. Blacks also reported poorer physical functioning than whites, however, the differences was

TABLE 2. UNADJUSTED ANALYSIS: ASSOCIATION OF DEMOGRAPHIC, DISEASE STATUS, AND BEHAVIORAL CHARACTERISTICS WITH SF-12 SCORES (PHYSICAL COMPONENT SUMMARY AND MENTAL COMPONENT SUMMARY) AMONG HIV/AIDS PARTICIPANTS FROM THOMAS STREET CLINIC, HOUSTON, TEXAS, FALL 2000 ($n = 285^a$)

Variable	Subgroup ^b	Physical component summary score mean (SD)	Mental component summary score mean (SD)
Total sample ^c		38.9 (7.8)***	41.6 (7.6)***
Race/ethnicity	White	40.1 (6.8)	40.5 (7.8)
	Black	38.6 (7.4)*	42.2 (7.3)*
	Hispanic	37.5 (9.4)***	41.9 (7.8)
Gender	Female	39.9 (8.7)	39.8 (7.3)
	Male	38.6 (7.5)	42.0 (7.5)**
Age (years)	18–29	38.6 (9.4)	41.7 (8.7)
	30–39	39.5 (8.3)	41.8 (7.4)
	40–49	37.5 (7.2)	41.9 (7.8)
	≥ 50	40.1 (6.9)	40.4 (6.7)
Education level	High school or less	39.2 (8.9)	41.0 (8.0)
	Some college	38.5 (6.5)	42.3 (7.0)*
	Bachelor's degree or more	38.2 (7.1)	43.3 (7.4)*
Work status	Working full- or part-time	38.3 (8.1)	42.6 (7.2)
	Not working or unemployed	38.8 (7.2)	40.9 (9.1)
	Disabled	39.1 (7.4)	41.4 (7.4)
In a relationship	No	38.9 (8.5)	41.4 (6.8)
	Yes	38.8 (7.6)	41.6 (7.8)
HIV risk group	MSM	38.4 (7.3)	42.6 (7.3)
	Heterosexual contact	39.1 (8.7)	40.5 (7.8)
	IDU	40.7 (6.2)*	40.3 (7.8)*
	Other	37.5 (6.8)	42.9 (7.8)
AIDS status	No	38.6 (7.2)	42.0 (7.2)
	Yes	39.4 (7.7)	41.1 (7.7)
Most recent CD4 count (per cubic millimeter)	≥ 500	39.6 (6.3)	42.5 (6.3)
	200–499	38.2 (8.2)	41.5 (7.3)
	50–199	38.7 (8.5)	40.7 (7.6)
	0–50	41.2 (4.4)	42.2 (8.2)
Nadir CD4 count (per cubic millimeter)	≥ 500	43.1 (6.9)	43.3 (11.2)
	200–499	37.9 (7.0)**	42.1 (7.4)
	50–199	38.9 (7.8)**	41.4 (6.9)
	0–50	38.8 (8.1)*	41.2 (8.0)
Smoking status	Nonsmoker	38.5 (8.5)	42.0 (7.7)
	Smoker	39.1 (7.0)	41.2 (7.6)
Heavy drinker ^b	No	38.9 (7.5)	41.8 (7.3)
	Yes	38.5 (8.5)	40.3 (7.9)
Current illicit drug use	No	38.6 (7.8)	42.1 (7.4)
	Yes	39.6 (7.6)	40.3 (7.8)

^aCell sizes vary because of missing data.

^bThe reference group is the first subgroup listed.

^cComparison with population norm: mean = 50 (SD = 10)

* $p < 0.2$; ** $p < 0.1$; *** $p < 0.05$; **** $p < 0.01$.

SF = 12, Medical Outcome Study 12 = Item Short Form; MSM, men who have sex with men; IDU, injection drug use; SD, standard deviation.

not significant ($p = 0.18$). No differences in the MCS were significant at the 0.05 level.

Numerous significant differences were observed among the five scales of the WRF (Table 3). Participants from the white racial/ethnic subgroup reported better scores on all scales, with significant differences observed in Scheduling, Output, Psychological, and Social work functioning. Males also reported better func-

tioning, with a significant difference ($p = 0.04$) observed in Psychological work function. Differences in work related functioning were also observed by level of education. Participants in the lowest education category—high school or less—reported significantly poorer ($p < 0.05$) functioning on all WRF scales. Individuals reporting current involvement in a committed relationship reported better work-related func-

TABLE 3. UNADJUSTED ANALYSIS: ASSOCIATION OF DEMOGRAPHIC, DISEASE STATUS AND BEHAVIORAL CHARACTERISTICS WITH WRF SCALE SCORES (SCHEDULING, OUTPUT, PSYCHOLOGICAL, SOCIAL AND PHYSICAL) AMONG HIV/AIDS PARTICIPANTS FROM THOMAS STREET CLINIC, HOUSTON, TEXAS, FALL 2000 (n = 101^a)

Variable	Subgroup ^b	Scheduling mean (SD)	Output mean (SD)	Psychological mean (SD)	Social mean (SD)	Physical mean (SD)	Total mean (SD)
Total sample	White	48.1 (32.9)	52.8 (34.6)	53.2 (36.0)	62.5 (35.1)	7.2 (34.3)	56.0 (30.2)
	Black	62.7 (29.7)	68.0 (29.6)	68.0 (28.6)	69.9 (31.4)	7.6 (31.5)	70.2 (26.1)
Race/ethnicity	Hispanic	43.7 (32.5)**	44.1 (35.3)***	41.0 (36.7)***	51.8 (36.1)***	9.0 (33.2)*	46.0 (30.7)***
	Female	39.5 (32.1)***	49.7 (33.8)**	54.1 (36.5)**	68.3 (35.0)	8.5 (36.0)	56.6 (28.6)**
Gender	Male	35.2 (32.4)	41.5 (37.9)	38.1 (38.9)	51.9 (38.0)	6.0 (38.6)	44.6 (34.7)
	18-29	51.4 (32.3)**	55.4 (33.8)*	56.8 (34.8)***	64.5 (34.3)*	0.0 (33.1)*	58.5 (29.2)**
Age (years)	30-39	63.0 (36.1)	64.3 (35.2)	51.1 (38.1)	64.4 (36.3)	8.5 (39.7)	62.2 (34.7)
	40-49	46.6 (31.5)*	50.0 (36.7)	51.9 (37.7)	56.0 (36.1)	5.0 (36.4)	52.7 (31.5)
Education level	≥ High school	53.5 (33.1)	53.5 (33.1)	56.1 (36.2)	68.3 (35.2)	9.0 (31.8)	57.7 (29.7)
	Some college	39.2 (30.6)*	43.8 (31.1)	48.6 (24.5)	59.5 (26.5)	1.7 (28.6)	52.4 (22.0)
In a Relationship	≥ Bachelor's	41.6 (29.9)	44.7 (32.4)	47.0 (35.1)	51.0 (34.8)	5.6 (33.5)	47.8 (29.5)
	No	56.0 (34.5)**	61.0 (36.0)**	64.0 (35.7)***	75.5 (30.8)***	2.4 (28.7)***	66.0 (27.9)***
HIV risk group	MSM	63.0 (35.3)**	70.3 (32.7)**	62.5 (36.9)	81.3 (30.1)***	5.7 (21.5)***	72.3 (29.3)***
	Heterosexual	45.6 (32.7)	48.5 (35.8)	49.5 (37.4)	56.2 (37.2)	3.4 (36.5)	51.7 (31.2)
AIDS status	Yes	56.4 (32.2)*	61.7 (30.7)**	62.9 (31.2)**	74.4 (26.3)***	5.6 (28.6)*	64.9 (25.6)**
	No	54.4 (32.7)	61.7 (32.5)	62.9 (31.6)	72.9 (30.5)	6.4 (30.3)	64.9 (26.7)
Most recent CD4 count (per cubic millimeter)	≥ 500	44.4 (34.8)*	45.7 (35.3)***	45.7 (35.3)***	51.7 (37.2)***	8.2 (36.4)***	48.4 (32.5)***
	200-499	30.0 (18.3)*	31.5 (28.7)**	35.8 (41.0)**	36.7 (25.4)***	6.7 (35.6)**	36.7 (27.2)***
Nadir CD4 count (per cubic millimeter)	50-199	30.8 (18.0)**	31.0 (38.3)***	16.7 (19.5)***	41.7 (42.5)***	5.8 (44.1)*	34.6 (28.9)***
	0-50 (no obs)	50.3 (33.9)	56.1 (34.5)	56.8 (35.4)	63.8 (33.8)	2.0 (33.3)	58.3 (30.1)
Smoking status	Yes	48.8 (32.3)	51.5 (33.9)	51.9 (35.5)	62.8 (36.2)	2.1 (35.8)	55.6 (29.8)
	No	40.2 (33.6)	50.5 (37.4)	54.4 (36.9)	62.3 (31.3)	0.0 (33.0)	53.8 (31.5)
Heavy drinker ^b	Yes	51.2 (32.4)	53.5 (33.5)	53.2 (35.9)	63.3 (36.5)	7.9 (33.6)	57.1 (29.2)
	No	55.0 (33.9)	59.2 (36.7)	55.0 (36.8)	60.8 (38.9)	7.1 (44.9)	57.3 (35.5)
Current IDU	Yes	—	—	—	—	—	—
	No	42.5 (31.4)	52.6 (38.8)	55.4 (40.2)	71.7 (24.7)	7.9 (25.5)	52.9 (31.9)
Smoking status	Yes	50.9 (34.4)	53.1 (34.0)	56.6 (35.3)	62.2 (36.0)	8.7 (30.4)	57.7 (30.5)
	No	41.1 (33.2)	49.2 (33.5)	48.6 (35.0)	61.5 (36.9)	2.2 (38.0)	52.5 (29.5)
Heavy drinker ^b	Yes	57.0 (29.0)	61.7 (37.3)	56.2 (38.6)	64.6 (33.5)	2.9 (30.8)	61.1 (31.5)
	No	44.3 (35.0)	49.3 (35.8)	47.1 (37.8)	58.8 (36.6)	7.0 (36.1)	53.2 (32.1)
Current IDU	Yes	52.7 (33.7)	57.4 (33.7)	60.9 (32.8)**	67.8 (32.0)	7.8 (31.1)	59.6 (27.8)
	No	48.8 (33.3)	56.5 (33.9)	55.9 (35.4)	63.4 (34.2)	9.5 (33.0)	58.9 (29.4)
Current IDU	Yes	49.4 (31.1)	48.3 (36.7)	54.6 (37.0)	69.3 (35.4)	6.7 (36.4)	53.5 (32.3)
	No	49.2 (33.5)	54.3 (34.9)	53.8 (36.7)	64.3 (35.3)	9.3 (33.5)	57.7 (30.3)
Current IDU	Yes	44.0 (31.0)	46.8 (33.3)	50.7 (33.9)	54.8 (34.2)	8.6 (37.0)	49.2 (29.7)
	No	—	—	—	—	—	—

^aCell sizes vary due to missing data.

^bThe reference group is the first subgroup listed.

p* < 0.2; *p* < 0.1; ****p* < 0.05; *****p* < 0.01.

WRF, Work Role Functioning Questionnaire; MSM, men who have sex with men; IDU, injection drug use; SD, standard deviation.

tioning, significant for Social and WRF total. Participants who became infected with HIV through MSM reported significantly ($p = 0.05$) better work function on the Output, Psychological, Social, and Physical scales.

The final multiple regression model for PCS contained race/ethnicity, education level, and nadir CD4 cell count as the independent variables (Table 4). The Hispanic racial/ethnic subgroup reported significantly poorer function than whites. Nadir CD4 cell count was the strongest predictor of physical function, with participants in the highest category (≥ 500 cells per cubic millimeter) having significantly better scores. Race/ethnicity, education level, nadir CD4 cell count, and HIV risk group were retained in the final model for MCS (Table 4). The white racial/ethnic group had poorer MCS scores, while the MSM HIV risk group reported better MCS scores.

The final multiple regression models for each of the five WRF scales (i.e., Scheduling, Output, Psychological, Social, and Physical limitations in work-role functioning) and for the total WRF (combining all items to generate a single score) are presented in Table 5. Race/ethnicity and age were retained only for

the Scheduling limitations scale. Whites and participants in the 18–29 age group reported having significantly fewer scheduling role limitations. Higher level of education was associated with higher WRF scores. These differences were significant for the Psychological, Social, and Physical scales as well as for the WRF total. Participants currently in a committed relationship also reported better WRF scores (significant for Social and WRF total). HIV risk category was retained in all WRF final models except for the Scheduling and Physical scales. Generally, the MSM subgroup reported the highest WRF scores while those in the other/unknown group reported the poorest work-related functioning. The highest two categories of nadir CD4 cell counts were combined in the WRF multivariate analyses due to the small number of individuals in the 500 cells cubic millimeter or more group. Participants with nadir CD4 cell counts of 200 cubic millimeter or more had better total work related function (WRF total) as well as high scale scores (significant for Psychological, Physical, and WRF total). Current smoking status was included only in the final Psychological model. Current smokers reported significantly better

TABLE 4. MULTIVARIATE ANALYSIS: ASSOCIATION OF DEMOGRAPHIC, DISEASE STATUS AND BEHAVIORAL CHARACTERISTICS WITH SF-12 SCORES (REGRESSION COEFFICIENTS) AMONG HIV/AIDS PARTICIPANTS FROM THOMAS STREET CLINIC, HOUSTON, TEXAS, FALL 2000

Variable	Subgroup ^a	Physical component summary n = 267	Mental component summary n = 265
Race/ethnicity	White		
	Black	-2.02**	2.89***
	Hispanic	-3.67***	2.32**
Education level	≤ High school		
	Some college	-0.78	1.62
	Bachelor's degree or more	-1.72	2.24
Nadir CD4 count (per cubic millimeter)	≥ 500		
	200–499	-5.86****	-1.27
	50–199	-5.31***	-1.99
	0–50	-5.03***	-2.05
HIV risk group	MSM		
	Heterosexual		-2.59***
	IDU		-2.80**
	Other		-0.42
Intercept		46.0	41.9
F		2.13, $p < 0.04$	1.70, $p < 0.08$
R ²		0.05	0.06

^aThe reference group is the first subgroup listed.

** $p < 0.1$; *** $p < 0.05$, **** $p < 0.01$.

SF = 12, Medical Outcome Study 12-item Short Form; MSM, men who have sex with men; IDU, injection drug use.

TABLE 5. MULTIVARIATE ANALYSIS: ASSOCIATION OF DEMOGRAPHIC, DISEASE STATUS, AND BEHAVIORAL CHARACTERISTICS WITH WRF SCALE SCORES (REGRESSION COEFFICIENTS) AMONG HIV/AIDS PARTICIPANTS FROM THOMAS STREET CLINIC, HOUSTON, TEXAS, FALL 2000

Variable	Subgroup ^a	Scheduling (n = 93)	Output (n = 90)	Psychological (n = 96)	Social (n = 90)	Physical (n = 90)	Total (n = 93)
Race/ethnicity	White						
	Black	-15.67**					
Age (years)	Hispanic	-20.80***					
	18-29						
	30-39	-21.42**					
	40-49	-20.35**					
Education level	≥ 50	-38.21***					
	≤ High school						
Marital status (in a relationship?)	Some college	13.56**	11.94	18.65***	21.57***	29.77***	15.42***
	≤ Bachelor's	19.9	26.16**	31.10***	31.12***	40.23***	25.69***
HIV risk group	No		12.38**	12.96**	15.27***		12.46***
	Yes						
	MSM						
	Heterosexual		-7.75	-3.77	-12.32		-7.97
	IDU		-24.16	-19.67	-25.56**		-21.05**
	Other		-42.96***	-41.12***	-40.64***		-38.96***
Nadir CD4 count (per cubic millimeter)	≥ 200		-13.98**	-20.89***	-14.00**	-15.96***	-15.32***
	50-199		-0.86	-12.30	-10.10	-5.45	-2.86
Current smoking status	No						
	Yes			18.41***			
Intercept		77.88	53.86	47.23	61.70	59.97	56.35
	F	2.28 (p = 0.025)	3.07 (p = 0.005)	3.43 (p = 0.001)	4.43 (p = 0.0002)	6.16 (p = 0.0002)	4.27 (p = 0.0002)
R ²		0.20	0.23	0.26	0.30	0.22	0.29

^aThe reference group is the first subgroup listed.

p < 0.1, *p < 0.05, ****p < 0.01.

WRF, Work Role Functioning Questionnaire; MSM, men who have sex with men; IDU, injection drug use.

psychological work-role performance than nonsmokers.

No significant interaction terms were observed in any of the final multiple regression models. In addition, no major violations to linear regression assumptions were observed among any of the final multiple regression models.

DISCUSSION

This study is among the first to explore QOL and functional status outcomes in an ethnically diverse economically disadvantaged HIV/AIDS population. Results indicated that overall QOL and work-related functioning were impaired in this patient population. The impaired functional status findings hold for every social, demographic, and behavioral subgroup examined. The consistency of findings suggest that functional status measures were equally appropriate for all socioeconomic and demographic U.S. population segments. However, the influence of social inequality persists even among a universally disadvantaged population.

Unadjusted and multivariate analyses suggest that racial/ethnic group affiliation was significantly associated with overall physical functional status, as assessed with the PCS. Ethnic minority groups reported poorer physical functional status than whites. While similar findings have been reported by others,^{10,11} the importance of social inequality, as indicated by minority group membership, persists even among a universally indigent population. Interestingly, this relationship was not observed by Hays and colleagues⁸ among a nationally representative group of patients with HIV/AIDS in the United States.

Another important finding of the current study was the association of clinical status variables with QOL/functional status outcomes. Neither clinical stage (defined as the presence or absence of AIDS) nor most recent CD4 cell count were associated with PCS scores. These findings are not in agreement with findings from the HIV Cost Service Utilization Study^{2,8} or the Multi-Center AIDS Cohort Study (MACS)⁴ in which clinical stage was a significant predictor of physical functional status. Nadir CD4 cell count, however, was a signifi-

cant predictor of physical functioning in both the current study, the HIV Cost Service Utilization Study and in the MACS. In today's era of highly active antiretroviral therapy (HAART) therapy, the importance of CD4 cell counts and clinical stage of disease may be of questionable relevance. Nadir CD4 counts are frequently recorded prior to the initiation of HIV/AIDS therapy and begin to elevate after therapy initiation. As a result, this variable may no longer be associated with disease progression.²¹ The findings of Low-Beer et al.²² appear to support this premise. They reported that participants with HIV/AIDS receiving protease inhibitors maintained a constant QOL. In the present study, the lower nadir CD4 cell count categories may serve as an indicator for those individuals with a positive history of a prior opportunistic infection (OI). OI treatment involves numerous additional clinic visits, as well as side effects to medications. Thus, the decreased physical functional status observed among those in the lower nadir CD4 cell count categories may be related more to the effect of OI treatment than advanced stage of HIV/AIDS as was the case in previous studies conducted before the widespread HAART availability. A limitation of the current study was the use of self-reported nadir CD4 cell counts. Inaccuracy in reporting may have occurred biasing results.

An association between work status and physical and mental function has been reported by others,^{8,23} however, these relationships were observed before the HAART era. However, work status was not significantly associated with SF-12 scores. The lack of a significant association between work status and SF-12 scores may reflect both the generic QOL constructs assessed by this measure (physical and mental component summary scores) as well as the improvement in clinical signs and symptoms resulting from HAART. In this new treatment era, the functional status of HIV/AIDS patients may be better assessed by more specific measures such as the WRF.

A contribution of the current study is the assessment of new and innovative functional status outcomes. These new and more specific measures were able to detect potentially important difference in functional status not ob-

served by the generic measure. Despite the small sample size available to assess work-role limitation in the present analyses, several trends were identified. Ethnic minorities and those with a lower education level reported poorer work-role functioning. These findings suggest the potential presence of a social gradient even among this uniformly disadvantaged population with equal access to quality HIV/AIDS care. Social status indicators (i.e., race/ethnic identity and SES) in combination with the adverse social and physical consequences of HIV/AIDS may be particularly detrimental to health outcomes such as work-role functioning.

With the exception of current illicit drug use, the behavioral variables assessed did not have the hypothesized effect on functional status. It was expected that current cigarette smoking would be associated with poorer functional status. Turner and colleagues²⁴ recently reported that current smokers with HIV/AIDS had significantly poorer QOL status than did non-smokers. This relationship has also been observed in healthy populations^{25,26} and other (non-HIV/AIDS) patient populations.^{27,28} The reasons for the absence of such a relationship in the present study are not clear, but because smoking prevalence is greatly elevated in this population, further consideration is warranted.

Excessive alcohol abuse has also been shown to negatively affect QOL in previous studies of patients without HIV/AIDS.²⁹ In the current study, alcohol abuse was not formally assessed. Excess drinking, as defined by more than 5 drinks on at least one occasion in the previous 30 days, was used as an alcohol abuse marker.⁵ A more thorough assessment of alcohol use should be used to adequately examine the relationship between HIV/AIDS, alcohol use, and QOL.

Several of the significant relationships observed in the current study were not hypothesized and have not been reported by others. White patients with HIV/AIDS reported significantly poorer mental function than did black participants. Also, the finding that current smokers had significantly fewer psychological work-role limitations was not expected. It is possible that the findings were due to type I error (rejection of a true null hypothesis), especially when multiple comparison procedures were not taken into account. Future efforts will

be needed to assess the true nature of these relationships.

The cross-sectional design used in this study served as a needed first step to assess QOL and functional status among this previously unstudied patient population. However, it does not allow for temporal relationship assessment. Future efforts utilizing a cohort design are needed. A second limitation in this study was the limited sample size for several outcomes, providing limited statistical power. A larger sample size is needed to more thoroughly assess work role functioning. Missing data were another limitation. The proportion of participants with missing data was higher than desirable. Efforts to minimize respondent burden are particularly important in this disadvantage population with numerous competing demands. A final limitation of the current study was the failure to adequately assess symptom status. A review of the recent literature on QOL in patients with HIV/AIDS indicates that the number/severity of symptoms (e.g., headaches, fever, mouth sores, skin rashes, nausea/diarrhea, and weight loss) is a major QOL outcomes predictor.^{4,8,12,22} While HAART has resulted in decreased AIDS mortality and disease progression¹ and a stable QOL the effects of HAART-related symptoms (i.e. peripheral neuropathy, metabolic disorders, and lipodystrophy) should be addressed.^{13,30,31}

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