

Health-Related Quality of Life Among Men with HIV Infection: Effects of Social Support, Coping, and Depression

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ABSTRACT

In a prospective cohort study, baseline data were collected on 226 males with HIV infection attending three infectious disease clinics in a southern state. As a result of advances in HIV treatment, understanding the association between psychosocial factors and health-related quality of life has become an important area of study. The purpose of this study was to assess the total effects of social support and coping as well as the direct and indirect effects of these factors through depression on health-related quality of life. Subjects were interviewed and answered the following standardized questionnaires: The HIV Cost and Services Utilization Study tool, Coping with HIV Questionnaire, Social Support Appraisals Scale, and Centers for Epidemiological Studies Depression instrument. Path models with strictly ordered relationships were fitted to study the effects of the psychosocial variables on each quality of life subscale. We found that coping and social support had total effects on some, but not all dimensions of health-related quality of life, whereas depression was associated with all dimensions of health-related quality of life. Furthermore, the effects of both social support and coping were mainly through the intermediate variable, depression. In the era of highly active antiretroviral therapy (HAART), when quality of life issues are of paramount importance, strategies to improve social support, coping, and particularly, depressive symptoms are strongly encouraged.

INTRODUCTION

ADVANCES IN ANTI-HIV treatment have produced a notable decline in HIV-related mortality, improved the survival times for individuals with HIV infection, and changed the disease from an acute illness to a chronic, debilitating disease. As a result, health-related quality of life (HRQOL) has become an impor-

tant clinical outcome, and assessing the factors that impact on HIV-infected patients' perceptions of HRQOL has become a major concern of clinicians and researchers in the field. A large body of previous research has provided important information on the correlates of HRQOL. Sociodemographic characteristics, such as age, gender, race/ethnicity, education, income, employment, and types of insurance

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are strongly associated with HRQOL.¹⁻⁴ In addition, patient CD4 cell counts, viral burden, and HIV/AIDS stage (i.e., asymptomatic, symptomatic, AIDS) are significant predictors of different dimensions of HRQOL.^{5,6} Furthermore, previous studies in the field also showed that the efficacy of the new combination antiviral therapies depends on the users' adherence behavior, and there is a linear association between decreased compliance and increased viral loads and the risk of progression to AIDS.⁷⁻¹⁰

The association between psychosocial factors (e.g., social support, coping, and depressive symptoms) and patient outcomes has been increasingly a focus in HIV/AIDS study. Social support is defined by Cobb¹¹ as beliefs that one is loved, respected, and esteemed by and involved with family, friends, and others. Accordingly, this belief constitutes the individual's appraisal of information provided by the supporting sources as well as the occurrence of supportive interactions. Generally, the impact of social support on health outcomes could be either through direct effect¹¹ or through buffering effect.¹² The latter hypothesis suggests that when people are faced with stressful life events, they respond by adopting different social support strategies, and these responses may buffer the negative health outcomes resulting from stressors.¹² In the field of HIV/AIDS study, several researchers have reported the direct impact of social support on the patients' HRQOL as well as the link between social support and psychological well-being of the patients. Swindells et al.,⁴ in a multiple-site longitudinal study of 138 HIV-infected patients, found that these patients' satisfaction with social support, regardless of the source of the support, was significantly associated with improved quality of life. In a relatively recent cross-sectional study of 82 women living with HIV, Cowdery and Pesa² demonstrated that social support was significantly associated with mental health, general health perception, and pain. Social support has also been found to be correlated with other patient outcomes. For example, in her study on mediators of social support and antiretroviral adherence among an indigent population in New York City, Simoni¹⁰ demonstrated that the perceived

need for social support was positively correlated with acknowledged nonadherence. In addition, the relationship between social support and depression has also been documented. Hays et al.,¹³ for example, found social support was significantly inversely correlated with depression in their sample of 508 homosexual men.

Coping strategies can be categorized as active and passive coping. The former refers to taking a direct and rational approach in dealing with a problem; and the latter involves avoidance, withdrawal, and wishful thinking. Similar to social support, coping could have direct or buffering effect on patient outcomes. According to Folkman's et al.¹⁴ study, active coping was associated with diminished depressive mood, and passive or detachment coping was related to increased depressive mood. Other studies indicated that "healthy adaptive strategies" such as problem-focused and active-behavioral copings were strongly associated with the patients' improved quality of life, and maladaptive coping such as emotional-focused and avoidance copings were significantly related to the patients' reduced quality of life.^{4,15}

Evidently, both social support and coping are important factors influencing patient outcomes, particularly adaptational outcomes of stressful life situations.¹⁶ HIV infection is a stressful life event. It is widely accepted that individuals with HIV infection are highly vulnerable to stress,¹⁷ and that the depression associated with the infection and/or disease significantly impacts the individuals' quality of life. Therefore, it is important to understand how social support and coping impact patient outcomes, whether it is through a direct effect or through an indirect effect via depression. Such information would help develop interventions to improve the HRQOL of individuals with HIV infection.

The purpose of this study was to assess the total effects of social support and coping as well as the direct and indirect effects of these predictors through depression on HRQOL in a sample of men living with HIV infection. Based upon the aforementioned research, we hypothesized that social support and coping would affect different aspects of the patients' HRQOL. We further hypothesized that social

support and coping would have effects on depressive symptoms, which would then influence the patients' HRQOL.

MATERIALS AND METHODS

Study sample and data

The findings reported in this article represent the first of three interviews from a 24-month prospective cohort study designed to examine the effects of sociodemographic and psychosocial variables on health outcomes among HIV-infected men. The sample consisted of 226 patients recruited from three infectious diseases clinics: a Veterans Affairs (VA) medical center ($n = 131$), a university hospital ($n = 55$), and a public health department ($n = 40$). Only male patients 18 years of age and older who spoke English and had positive enzyme linked immunosorbent assay (ELISA) and Western blot tests for HIV were eligible for participation in the study. Exclusion criteria were cognitive impairment, current use of corticosteroids and testosterone, current acute bacterial and viral infections, diagnosis with HIV for less than 3 months, and a recent (within 30 days) change in antiretroviral medications.

Procedure

All subjects signed a written informed consent before participating in the study. Data collectors were trained in interviewing the patients and in helping the subjects to complete standardized questionnaires. Subjects were paid \$30 for the baseline interview. Members of the research team reviewed subjects' medical records to obtain additional information and to validate demographic and clinical data obtained during the interviews. The study was approved by the human subjects committee of each participating study site as well as the university's Institutional Review Board (IRB).

Measures

Demographic and clinical variables. The demographic variables of interest for this study included subjects' age, race/ethnicity, education, marital status, site for health care (VA

clinic versus non-VA clinic), and annual household income. Clinical measures used in the study were CD4 cell counts and comorbidity. We obtained the CD4 cell count (cells per microliter of blood) from the subjects' blood tests, which were all analyzed at a VA clinical laboratory. The questionnaire version of the Charlson Co-morbidity Index¹⁸ was used to assess the patients' comorbid conditions, with the higher the summary score, the more severe the burden of comorbidity.

HRQOL. The HIV Cost and Services Utilization Study (HCSUS)¹⁹ tool is a disease-specific instrument used to measure how well an individual functions and his/her perceptions of well-being in the physical, mental, and social domains of life. This 31-item tool includes the following scales: physical functioning (9 items), social functioning (2 items), role functioning (2 items), pain (2 items), emotional well-being (7 items), energy (2 items), disability days (1 item), general health perception (3 items), overall quality of life (1 item), and overall health perception (1 item). Scales having more than one item are scored by averaging together the items. Except for disability days, all the measures are then linearly transformed and range from 0 (worst health) to 100 (best health). From the scales, three composite scores reflecting patients' perception of their physical health, mental health, and total quality of life are constructed.²⁰ For this study, the two 1-item dimensions of overall quality of life and overall health perception were excluded.

Social support. Patient's social support was assessed with the Social Support Appraisals Scale (SS-A).²¹ The SS-A is a 23-item questionnaire. Subjects were asked to indicate on a scale from 1 (strongly agree) to 4 (strongly disagree) how much they believe that they were loved by, esteemed by, and involved with family, friends, and others (e.g., "My friends respect me." "My family holds me in high esteem." "I feel valued by other people."). Three scores are typically computed: total social support (sum of 23 items), support by family members (sum of 8 items), and support by friends (sum of 7 items). Higher scores indicate more favorable social support perceived by the patients. In the

present study, we used only the total social support score.

Coping. Coping was measured using an adaptation of the Coping with HIV questionnaire.²² This 34-item tool asks subjects to indicate on a scale from 1 (i.e., never) to 4 (always) how frequently they used various strategies to deal with being HIV positive in the past 3 months. The tool includes 5 subscales: seeking social support, spirituality, avoidance, managing the illness, and focusing on others. The total coping score, which was used in the present study, is the mean of all 34 items. Higher mean total scores indicate more effective coping.

Depression. Patients' depressive symptoms over the previous week were assessed using the 20-item self-report instrument, Center for Epidemiological Studies Depression (CES-D). The CES-D has been widely used and well validated in measuring depressive symptoms in HIV-infected individuals.²³⁻²⁶ The 20 items are rated on a 4-point Likert scale with 0 = rarely or none of the time (less than 1 day); 1 = some or little of the time (1-2 days); 2 = occasionally or a moderate amount of the time (3-4 days); 3 = most or all of the time (5-7 days). Total sum scores range from 0 to 60, with higher scores indicating increased levels of depression. The CES-D does not provide a clinical diagnosis of depression, rather it is often used to estimate depressive symptom prevalence, and may be used as screening tool for clinical and research efforts.²⁷

Patient medication adherence. For this study, patient self-reported adherence was measured by the Patient Medication Adherence Questionnaire 7 (PMAQ7).²⁸ The PMAQ7 is a self-administered questionnaire that provides a quantitative assessment of adherence. It evaluates the frequency of the prescribed daily dose and the actual drug intake by the subject over the last 7 days, leading to an index of adherence. Scores are obtained for each medication and then all medications are combined as the percentage of doses taken as prescribed. Higher scores indicate great adherence. A patient was said to be completely adherent if he

reported a 100% intake of antiretrovirals over the last 7 days.

Statistical analysis. All data were analyzed using SAS version 8.1 (SAS Institute, Cary, NC). First, descriptive statistics were obtained on all variables used in this study. Second, collinearity diagnostics (condition indices and variance proportions) were calculated to measure degrading or harmful multicollinearity. Third, path models with strictly ordered relationships²⁹ were fitted to study the effects of social support, coping and depression on each HRQOL subscale. Because of a strong multicollinearity between the different domains of social support, coping, and depression, in the final analysis we chose to use the total score for social support and coping, and two separate sets of multivariate regression analyses were employed: one involved social support and the other included coping. The method for estimating the effects of social support is presented here: The total effect of social support was estimated based upon model HRQOL subscales = $\beta_0 + \beta_1$ (social support); and model HRQOL subscales = $\gamma_0 + \gamma_1$ (social support) + γ_2 (depression) provided estimates of the direct effect of social support and depression. We calculated the indirect effect of social support by subtracting its direct effect from its total effect. All these models were fitted controlling for the same demographic variables (i.e., age, race/ethnicity, marital status, annual household income, and site of health care), and clinical variables (i.e., CD4 cell count and comorbidity). We used a similar process and models to assess the total, direct, and indirect effects of coping.

RESULTS

Table 1 summarizes the demographic and clinical characteristics of the study sample. Of the 226 patients who participated in the study, 45% were nonwhite, 58% were patients from the local VA medical center, 54% had annual household income of less than \$20,000, and 53% were married or widowed. The sample's mean age was 46 years old, with a range of 20 to 70 years. Their average years of education were 13

TABLE 1. PATIENT'S CHARACTERISTICS ($n = 226$)

Characteristics	n	% or Mean (SD)
Age	226	45.7 (8.7)
Education	225	13.0 (2.0)
Race/ethnicity:		
White	124	54.9%
Nonwhite	102	45.1%
Marital status:		
Single	107	47.4%
Married	59	26.1%
Widowed	60	26.6%
Clinic attended:		
VA	131	58.1%
Non-VA	95	41.9%
Family income:		
≤\$9,999	71	32.6%
\$10k–\$19,999	46	21.1%
\$20k–\$34,999	60	27.6%
≥\$35,000	41	18.8%
CD4 cell count:		
< 200	56	25.3%
200–500	98	44.3%
> 500	67	30.3%
Comorbidity (Charlson Index)	226	3.6 (3.7)
Medication compliance (PMAQ7)	198	96.9 (12.0)
Acknowledged risk factors:		
Blood transfusion only	6	(2.7%)
IV drug use only	18	(8.0%)
Heterosexuality only	51	(22.6%)
Homosexuality only	72	(31.9%)
Multiple risk factors	40	(17.7%)
Unknown	39	(17.3%)

SD, standard deviation; VA, Veteran's Administration; IV, intravenous.

years. Twenty-five percent of the sample had a CD4 cell count of less than 200 per milliliter, and the mean score for comorbidity was 3.6. Among the 198 patients (87.6% of the total sample) to whom an antiviral medication was currently prescribed, their mean PMAQ7 score was 96.9 (standard deviation [SD] 12.0). This result indicates that our sample had a high medication adherence according to their reports. In this study, we also asked the subjects to indicate how they believed that they became infected with HIV or what was their risk for HIV infection. Among the 226 patients who participated in the study, 32% believed that they contracted the infection from homosexuality only, 23% from heterosexuality only, 18% from multiple risk factors or more than one transmission risk factors, 17% reported unknown of their transmission, 8% from intra-

venous drug use only, and 3% from blood transfusion only.

Table 2 presents the mean summary score for the HRQOL scales and composite scores, social support, coping, and depressive symptoms. As shown, the mean scores for HRQOL ranged from 51.7 (for aggregate physical functioning) to 82.5 (for physical functioning), and the disability days averaged 2 days for the cohort. Except for the pain score, the study subjects had higher HRQOL scores when compared to samples in previous HIV/AIDS studies using the same instrument.^{30,31} In addition, the mean total score was 71.7 for social support, 2.7 for coping total, and 14.5 for depressive symptoms. Using a conventional definition of depression (CES-D ≥ 16), 85 (37.8%) patients were classified as having mild or severe depression. Among these patients with mild and severe depression, 31 (36.5%) received psychiatric or psychological care, and 16 (18.8%) had taken an antidepressant during the last 12 months. These self-reported treatments for depression were validated by our research team with the patients' medical records.

Table 3 shows the total, direct and indirect effects of social support (on the left-hand side) as well as the direct effect of depression (on the right-hand side) on each HRQOL dimension respectively. As shown, social support had a significant ($p < 0.05$) and positive total effects on eight of the HRQOL dimensions. The effect

TABLE 2. HRQOL AND PSYCHOSOCIAL PROFILE ($n = 226$)

Measures	Mean (SD)
HRQOL:	
Physical functioning	82.5 (22.9)
Social functioning	72.8 (28.7)
Role functioning	74.7 (32.4)
Pain	59.9 (26.8)
Emotional well-being	68.8 (20.7)
Energy	60.4 (27.1)
Disabled days	2.0 (4.4)
General health	59.4 (27.4)
Aggregate physical	51.7 (8.5)
Aggregate mental	52.1 (9.1)
Aggregate quality of life	52.0 (8.7)
Social support total	71.7 (12.1)
Coping total	2.7 (0.4)
Depressive symptoms	14.5 (12.1)

HRQOL, health-related quality of life; SD, standard deviation.

TABLE 3. SUMMARY OF SOCIAL SUPPORT AND DEPRESSION EFFECTS ON HRQOL DIMENSIONS (*n* = 226)

HRQOL	Social support effect			Depression effect
	Total ^a	Direct ^b	Indirect ^c	Direct ^b
Physical functioning	0.16	-0.03	0.19	-0.45*
Social functioning	0.82*	0.13	0.69	-1.66*
Role functioning	0.26	-0.18	0.44	-1.04*
Pain	0.21	-0.14	0.35	-0.84*
Emotional health	0.61*	0.08	0.53	-1.27*
Energy	0.61*	0.10	0.51	-1.20*
Disabled days	-0.08*	-0.03	-0.05	0.13*
General health	0.72*	0.21	0.51	-1.21*
Aggregate physical	0.18*	0.01	0.17	-0.40*
Aggregate mental	0.29*	0.05	0.24	-0.59*
Aggregate HRQOL	0.26*	0.03	0.23	-0.54*

^aTotal effect was estimated with HRQOL dimensions as dependent variables, and social support as independent variable, controlling for patient sociodemographic and clinical characteristics.

^bDirect effect was assessed with HRQOL dimensions as dependent variables, and social support and depressive symptoms as independent variables, controlling for patient sociodemographic and clinical characteristics.

^cIndirect effect was calculated by subtracting the direct effect from the total effect.

**p* < 0.05.

HRQOL, health-related quality of life.

magnitudes ranged between -0.08 for disability days to 0.82 for social functioning. Social support did not have significant direct effects on any of the dimensions of HRQOL. Further, the coefficients of direct effects (between -0.03 for physical functioning and disabled days, and 0.21 for general health perception) appear to be smaller than that of the indirect effects (be-

tween -0.05 for disabled days and 0.69 for social functioning).

Similar results for the different effects (total, direct and indirect) of coping and direct effect of depression are presented in Table 4. Coping showed a significant (*p* < 0.05) total effect on improved emotional health, general health perception, aggregate mental health, and aggregate

TABLE 4. SUMMARY OF COPING AND DEPRESSION EFFECTS ON HRQOL DIMENSIONS (*n* = 226)

HRQOL	Coping effect			Depression effect
	Total ^a	Direct ^b	Indirect ^c	Direct ^b
Physical functioning	4.48	2.07	2.41	-0.43*
Social functioning	8.77	-0.73	9.50	-1.70*
Role functioning	2.17	-3.49	5.66	-1.01*
Pain	-1.99	-6.68	4.69	-0.84*
Emotional health	7.54*	0.19	7.35	-1.29*
Energy	7.36	0.38	6.98	-1.23*
Disabled days	-1.32	-0.58	-0.74	0.13*
General health	12.78*	5.80	6.98	-1.24*
Aggregate physical	2.39	0.10	2.29	-0.41*
Aggregate mental	3.54*	0.14	3.40	-0.60*
Aggregate HRQOL	3.22*	0.13	3.09	-0.55*

^aTotal effect was estimated with HRQOL dimensions as dependent variables, and social support as independent variable, controlling for patient sociodemographic and clinical characteristics.

^bDirect effect was assessed with HRQOL dimensions as dependent variables, and social support and depressive conditions as independent variables, controlling for patient sociodemographic and clinical characteristics.

^cIndirect effect was calculated by subtracting the direct effect from the total effect.

**p* < 0.05.

HRQOL, health-related quality of life.

gate HRQOL. The magnitudes of these significant effects ranged from 3.22 (for aggregate HRQOL) to 12.78 (for general health perception). Similar to social support, coping did not have significant direct effect on any dimension of the HRQOL, and its direct effects appeared to be weaker than its indirect effects (0.19 vs. 7.35 for emotional health, 5.80 vs. 6.98 for general health, 0.14 vs. 3.40 for overall mental health, and 0.13 vs. 3.09 for overall quality of life).

Our regression models consistently showed that depressive symptoms had a significant and negative direct effect on every aspect of the quality of life (Tables 3 and 4). As mentioned previously, these results about the total, direct, and indirect effect of social and coping, and the direct effect of depressive conditions were from two separate multivariate regression models, controlling for the same set of patients' sociodemographic and clinical characteristics.

DISCUSSION

The results of the multivariate analyses partially supported our hypothesis that both social support and coping affect the patients' HRQOL. They also confirm our hypothesis that the effect of social support and coping on HRQOL was through the intermediate variable, depressive symptoms.

We found that higher levels of social support from family members, friends and other sources was significantly ($p < 0.05$) associated with fewer disability days and varying degrees of increased social functioning, emotional health, energy, general health perception as well as overall physical functioning, mental health, and overall quality of life. For example, an increase of 10 points in social support was associated with improvement in the patients' social functioning by 8.2 units and a decrease in the patients disabled days by 0.8 day. These findings are based upon the total effect of social support on HRQOL, resulting from the multivariate regression analysis discussed in method section. These results support those found in previous studies that social support was significantly associated with quality of

life.^{4,15,32} In contrast to previous researchers, we further examined the effects of social support on specific dimensions of quality of life, instead of HRQOL in general. Through this process we found that social support was associated with most dimensions of HRQOL, except for physical functioning, role functioning, and pain. Another unique aspect of our study was the investigation of the direct and indirect effects of social support on HRQOL. We found that the impact of social support on HRQOL was mainly through the intermediate variable, depressive symptoms. This suggests that enhancing the patients' support from their family members, friends and other sources would improve their depressive symptoms, which in turn would significantly improve HRQOL.

We found that coping was significantly associated with several aspects of the patients' HRQOL. To be specific, an increase of one unit of coping (including seeking social support, spirituality, managing illness, and focusing on others) was significantly ($p < 0.05$) associated with an increase in the patients' emotional health by 8 points, general health perception by 13 points, overall mental health by 4 points, and overall quality of life by 3 points. Similar to our findings related to social support, coping was not associated with several dimensions of HRQOL (i.e., physical functioning, role functioning, and pain). In addition, coping was not associated with social functioning, energy, and overall physical health. Although we measured total coping, our finding partially supports those of others^{4,14,15} who found that different dimensions of coping are related to improved quality of life. However, our results from the multivariate regression analysis on the direct and indirect effect of coping and depressive symptoms indicated that the effect of coping on HRQOL was mainly through depressive symptoms because the magnitudes of its indirect effect were stronger than its indirect effect. This suggests that improving the patients' coping strategies such as seeking social support, spirituality, managing illness, and focusing on others would also improve their depressive symptoms, thereby ultimately improving HRQOL.

Several limitations in this study need to be addressed. First, we could not establish a causal

relationship between quality of life and the explanatory variables because of the cross-sectional nature of the data. Second, because of multicollinearity problems in our final analysis we used the total score for social support and coping instead of using their subscale scores. This prevented us from examining the effects of specific sources of social support and specific types of coping strategies on HRQOL. Finally, because this study was conducted among HIV-infected men, findings may not be generalized to the general and/or female populations.

Despite these limitations, our findings have several clinical and research implications and add to our understanding of the processes by which psychosocial variables impact on different dimensions of HRQOL. Unlike most previous researchers, we developed and tested a theoretical model that predicted multiple components of HRQOL. We found that coping and social support had total effects on some, but not all dimensions of HRQOL. Interestingly, we found that neither social support nor coping were associated with physical functioning, role functioning, and pain. In addition, coping was not associated with social functioning, energy, and overall physical health. However, depression was significantly ($p < 0.05$) associated with all dimensions of HRQOL. Furthermore, we found that the effects of both social support and coping were mainly through the intermediate variable, depression. These findings do not negate the importance of improving social support and coping among men with HIV infection, but rather highlight the centrality of depressive symptoms in affecting all dimensions of HRQOL. Social support, coping, and depression, unlike demographic variables and some clinical factors, are readily amenable to intervention and can be assessed and modified. Efforts to enhance all three of these psychosocial factors will likely improve HRQOL of individuals with HIV infection, and they may slow down the accelerating HIV's progression to AIDS.^{33,34} Effective interventions to ameliorate depressive symptoms are available and can be implemented by those clinicians caring for HIV patients in ambulatory care settings or patients can be referred to mental health spe-

cialists.^{35,36} In the era of highly active antiretroviral therapy (HAART), when quality of life issues are of paramount importance, strategies to improve social support, coping, and particularly, depressive symptoms are strongly encouraged.

CONCLUSION

In conclusion, our regression analyses results showed that social support was significantly associated with all improved HRQOL dimensions except physical functioning, role functioning, and pain. Coping was significantly related to better emotional health, general health perception, overall mental health, and overall HRQOL. Depressive symptoms were negatively associated with all dimensions of HRQOL. Furthermore, the effects of social support and coping were mainly through the intermediate factor of depressive symptoms. Our findings suggest improving social support, coping and depression of the individuals with HIV infection would improve their quality of life, and improving the patients' social support and coping would reduce the patients' depressive symptoms, which in turn would improve their HRQOL.

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