

# Perceived Stress Mediates the Effects of Coping on the Quality of Life of HIV-Positive Women on Highly Active Antiretroviral Therapy

Kathryn E. Weaver,<sup>1</sup> Michael H. Antoni,<sup>1,2,5,6</sup> Suzanne C. Lechner,<sup>2,5</sup> Ron E. F. Durán,<sup>1</sup> Frank Penedo,<sup>1,5</sup> M. Isabel Fernandez,<sup>2,3</sup> Gail Ironson,<sup>1,2</sup> and Neil Schneiderman<sup>1,2,4</sup>

Received May 13, 2003; revised Nov. 20, 2003; Accepted Dec. 8, 2003

This study examined the relationship between three HIV-specific coping strategies (cognitive coping strategies, denial, and religious coping) and quality of life (QoL) in 90 HIV+, predominately minority women on highly active antiretroviral therapy. Religious coping was unrelated to QoL; however, use of cognitive coping strategies was related to greater QoL, and denial was related to poorer QoL. Baron and Kenny's model of mediation was then used to test perceived stress as a mediator of the relationships between denial and cognitive coping strategies and QoL. These relationships were both mediated by perceived stress. Results suggest that utilization of certain coping strategies may lessen or heighten perceptions of life stressfulness, thereby influencing QoL in this understudied population.

**KEY WORDS:** HIV/AIDS women; coping; quality of life; perceived stress.

## INTRODUCTION

In the United States alone, it is estimated that between 120,000 and 160,000 women aged 13 years or older are living with HIV. Studies have shown that HIV-seropositive women report more symptoms of depression, anxiety, and other mental disorders as well as a higher level of psychological distress than do their male counterparts; however, they are also less likely to receive mental health services (Marlink *et al.*, 2001).

Advances in treatment of HIV infection have highlighted the need to supplement traditional clinical

research endpoints, such as disease progression, immune status, and mortality, with more subjective measures of health and well-being (O'Keefe and Wood, 1996). As the number of persons living with HIV or AIDS increases, developing strategies to assess and maintain quality of life (QoL) has become increasingly important. Moreover, there is a growing need to identify individual difference variables that predict optimal QoL in the face of the very demanding treatment regimens that HIV+ men and women must endure.

Reviews of the general stress and coping literature suggest that greater use of approach-orientated coping strategies and less use of avoidance-orientated strategies may promote better adaptation to stress over time (Roth and Cohen, 1986). Although use of avoidant coping strategies such as a denial may decrease distress in the short term, long-term use of these strategies by HIV+ persons may be maladaptive, as stressors associated with HIV infection such as medication adherence, symptoms of HIV progression, side effects of antiretroviral therapy, financial difficulties, and stigmatization are likely to be chronic. In accordance, previous research suggests

<sup>1</sup>Department of Psychology, University of Miami, Coral Gables, Florida.

<sup>2</sup>Department of Psychiatry, University of Miami, School of Medicine, Coral Gables, Florida.

<sup>3</sup>Department of Epidemiology and Public Health, University of Miami, Coral Gables, Florida.

<sup>4</sup>Department of Biomedical Engineering, University of Miami, Coral Gables, Florida.

<sup>5</sup>Sylvester Comprehensive Cancer Center, Miami, Florida.

<sup>6</sup>Correspondence should be directed to Michael H. Antoni, Department of Psychology, University of Miami, 5665 Ponce De Leon Drive, Coral Gables, Florida 33146; e-mail: mantoni@miami.edu.

that increased use of denial coping is associated with decreased QoL in HIV+ men and women (Burgess *et al.*, 2000; Lechner *et al.*, submitted; Swindells *et al.*, 1999). This is consistent with HIV research that has linked denial with increased distress and negative long-term effects on immune function and disease progression (Antoni *et al.*, 1991; Ironson *et al.*, 1994; Leserman *et al.*, 2000); however, the vast majority of the participants in these studies were HIV+ men.

In contrast to denial, conceptualized as an avoidant coping response, cognitive coping strategies such as acceptance and positive reframing require mental engagement with a stressor. These strategies have been studied less frequently; however, Friedland *et al.* (1996) found that coping by changing the way that one views a problem was related to greater mental health QoL. The link between use of these cognitive coping strategies and lower distress has also been supported by intervention research. Our research group used cognitive-behavioral stress management (CBSM) to modify acceptance and positive reframing in HIV+ men, and found associated changes in anxiety and depressed mood (Lutgendorf *et al.*, 1998). Similar studies have not, however, been conducted with HIV+ women.

Studies of men and women living with HIV suggest that spirituality/religiousness may be an important component of their efforts to cope with their illness and related stressors. Spirituality/religiousness is significantly related to less emotional distress, less loneliness, and greater hope in HIV+ individuals (Ironson *et al.*, 2002; Somlai *et al.*, 1996; Woods *et al.*, 1999). Again, however, the majority of the participants in these studies have been HIV+ men, despite the fact that HIV+ inner-city women may use spiritual and religious practices as a preferred coping strategy (Biggar *et al.*, 1999).

This study aims to contribute to the understanding of how coping strategies relate to QoL in HIV+ ethnic minority women by examining the relationship between three different coping strategies (religious coping, cognitive coping strategies, and denial) and QoL. Additionally, we evaluate perceived life stress as a mediator of the relationship between coping and quality of life.

It has been suggested that coping can affect the appraisal of stressful situations by shaping cognitive processing (Folkman *et al.*, 1979). For instance, employment of a cognitive coping strategy like positive reframing is likely to be accompanied by appraisals

that the stressor is more controllable and that sufficient resources are available. In contrast, employment of a less effective strategy such as denial might be accompanied by appraisals of lower control and coping self-efficacy and subsequent increased perceptions of life stressfulness. Perceived stress may also serve as an important indicator of the relative utility of the chosen strategy for coping with challenging situations, as utilization of less effective coping strategies might result in increases in life stressfulness. For example, employment of denial coping in response to symptoms of HIV progression could result in poor health behaviors such as failure to regularly attend medical appointments or to adhere to the antiviral regimen, possibly leading to worsening health, increased stress, and poorer QoL.

Accordingly, we hypothesized that the use of cognitive coping strategies (positive reframing and acceptance) and religious coping would be related to better QoL and that the relationship would be mediated by lower perceived life stress. Conversely, we hypothesized that the use of denial coping would be related to poorer QoL and that this relationship would be mediated by greater perceived life stress.

## METHODS

### Participants

The participants for this study were HIV+ adult women from the SMART Study, a longitudinal randomized trial investigating the effects of a 10-week cognitive-behavioral stress management intervention on various immunologic, health, and psychosocial outcomes. This study presents data from the baseline assessment. Women were recruited from community health centers, agencies servicing HIV-related needs, HIV conferences and community events, newspaper advertisements, and flyers placed throughout the Miami-Dade County area. All participants were between 18 and 65 years of age and were currently prescribed highly active antiretroviral therapy (HAART). Exclusionary criteria included use of other medications with immunomodulatory effects, history of chronic illness associated with permanent changes in the immune system, and history of whole-body irradiation or chemotherapy. Additional temporary exclusionary criteria included intravenous drug use within the previous 6 months, hospitalization for surgery within the last 3 months, acute bodily infection

during the last month, antibiotic use for an acute infection within the last 2 weeks, or changes in the HAART regimen during the previous month.

### Procedure

Participants who met initial eligibility requirements were scheduled for an in-person screening interview. All participants provided informed consent prior to participation in the study. At the screening interview, participants were permanently excluded on the basis of significant cognitive impairment [score on the HIV Dementia Scale (HDS) (Power *et al.*, 1995)  $<7.5$ ] or inability to read at a sixth-grade level based on the Wide Range Achievement Test (WRAT-3) (Wilkinson, 1993). Current psychosis, drug or alcohol dependence, and panic disorder [as diagnosed by the Structured Clinical Interview for the DSM-IV (SCID IV) (First *et al.*, 1997)] resulted in temporary exclusion, as did active suicidality [as assessed by the Structured Interview Guide for Hamilton Depression and Anxiety Scales (SIGH-AD) (Hamilton, 1960; Williams, 1988)]. Participants received a physical examination and blood draw performed by a licensed physician, nurse, or phlebotomist during their initial appointment. Following the screening interview, qualified participants were asked to return to complete a battery of psychosocial measures via interview and self-report formats within 8 weeks of the screening interview. Participants were compensated \$60 for their participation.

We screened 211 women by phone and in person for the study. One hundred twenty-one women did not meet eligibility criteria (13.2% were not prescribed antiretroviral medication, 13.2% met physical health exclusion criteria, 21.5% met psychological exclusion criteria, 19.8% were unable to read or write English or showed evidence of significant cognitive impairment, 23.1% were participating in other clinical research studies, and 9.2% met other criteria for exclusion or decided to withdraw from the study). Ninety women provided complete data and were included in the analyses. African-American women made up the majority of the sample (84%), and 77% of the women had a high school diploma or less education. The average age of the women was 37 years ( $SD = 8.1$ ) and the mean time since HIV diagnosis was 78 months ( $SD = 48$ ). The majority of the participants (74%) reported a yearly income of less than \$10,000 (including government assistance), and 69% were either unemployed or disabled.

## MEASURES

### Quality of Life

We used the HIV/AIDS-Targeted Quality of Life Instrument (HAT-QoL) (Holmes and Shea, 1998), a 42-item self-report measure based on content generated during interviews with HIV+ men and women, to assess nine dimensions of QoL that seropositive individuals consider to be important: overall function, sexual function, disclosure worries, health worries, financial worries, HIV mastery, life satisfaction, medication concerns, and provider trust. Sample items include, "I have been satisfied with my physical activity"; "I have been content with my life"; "I have felt confident in my doctor's ability to care for people with HIV." Items assessing QoL during the last month were rated on a 5-point Likert-type scale ranging from 0 (*none of the time*) to 4 (*all of the time*). A composite QoL score was calculated by summing the subscales and converting the total to a 100-point scale. Higher scores indicate better QoL. This measure has been shown to have good reliability and validity in samples including a substantial number of ethnic minority women. In this sample the internal consistency for composite QoL was excellent ( $\alpha = .91$ ). This questionnaire may be more sensitive to changes in health status in asymptomatic individuals, as it does not have the ceiling effects that may be present in many commonly used QoL measures (Holmes and Shea, 1997).

### Coping

We used 16 items from the state version of the COPE Inventory (Carver *et al.*, 1989) to assess four HIV-specific coping strategies (religious coping, positive reframing and growth, acceptance, and denial). Participants were instructed to choose answers that best reflected how they "dealt with HIV concerns or problems" during the last month. The items are rated on a 4-point Likert-type scale ranging from 1 (*Not at all*) to 4 (*A lot*). The COPE has been used extensively in studies including both healthy individuals and those with physical illnesses such as cancer and HIV (Carver *et al.*, 1989, 1993; Lutgendorf *et al.*, 1998). For the purposes of this study, we combined the positive reinterpretation and growth and acceptance scales into a single cognitive coping skills variable, as in previous work from our research team (Lutgendorf *et al.*, 1998). The alpha reliabilities of coping scales used in this

study were adequate (cognitive coping skills,  $\alpha = .73$ ; denial,  $\alpha = .76$ ; and religious coping,  $\alpha = .70$ ).

### Perceived Stress

We used the Perceived Stress Scale (PSS) (Cohen *et al.*, 1983) to measure the perception that events in one's life are stressful. The scale is composed of 14 items that assess perceptions of stress during the last month. Sample items include, "How often have you been upset because of something that happened unexpectedly?" and "How often have you felt confident about your ability to handle your personal problems?." Items are rated on a 5-point Likert-type scale ranging from 0 (*never*) to 4 (*very often*). Construct validity of this measure has been established through high correlations with stressful life-event scales and depressive and physical symptomatology measures (Cohen *et al.*, 1983). Alpha reliability for the PSS in this sample was adequate ( $\alpha = .70$ ).

### Symptoms and Medication Information

We used the Adherence to Combination Therapy Guide (ACTG) (Chesney *et al.*, 2000) to assess the number of antiretroviral medications prescribed to a participant and the number of doses for a participant's drug regimen. The measure also assessed the presence and frequency of 12 symptoms associated with medication side effects and HIV progression. These include symptoms such as nausea, fever, headaches, and diarrhea. The questionnaire uses a 4-point Likert-type scale to assess frequency of symptoms, from 0 (*never*) to 3 (*often*). We excluded a single item assessing depression from analyses so as not to confound negative mood and symptom status. Scores ranged from 0 (no symptoms reported) to 33 (every symptom present often). Alpha reliability for the ACTG symptom measure in the sample was excellent ( $\alpha = .85$ ).

## RESULTS

### Sociodemographic and Disease-Related Predictors of Quality of Life

Sociodemographic variables including age, education, income, ethnicity, and employment status were entered as a single block in a regression model predicting QoL. Only income was significantly associated

**Table I.** Descriptive Statistics for Coping, Perceived Stress, and Quality of Life Variables

Variable	Range	Mean	SD
COPE			
Denial coping	4–16	7.0	3.2
Cognitive coping	8–32	26.3	4.6
Religious coping	4–16	14.1	2.5
PSS	0–56	24.5	7.4
HAT-QoL	0–100	70.1	14.4

with QoL ( $\beta = .25$ ,  $p < .05$ ), so it was retained as a control variable in the first block of subsequent analyses. We then entered health status indicators including time since diagnosis, viral load, CD4 count, number of prescribed antiviral medications, number of antiviral doses per day, and reported symptoms in a second block of a regression model predicting QoL. Only reported symptoms was significantly related to quality of life ( $\beta = -.38$ ,  $p < .01$ ), so it was also included as a control variable in subsequent analyses.

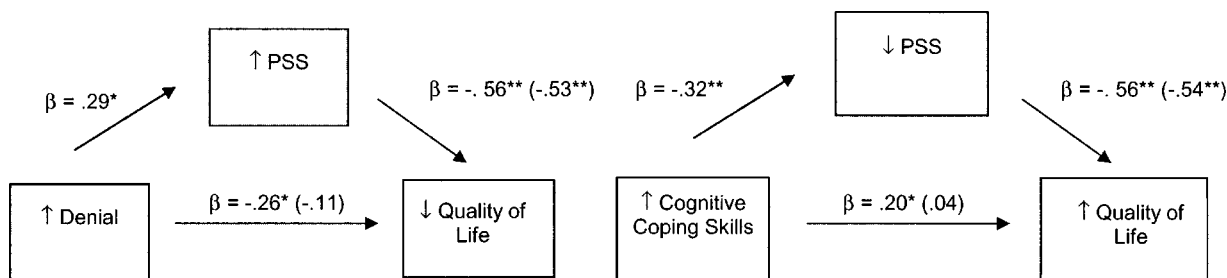
### Coping, Perceived Stress, and Quality-of-Life Relationships

Descriptive statistics for coping strategies, perceived stress, and QoL are shown in Table I and correlations between coping and perceived stress variables are shown in Table II. We conducted separate linear regression analyses with denial, cognitive coping skills, and religious coping as the independent variables and QoL as the dependent variable with income and reported symptoms entered in the first block as controls. Denial coping was significantly related to poorer QoL ( $\beta = -.26$ ,  $p < .05$ ) and cognitive coping skills were significantly related to greater QoL ( $\beta = .20$ ,  $p < .05$ ). Religious coping was unrelated to QoL ( $\beta = .04$ ,  $p > .05$ ). Perceived stress was significantly correlated with greater use of denial coping and less use of cognitive coping skills; however, PSS scores were not significantly related to religious coping.

**Table II.** Correlations Between Coping and Perceived Stress Variables<sup>a</sup>

	1	2	3	4
1. Cognitive coping				
2. Religious coping	.32*			
3. Denial	-.19	-.19		
4. Perceived stress	-.32*	-.07	.29*	

<sup>a</sup>Significant relationships are indicated by single asterisks ( $p < .05$ ).



**Fig. 1.** Path diagram for model testing perceived stress (PSS) as a mediator of the association between coping and quality of life. All equations control for income and reported symptoms. Standardized beta weights for factors entered in the model individually are outside parentheses, and standardized beta weights for all factors in the diagram entered simultaneously are inside parentheses. Significant relationships are indicated by single (\* $p < .05$ ) or double (\*\* $p < .01$ ) asterisks.

After controlling for income and reported symptoms, PSS scores were significantly related to poorer QoL ( $B = -.56$ ,  $p < .01$ ).

### Mediational Models

Only the models including denial and cognitive coping skills met the first two criteria of Baron and Kenny's (1986) test for mediation: These coping strategies were significantly related to both QoL and perceived stress. To test the mediation model for denial coping (see Fig. 1), we conducted a multiple regression analysis with control variables entered in the first step, PSS entered in the second step, and denial coping entered in the third step. When compared to the model without PSS as a mediator, the beta weight of denial coping was no longer significant (see Table III), which, when combined with minimal reduction in the beta weight of perceived stress, provides evidence for partial mediation. Similarly, we conducted a multiple regression analysis with control variables entered in the first step, PSS entered

in the second step, and cognitive coping skills entered in the third step (see Fig. 1). Again, when compared to the model without perceived stress as a mediator, the beta weight of cognitive coping was nonsignificant (see Table IV), indicating partial mediation. Consistent with these results, calculation of Sobel test statistics confirmed that the PSS-mediated effect of coping on QoL was significant for both cognitive coping skills ( $z = 2.61$ ,  $p < .01$ ) and denial ( $z = -2.32$ ,  $p < .05$ ).

To determine whether an alternate model better accounted for the data, we tested coping as a mediator of the relationship between perceived stress and QoL. We regressed QoL on perceived stress while controlling for income, symptoms, and coping. When the results were compared to the model without denial coping as a mediator (PSS  $\beta = -.56$ ,  $p < .01$ ), minimal reduction in the beta weight of perceived stress ( $\beta = -.53$ ,  $p < .01$ ) was observed and the direct effect of denial was not significant ( $\beta = -.11$ ,  $p > .05$ ), indicating that denial coping does not mediate the relationship between perceived stress and QoL. Similar results were observed when cognitive

**Table III.** Perceived Stress Mediator Regression Analyses for Denial Coping ( $N = 79$ )<sup>a</sup>

Variable	<i>B</i>	SE <i>B</i>	$\beta$		<i>B</i>	SE <i>B</i>	$\beta$
Step 1							
Income	2.85	2.16	.14				
Symptoms	-.66	.21	-.35**				
Step 2							
Income	3.13	2.10	.16	Income	2.31	1.75	.12
Symptoms	-.57	.20	-.30**	Symptoms	-.40	.17	-.21*
Denial	-1.25	.50	-.26*	Perceived stress	-1.08	.17	-.56**
Step 3							
Income	2.46	1.75	.12				
Symptoms	-.38	.17	-.20*				
Perceived stress	-1.02	.17	-.53**				
Denial	-.52	.43	-.11				

<sup>a</sup>Significant relationships are indicated by single (\* $p < .05$ ) or double (\*\* $p < .01$ ) asterisks.

**Table IV.** Perceived Stress Mediator Regression Analyses for Cognitive Coping ( $N = 77$ )<sup>a</sup>

Variable	<i>B</i>	SE <i>B</i>	$\beta$		<i>B</i>	SE <i>B</i>	$\beta$
Step 1							
Income	2.71	2.12	.14				
Symptoms	-.71	.20	-.38**				
Step 2							
Income	2.56	2.08	.13	Income	2.31	1.73	.12
Symptoms	-.70	.20	-.37**	Symptoms	-.41	.17	-.22*
Cognitive coping	.60	.30	.20*	Perceived stress	-1.07	.17	-.55**
Step 3							
Income	2.29	1.74	.12				
Symptoms	-.41	.18	-.22*				
Perceived stress	-1.04	.18	-.54**				
Cognitive coping	.11	.27	-.04				

<sup>a</sup>Significant relationships are indicated by single (\* $p < .05$ ) or double (\*\* $p < .01$ ) asterisks.

coping skills was tested as a mediator (PSS  $\beta = -.54$ ,  $p < .01$ ; cognitive coping  $\beta = .04$ ,  $p > .05$ ).

## DISCUSSION

This study aimed to address recent calls for QoL research using measures specific to the needs and lives of HIV+ minority women receiving long-term medical treatments (Pequegnat and Stover, 1999). It builds on existing research by including an understudied population and describing one pathway by which coping strategies could have a beneficial or detrimental impact on QoL—through perceived stress.

### Coping, Perceived Stress, and Quality of Life

Two disparate sets of coping strategies (cognitive coping skills and denial) were significant predictors of QoL, over and beyond the effects of sociodemographic and disease-related variables. Although these coping strategies relate in opposite ways to quality of life, their influence appears to be mediated through perceptions of life stressfulness. This is consistent with research with HIV+ individuals and other medical patients linking increased stress with greater distress and poorer adjustment or QoL (e.g., Janz *et al.*, 2001; Pakenham and Rinaldis, 2002; Thompson *et al.*, 1996). According to the Lazarus and Folkman (1984) stress and coping model, several appraisal processes mediate the relationship between stress and adjustment, including assessment of threat, control, possible coping strategies, and available coping resources. Because many of the questions on the Perceived Stress Scale seem to assess perceptions of low control, low self-efficacy with regard to coping, and overwhelmed coping resources, individuals who perceive their lives as

very stressful would be expected to exhibit poorer adjustment to HIV illness and QoL, in accordance with this model.

Results suggest that HIV+ women who use denial coping have poorer QoL, in part, because they perceive their lives to be highly stressful. In contrast, women who make use of cognitive coping strategies such as acceptance and positive reframing have better QoL because they perceive their lives to be less stressful. Perceived stress could also be viewed as an indicator of the relative utility of cognitive and denial coping strategies. It is plausible that using denial to cope with many of the chronic stressors of HIV infection may be ineffective, leading to greater perceived life stressfulness. Our finding linking cognitive coping skills with greater QoL and denial with poorer QoL is consistent with research linking greater use of approach-orientated coping strategies such as cognitive reframing and acceptance and less use of avoidance-orientated coping strategies such as denial with more positive psychological and physical health outcomes in individuals with chronic diseases, including HIV (Friedland *et al.*, 1996; Penedo *et al.*, 2003).

It is unclear why religious coping was unrelated to perceived stress and quality of life in this population, as other researchers have found significant relationships between greater religiousness/spirituality and less perceived stress and distress in HIV+ individuals (Ironson *et al.*, 2002; Woods *et al.*, 1999). In general, the women in this sample reported a high level of religious coping in response to HIV-related stressors. It is possible that religious coping is more strongly related to certain QoL dimensions such as HIV mastery and life satisfaction and less strongly related to QoL dimensions such as overall functioning, provider trust, and medication concerns. Future research should investigate the relationships between

individual QoL scales and religious coping. Measures that more clearly delineate spirituality from religious behavior may also be better predictors of QoL in this population. It may also be important to consider the social aspects of spiritual/religious expression because emotional and tangible support from members of one's spiritual community may be an important predictor of QoL.

It is possible that denial increases perceptions of life stressfulness by inhibiting expression and processing of negative emotions, possibly leading to rumination. Denial may also affect perceived life stress by preventing effective help seeking or problem solving. If a person is unable to acknowledge his or her illness and associated stressors, he or she cannot effectively seek assistance from a support network or health care providers. In contrast, utilizing cognitive coping skills such as acceptance and positive reframing may decrease perceptions of life stressfulness in HIV+ women by decreasing negative affect. Utilization of these coping strategies may also lead women to view HIV-related stressors as challenges to be overcome rather than as threats to their well-being.

Results suggest that acceptance does not seem to be the converse of denial, as the two coping strategies were not significantly correlated. The cognitive coping strategies of acceptance and positive reframing seem to go beyond mere acknowledgement of the present circumstance and focus more on integration of the experience into present understanding. This can be seen in items from the scale that emphasize learning to live with HIV and trying to grow as a person as a result of being HIV+. It is possible that movement from denial to acceptance occurs in two stages. First, a decrease in denial occurs through acknowledgment of present circumstance. The initial shock of an HIV+ diagnosis begins to wear off and the person acknowledges the reality of the situation through activities such as seeking appropriate medical care. Acceptance might occur at a later point, as the person begins to integrate HIV into his or her identity and views related challenges as opportunities for growth (Lutgendorf *et al.*, 1998).

One can argue that the utility of acceptance coping depends on the context of the stressor; acceptance may be most adaptive when confronting stressors that are largely uncontrollable, and maladaptive when confronting stressors that demand direct action. However, acceptance is not necessarily synonymous with passivity. Acceptance may be a very active process and may facilitate the mobilization of coping strategies that more directly address the stressor. Because

this study was designed to assess broad patterns of coping, it cannot evaluate the match between individual stressors and coping efforts. Alternative methodologies may advance our understanding of the coping process at the level of distinct stress and coping transactions.

### Alternative Stress and Coping Models

The proposed model assumes that coping is a response to life stressors that has the potential to either increase or decrease perceptions of life stressfulness. QoL is viewed as a result of these perceptions. It might also be plausible to argue that coping is a response to the overall perception of life stressfulness that a person experiences. QoL would then be viewed as a result of the choice of coping strategies. To determine whether this alternative model might better fit the data, we tested coping as a mediator of the relationship between perceived stress and QoL. These mediational models were not statistically significant. Although the cross-sectional design of this study limits establishment of directionality, the rejection of an alternative model lends support to the perceived stress mediation model.

### Limitations and Directions for Future Research

This sample consisted of predominately low-income, minority women, and we employed strict exclusionary criteria to create a relatively homogeneous sample. Thus, these findings may not generalize to women of other socioeconomic strata or ethnicities, or very ill women with AIDS. We observed significant variability in time since diagnosis and HIV-related symptom status among the women in the sample. Because the relationships among the studied variables may vary greatly based on time since diagnosis and clinical status, future studies with larger samples should examine these variables as possible moderators of the relationships among coping, perceived stress, and QoL. The relationships among coping, perceived stress, and individual QoL dimensions should also be examined. Because the focus of this study was on coping, the influence of external resources such as social support on quality of life was not investigated. Future studies should examine how these factors influence the proposed pathway. Our limited number of participants prevented us from utilizing more powerful statistical procedures such as structural equation modeling, which would have provided

more conclusive evidence of the hypothesized relationships. It is important to note that differences in stress perceptions may reflect real differences in types and levels of stressors among women. Future studies should examine the proposed pathway utilizing both subjective and objective measures of stressors experienced. The cross-sectional nature of these analyses is another limitation of this study. Prospective analyses are necessary to test the causal nature of the suggested mediational relationship among denial, perceived stress, and QoL.

### Implications and Concluding Considerations

These results may have important implications for interventions designed to improve QoL in HIV+ minority women. First, because perceived life stressfulness was significantly related to QoL, it is plausible that interventions such as cognitive-behavioral stress management (CBSM) that broadly target life stress may be successful in improving quality of life. In a sample of 73 HIV+ gay or bisexual men who were not on HAART therapy, CBSM was found to reduce mood disturbance and perceived stress (Antoni *et al.*, 2000). Furthermore, increased use of cognitive coping skills was found to mediate the positive effects of the CBSM intervention on distress (Lutgendorf *et al.*, 1999). However, there was no evidence that CBSM reduced distress by decreasing denial in HIV+ men. However, other CBSM intervention studies have found that decreased denial coping mediates the effect of the intervention on mental well-being in women with AIDS (Lechner *et al.*, submitted). Future research might use the results from this study to model how CBSM interventions can enhance quality of life by reducing perceived stress in minority women on HAART therapy.

In conclusion, this study expands on current coping research by including an understudied population and utilizing a QoL measure generated from interviews with HIV+ individuals. It meets current calls for research identifying psychosocial variables that are predictors of QoL and mediators of change associated with secondary prevention programs (Pequegnat and Stover, 1999). Perceived stress was found to mediate the relationship between denial coping and cognitive coping skills and QoL in this sample of HIV+, predominately minority women. Prospective and intervention studies are necessary to investigate the causal nature of these relationships and assess applications of this research to interventions designed to improve the quality of life of HIV-seropositive women.

### ACKNOWLEDGMENTS

This project was supported by grants from the National Institute of Mental Health (P01 MH49548 and T32 MH18917). We thank the graduate assistants and staff of the SMART study for their assistance with recruitment and assessment. We are deeply grateful to the participants for sharing their time and experiences with us.

### REFERENCES

- Antoni, M. H., Baggett, L., Ironson, G., August, S., LaPerriere, A., Klimas, N., Schneiderman, N., and Fletcher, M. A. (1991). Cognitive behavioral stress management intervention buffers distress responses and immunologic changes following notification of HIV-1 seropositivity. *Journal of Consulting and Clinical Psychology*, 59, 906-915.
- Antoni, M. H., Cruess, D., Wagner, S., Lutgendorf, S., Kumar, M., Ironson, G., Klimas, N., Fletcher, M. A., and Schneiderman, N. (2000). Cognitive behavioral stress management effects on anxiety, 24-hour urinary catecholamine output, and T-cytotoxic/suppressor cells over time among symptomatic HIV-infected gay men. *Journal of Consulting and Clinical Psychology*, 68, 31-45.
- Baron, R. M., and Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Biggar, H., Forehand, R., Devine, D., Brody, G., and Armistead, L. (1999). Women who are HIV infected: The role of religious activity in psychosocial adjustment. *AIDS Care*, 11, 195-199.
- Burgess, A. P., Carretero, M., Elington, A., Pasqual-Marsettin, E., Lobaccaro, C., and Catalan, J. (2000). The role of personality, coping style and social support in health-related quality of life in HIV infection. *Quality of Life Research*, 9, 423-437.
- Carver, C. S., Scheier, M. F., and Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, 56, 267-283.
- Carver, C. S., Pozo, C., Harris, S. D., Noriega, V., Scheier, M. F., Robinson, D. S., Ketcham, A. S., Moffat, F. L., and Clark, K. C. (1993). How coping mediates the effect of optimism on distress: A study of women with early stage breast cancer. *Journal of Personality and Social Psychology*, 65, 375-390.
- Chesney, M. A., Ickovics, J. R., Chambers, D. B., Gifford, A. L., Neidig, J., Zwickl, B., and Wu, A. W. (2000). Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: The AACTG adherence instruments. Patient Care Committee and Adherence Working Group of the Outcomes Committee of the Adult AIDS Clinical Trials Group (AACTG). *AIDS Care*, 12, 255-266.
- Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 385-396.
- First, M. B., Spitzer, R. L., Gibbon, M., and Williams, J. B. W. (1997). *Structured clinical interview for DSM-IV axis I disorders-Non-patient edition* (Version 2.0-4/97 revision). New York: Biometrics Research Department, New York State Psychiatric Institute.
- Folkman, S., Schaefer, C., and Lazarus, R. (1979). Cognitive processes as mediators of stress and coping. In V. Hamilton and D. M. Warburton (Eds.), *Human stress and cognition* (pp. 265-298). New York: Wiley.



- Friedland, J., Renwick, R., and McColl, M. (1996). Coping and social support as determinants of quality of life in HIV/AIDS. *AIDS Care*, 8, 15–31.
- Hamilton, A. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery, and Psychiatry*, 23, 56–61.
- Holmes, W., and Shea, J. (1997). Performance of a new, HIV/AIDS-targeted quality of life (HAT-QoL) instrument in asymptomatic seropositive individuals. *Quality of Life Research*, 6, 561–571.
- Holmes, W. C., and Shea, J. A. (1998). A new HIV/AIDS-targeted quality of life (HAT-QoL) instrument: Development, reliability, and validity. *Medical Care*, 36, 138–154.
- Ironson, G., Friedman, A., Klimas, N., Antoni, M., Fletcher, M. A., LaPerriere, A., Simoneau, J., and Schneiderman, N. (1994). Distress, denial, and low adherence to behavioral interventions predict faster disease progression in gay men infected with human immunodeficiency virus. *International Journal of Behavioral Medicine*, 1, 90–105.
- Ironson, G., Solomon, G. F., Balbin, E. G., O'Cleirigh, C., George, A., Kumar, M., Larson, D., and Woods, T. E. (2002). The Ironson-Woods spirituality/religiousness Index is associated with long survival, health behaviors, less distress, and low cortisol in people with HIV/AIDS. *Annals of Behavioral Medicine*, 24, 34–48.
- Janz, N. K., Janevic, M. R., Dodge, J. A., Fingerlin, T. E., Schork, M. A., Mosca, L. J., and Clark, N. M. (2001). Factors influencing quality of life in older women with heart disease. *Medical Care*, 39, 588–98.
- Lazarus, R. S., and Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Lechner, S. C., Antoni, M. H., Lydston, M. A., LaPerriere, A., Ishii, M., Devieux, J., Stanley, H., Ironson, G., Schneiderman, N., Brondolo, E., Tobin, J., and Weiss, S. (submitted). *Does coping mediate the effect of cognitive-behavioral stress management interventions on quality of life in women with AIDS?*
- Leserman, J., Petitto, J. M., Golden, R. N., Gaynes, B. N., Gu, H., Perkins, D. O., Silva, S. G., Folds, J. D., and Evans, D. L. (2000). Impact of stressful life events, depression, social support, coping, and cortisol on progression to AIDS. *American Journal of Psychiatry*, 157, 1221–1228.
- Lutgendorf, S. K., Antoni, M. H., Ironson, G., Starr, K., Costello, N., Zuckerman, M., Klimas, N., Fletcher, M. A., and Schneiderman, N. (1998). Changes in cognitive coping skills and social support during cognitive behavioral stress management intervention and distress outcomes in symptomatic human immunodeficiency virus (HIV)-seropositive gay men. *Psychosomatic Medicine*, 60, 204–214.
- Marlink, R., Kao, H., and Hsieh, E. (2001). Clinical care issues for women living with HIV and AIDS in the United States. *AIDS Research and Human Retroviruses*, 17, 1–33.
- O'Keefe, E. A., and Wood, R. (1996). Quality of life in HIV infection. *Scandinavian Journal of Gastroenterology*, 31, 30–32.
- Pakenham, K. I., and Rinaldis, M. (2002). Development of the HIV/AIDS Stress Scale. *Psychology and Health*, 17, 203–219.
- Penedo, F. J., Gonzalez, J. S., Davis, C., Dahn, J., Antoni, M. H., Ironson, G., Malow, R., and Schneiderman, N. (2003). Coping and psychological distress among symptomatic HIV+ men who have sex with men. *Annals of Behavioral Medicine*, 25, 203–213.
- Pequegnat, W., and Stover, E. (1999). Behavioral research needs and challenges of new treatments: AIDS as a chronic illness. In D. G. Ostrow and S. C. Kalichman (Eds.), *Psychosocial and public health impacts of new HIV therapies* (pp. 183–194). New York: Kluwer Academic/Plenum.
- Power, C., Selnes, O., Grim, J., and McArthur J. (1995). HIV Dementia Scale: A rapid screening test. *Journal of AIDS and Human Retroviruses*, 8, 273–278.
- Roth, S., and Cohen, L. J. (1986). Approach, avoidance, and coping with stress. *American Psychologist*, 4, 813–819.
- Somlai, A., Kelly, J., Kalichman, S., Mulry, G., Sikkema, K., McAuliffe, T., Multhau, K., and Davantes, B. (1996). An empirical investigation of the relationship between spirituality, coping, and emotional distress in people living with HIV infection and AIDS. *Journal of Pastoral Care*, 50, 181–191.
- Swindells, S., Mohr, J., Justis, J. C., Berman, S., Squier, C., Wagener, M. M., and Singh, N. (1999). Quality of life in patients with human immunodeficiency virus infection: Impact of social support, coping style and hopelessness. *International Journal of STD and AIDS*, 10, 383–391.
- Thompson, S. C., Nanni, C., and Levine, A. (1996). The stressors and stress of being HIV-positive. *AIDS Care*, 8, 5–14.
- Wilkinson, G. S. (1993). *The Wide Range Achievement Test*, 3rd ed. Wilmington, DE: Wide Range.
- Williams, J. (1980). *Structured interview guide for the Hamilton Depression and Anxiety Scales*. New York: Biometrics Research Department, New York State Psychiatric Institute.
- Woods, T., Antoni, M. H., Ironson, G., and Kling, D. (1999). Religiosity is associated with affective and immune status in symptomatic HIV-infected gay men. *Journal of Psychosomatic Research*, 46, 165–176.