Changes in Mood and Depressive Symptoms and Related Change Processes During Cognitive–Behavioral Stress Management in HIV-Infected Men

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This study examined the effects of a cognitive–behavioral stress management (CBSM) intervention vs. a no-treatment control group in 100 HIV-infected gay men. CBSM participants showed significant decreases in mood disturbance and depressive symptoms as well as changes in coping, perceptions of social support, self-efficacy, and dysfunctional attitudes. Stepwise regression analyses were conducted to determine which of these changes were most important for reductions in mood disturbance and depressive symptoms. Although increases in self-efficacy emerged as a significant predictor of reduction in both mood disturbance and depressive symptoms, improvements in behavioral coping strategies were most closely tied to lowered overall mood disturbance whereas improvements in cognitive coping strategies and reduction in dysfunctional attitudes were more closely associated with decreases in depressive symptoms. These results support the use of multimodal CBSM interventions for HIV-infected men as a way to modify many different types of processes independently associated with different indicators of psychological adjustment.

KEY WORDS: cognitive–behavioral stress management; HIV; coping; social support; self-efficacy.

COGNITIVE–BEHAVIORAL STRESS MANAGEMENT AND HIV INFECTION

Given the abundance of stressors that often accompany HIV infection (Thompson, Nanni, & Levine, 1996) and the concomitant experience of psychological

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distress states that may occur (Chesney & Folkman, 1994), cognitive–behavioral interventions designed to reduce distress may be beneficial for HIV-infected individuals. Cognitive–behavioral stress management (CBSM) interventions for HIV+ men in particular have been shown to have beneficial effects on mood (Antoni et al., 1991; Kelly et al., 1993; Lee, Cohen, Hadley, & Goodwin, 1999; Lutgendorf et al., 1997, 1998), quality of life, and HIV-related intrusive thoughts (McCain, Zeller, Cella, Urbanski, & Novak, 1996).

Some group-based interventions for individuals facing a chronic or life-threatening illness are designed to focus on one particular issue and thus employ one main treatment strategy, such as education (e.g., Dalton, 1987) or relaxation training (e.g., Burish & Lyles, 1981). CBSM, however, often employs multiple treatment techniques and has a number of targets, including reducing tension and arousal levels, increasing awareness of stress and the consequences of stress, changing stressor appraisals, enhancing adaptive coping, and improving quality of life, to name a few. As such, there are a number of different techniques that are taught to group members.

Coping Skills Training

A common goal of almost any cognitive–behavioral intervention is to move the individual away from maladaptive coping strategies towards more psychologically adaptive coping strategies. Numerous studies of HIV-infected individuals have demonstrated that active coping strategies tend to be associated with less psychological distress, whereas avoidance strategies are usually related to greater levels of distress (e.g., Leserman, Perkins, & Evans, 1992; Namir, Wolcott, Fawzy, & Alumbaugh, 1987; Pakenham, Dadds, & Terry, 1994). There is some evidence that emotion-focused coping may be even more adaptive than active problem-focused coping when the situation is uncontrollable, such as having HIV. Remien, Rabkin, Williams, and Kotoff (1992) found that some of the strategies articulated by their sample of long-term AIDS survivors were clearly emotion-focused, such as talking to others, maintaining a positive attitude, socializing, and pursuing pleasurable activities. Their coping choices, however, also included more active, problem-focused strategies, such as seeking information and good medical care and counseling (Remien et al., 1992). Perhaps what is most important is a balance between emotion-focused and problem-focused strategies that are in accordance with the type of stressor.

One of the aims of this study is to test whether a group CBSM intervention designed for HIV-infected gay men can modify a variety of coping skills. In an interim report of HIV-infected men enrolled in a trial testing the effects of CBSM, the intervention enhanced selected cognitive coping strategies, particularly positive reframing and acceptance, as well as the behavioral strategy of active coping (Lutgendorf et al., 1998). Furthermore, increases in these strategies were associated with improvements in mood, particularly lower dysphoria, anxiety, and overall distress (Lutgendorf et al., 1998). One goal of this study will be to replicate and expand these findings in the final sample for this trial, made up of nearly triple the number of cases included in the interim report. In particular we will explore the effects of CBSM on 13 coping strategies spanning problem and emotion-focused approaches.

Social Support

Many studies have documented the importance of social support in general, and for HIV-infected individuals in particular. Cohen and Wills (1985) propose that social support may be beneficial for individuals as a stress buffer, in which social support acts to protect the individual from the potential deleterious consequences of a stressful situation, or as a main effect—individuals who are more integrated socially will have a greater sense of well-being. Greater levels of support received or satisfaction with one's support network are associated with less distress and better adjustment among HIV+ individuals (e.g., Nott, Vedhara, & Power, 1995; Pakenham et al., 1994). Social support may not only help improve the HIV-infected individual's overall sense of well-being, but also work as a significant buffer against the acute and chronic stressors associated with HIV. We reasoned that social support is a vital change process to investigate in this study, as any group intervention is likely to provide participants with a certain amount of support. In the previously described study of HIV+ gay men, CBSM not only improved several dimensions of coping but also enhanced perceived social support (Lutgendorf et al., 1998). Furthermore, increases in social support were related to reductions in distress. This study will attempt to replicate these findings in a larger sample and expand the analysis to multiple indicators of emotion-focused and instrumental support.

Self-Efficacy

There are two other theoretically important change processes of CBSM that have not been systematically investigated during the course of intervention. These include increases in self-efficacy and reductions in dysfunctional attitudes (cognitive distortions). Ozer and Bandura (1990, p. 472) define perceived self-efficacy as "concerned with people's belief in their capabilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over given events." Very little research has investigated the importance of self-efficacy for an HIV+ individual's psychological well-being. One study found that among HIV-infected gay men who experienced Hurricane Andrew, coping self-efficacy was related to lower levels of distress after the storm (Benight et al., 1997). One prior study did show that a cognitive-based group intervention was successful in increasing coping self-efficacy in HIV+ gay men, although the unique contribution of self-efficacy beyond elements such as social support changes was not explored (Chesney, Folkman, & Chambers, 1996). This study focused on one specific type of self-efficacy, cognitive coping self-efficacy (CCSE), defined as an individual's belief in their ability to restructure distress-provoking thoughts. We focused on this type of coping self-efficacy because a key aspect of our CBSM intervention draws from Beck's model of cognitive therapy (Beck, Rush, Shaw, & Emery, 1979) and involves challenging and restructuring distorted cognitive appraisals. Incoming information is often biased and distorted based on existing schemas. Although schemas are often efficient ways to process information, when centered around certain themes, such as loss, danger, threat, or unworthiness, they can lead to maladaptive cognitive appraisals (Robins & Hayes, 1993).

Dysfunctional Attitudes

Beck's model proposes that it is an individual's negative and distorted appraisals of a situation that are responsible for the negative, affective reactions experienced (Beck et al., 1979). Thus, if an individual is able to change his or her cognitive appraisals to be more accurate and realistic, he/she will be less likely to experience negative affect. Within a therapeutic intervention, this process involves helping the individual gain increased awareness of his appraisal processes, challenging cognitive distortions and underlying dysfunctional attitudes, and replacing these with more adaptive, accurate appraisals. Although changing cognitive distortions to be more accurate and adaptive is a clear goal of many CBSM interventions, a more durable change may involve modifying underlying core themes or beliefs that may be pervasive across situations. In line with prior work, we refer to these in this study as dysfunctional attitudes (Weissman & Beck, 1979). Previous work has related the presence of these dysfunctional attitudes to greater negative mood states, especially depressed mood, in a cross-sectional study of HIV-infected men (Penedo et al., 2001). However, no published studies to date have measured changes in these attitudes over the course of an intervention for HIV+ individuals and related these to concomitant changes in distress. Given the amount of attention cognitive restructuring is given in CBSM, we assessed changes in dysfunctional attitudes as a final intervention change process in this study.

The purpose of this study was to replicate previous research documenting the beneficial effects of a 10-week CBSM intervention for HIV-infected gay men on mood, as well as intervention targets such coping, and perceived social support, using the largest sample studied to date. We also investigated changes in additional targets including dysfunctional attitudes and CCSE over the course of the intervention since these have emerged in recent studies as important predictors of psychological adjustment in HIV-infected men (Benight et al., 1997; Penedo et al., 2001). Finally we examined the relative contribution of these different change processes to reductions in overall mood disturbance and depressive symptoms. On the basis of our CBSM model (Antoni, 1997), we hypothesized that increases in adaptive coping strategies, such as active coping, acceptance, positive reinterpretation, and growth and seeking support, and increases in perceived social support and self efficacy would be associated with decreases in negative mood states and depression. We also hypothesized that decreases in behavioral disengagement and dysfunctional attitudes would relate to decreased negative mood state and depressive symptoms.

METHODS

Participants

Between 1992 and 1997, HIV-positive men were recruited for a study of stress management and relaxation training primarily through flyers, physician referrals, referrals from previous participants, and HIV/AIDS service organizations. Participants were required to have at least an eighth-grade education and the ability to read and

write fluently in English. Participants were also required to have at least one HIV-related (but non-AIDS defining) symptom or to have a T-helper-inducer (CD4) cell count between 200 and 700 cells/mm³.

Exclusion criteria were designed to increase sample homogeneity, to eliminate individuals who might not be able to benefit from or be disruptive to the group environment, and to reduce confounding factors that might affect the dependent measures. Individuals were excluded if they revealed a current alcohol or substance dependency as determined by *DSM-III-R* criteria, a current major psychiatric disorder (e.g., bipolar affective disorder, major depressive disorder with melancholia, and anxiety disorders other than adjustment disorders) or a previous history of organic mental disorder, schizophrenia, or other major psychopathology as determined on the Structured Clinical Interview for the *DSM-III-R* Axis I Disorders, Nonpatient, HIV Edition (SCID-NP-HIV; Spitzer, Williams, & Gibbon, 1988). We also excluded those with a *DSM-III-R* Axis II diagnosis of antisocial or borderline personality disorder as determined on the Structured Clinical Interview Guide for *DSM-III-R* Axis II Disorders (Spitzer, Williams, Gibbon, & First, 1990). Structured Interview Guide for the Hamilton Anxiety and Depression scales (SIGH-AD; Hamilton, 1959, 1960; Williams, 1988), depression (nonorganic), or HIV-corrected anxiety scores > 15 were also exclusionary, as was the presence of cognitive deficits as evidenced by a score of fewer than 25 on the Mini Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975).

Having ever received a clinical AIDS diagnosis (Centers for Disease Control, 1993) or a CD4 cell count less than 200 cells/mm³ at screening were also exclusionary criteria. These criteria were used to create a sample of men who were in the symptomatic stage of HIV infection but prior to the development of AIDS based upon clinical and immunologic criteria (Centers for Disease Control, 1993). We also excluded those experiencing any recent acute events, such as an acute infection, changes to medications, or death of a lover or a close friend in the past month. We also excluded men who had initiated formal psychotherapeutic interventions or aerobic fitness training programs in the prior 3 months. We monitored the use of low-dose neuroleptics, antidepressants, benzodiazipines, antiretroviral medications, and protease inhibitors.

Psychological Outcome Measures

Profile of Mood States

The Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) is a 65-item adjective checklist designed to assess mood over the past week. Respondents are asked to rate each adjective on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). The POMS has six individual mood subscales and one overall index of distress called Total Mood Disturbance (TMD). The POMS subscales have been shown to have internal consistencies near .90 or above and test-retest reliabilities ranging from .65 to .74. Several studies have shown the POMS to have good predictive and construct validity (McNair et al., 1971). The POMS has also been used in previous

studies with HIV-infected samples and has been shown to be sensitive to stressor-related affective responses (Antoni et al., 1990; Lutgendorf et al., 1998). As a data reduction strategy, the POMS subscales tested in this study were a negative mood composite (depression, anxiety, anger) as well as TMD scores (to include combined effects of positive and negative mood states).

Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)

Because mood states may be only a transient indicator of psychological adjustment, we also included a standard measure of depressive symptoms that reflect a more stable indicator of adjustment. The BDI is a 21-item self-report measure designed to assess affective, behavioral, and somatic aspects of depression. It has a split-half Spearman–Brown reliability of .93 for psychiatric patients (Beck, 1970), and a mean alpha coefficient of .81 for nonpsychiatric patients (Beck, Steer, & Garbin, 1988). The BDI has correlated highly with other measures of depression such as the Hamilton Rating Scale for Depression and discriminated well between various groups of psychiatric and nonpsychiatric populations (Beck et al., 1988).

Psychosocial Change Processes

COPE (Carver, Scheier, & Weintraub, 1989)

The COPE is a 60-item multidimensional measure that assesses the strategies used to cope with stress. The COPE may be used to assess either situational coping strategies or dispositional coping. In this study, the situational version was used. Participants were asked to indicate how they dealt with being HIV+ (including its symptoms) in the past month. The COPE is theoretically-based and measures conceptually different aspects of problem-focused coping (e.g., active coping, planning), emotion-focused coping (e.g., seeking emotional social support, acceptance), and less adaptive types of coping (e.g., behavioral or mental disengagement). The COPE scales have been shown to have both convergent and discriminant validity and fair-to-good reliabilities ($\alpha = .55-.80$). Given our interest in identifying the full repertoire of coping responses, all 13 scales of the COPE were used in this study.

Social Provisions Scale (SPS; Cutrona & Rusell, 1987)

The SPS is a 24-item self-report inventory designed to assess the extent to which an individual perceives his or her social relationships as providing opportunities to receive and give various types of emotional and instrumental social support. It is composed of six subscales (Attachment, Social Integration, Reassurance of Worth, Reliable Alliance, Guidance, and Opportunity for Nurturance) as well as a Total Social Provisions score. All of the scales with the exception of opportunities for nurturance, which indicates support provided rather than received, were used in this study. Alpha reliabilities for the SPS subscales have been shown to be fair, ranging from .65 to .76, whereas the reliability of the Total Social Provisions score is .92. In addition to the information provided in the SPS, two other aspects of social support were measured

in this study. These were tangible social support and belonging, both adapted from the Interpersonal Support Evaluation List (ISEL; Cohen & Hoberman, 1983).

Cognitive Coping Self-Efficacy

CCSE was derived from a 10-item self-report self-efficacy measure developed for use in this sample (Ironson, Antoni, August, & Baggett, 1987). The CCSE subscale was factor-analytically derived and utilized five items ($\alpha = .89$). The factor analysis yielding this dimension of self-efficacy was conducted on an independent sample of HIV+ gay or bisexual men (Wagner, 1996). CCSE refers to an individual's perceived ability to manage stressful events and anxiety-provoking thoughts through cognitive restructuring. This dimension accounted for 42.3% of the scale's total variance. Sample items from the CCSE include the following: "To what extent are you able to interpret stressful events realistically rather than catastrophically?"; "To what extent are you able to reduce anxiety-producing thoughts?"; "To what extent are you able to control disturbing thoughts?"; "In a difficult situation to what extent are you able to have positive as well as negative thoughts?"

Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1979)

The DAS is a 100-item self-report measure used to identify dysfunctional or negative beliefs, which may in turn be related to psychological distress. The items of the DAS are rated on a 7-point Likert scale ranging from 1 (*totally agree*) to 7 (*totally disagree*) and yield a total composite score, with higher scores indicative of more cognitively distorted and dysfunctional attitudes and beliefs. A factor analysis of the DAS with HIV-infected gay men (Penedo, 1998) revealed a one-factor solution of the 100 items. Therefore, a shorter 40-item version of the DAS that also yields a total composite score was used in this study ($\alpha = .88$).

Control Variables

A number of variables that could have confounded the effects of the intervention were investigated as control variables. These included cigarette use, alcohol use, caffeine intake, aerobic exercise, and sleep. Alcohol use in the past week was assessed as the number of alcoholic drinks consumed in a week. Participants reported the average number of hours spent exercising and the average number of hours of sleep they had each night over the past week. They also reported how much coffee, on average, they drank and packs of cigarettes they smoked each day during the last week. Antiretroviral and protease inhibitor use at the commencement of the study, obtained via a physical examination completed by the study physician, was also investigated as a potential confounding variable.

Procedure

Potential participants were telephone-screened to determine their initial eligibility. At this time, participants who were not excluded on the basis of their telephone interview were scheduled to come to the study office for further assessment.

Participants gave their informed consent, were briefed on the study and the day's activities, and were given a chance to ask questions.

Standardized psychiatric interviews were administered by a predoctoral research assistant trained specifically in the administration of these interviews. The psychiatric assessment battery consisted of the SCID-NP-HIV (Spitzer et al., 1988), the SIGH-AD scales (Hamilton, 1959, 1960; Williams, 1988), and the MMSE (Folstein et al., 1975). Participants were then given a physical examination by a registered nurse or physician and had their blood drawn to confirm that their CD4 cell count was >200 cells/mm^3. Eligible participants were then given a psychosocial questionnaire to take home with them. They returned approximately 1 week later to return their questionnaire and were paid $25.00 at that time. After completing all of these procedures, participants were randomized to either the experimental (10-week CBSM intervention) or the control condition. After completing the 10-week CBSM intervention or the 10-week period since study entry (controls), participants returned to the study office to complete another psychosocial assessment and were again paid $25.00.

Intervention Condition

Those men participating in the experimental condition attended a 10-week group-based CBSM intervention, referred to as the GET SMART (*G*roup *E*xperienced *T*herapy for *S*tress *M*anagement and *R*elaxation *T*raining) intervention (Antoni, Schneiderman, & Ironson, 1998). Each group typically consisted of 4–9 participants and two group leaders and met weekly for approximately 2.5 h. Groups were led by advanced clinical health psychology predoctoral graduate students or postdoctoral fellows according to a training manual.

Group leaders received weekly face-to-face supervision by a licensed clinical psychologist and a board-certified psychiatrist. The intervention focused on a variety of cognitive–behavioral stress-reducing techniques, and each session consisted of a relaxation training exercise and didactic component. In the didactic component, the group leaders presented various stress management techniques, and participants were urged to discuss the techniques and relate them to the stressors in their lives as often as possible. In addition, each session included one or more activities designed to facilitate group discussion and increase the participants' ability to comprehend and practice the relevant techniques. These activities were facilitated through in-session worksheets, role plays, or group interaction exercises. Topics focused on in the intervention included increasing awareness of stressors and the stress response, cognitive self-monitoring and restructuring, coping skills training, assertiveness training, anger management, and identification and enhancement of social support.

CBSM participants were also taught a variety of arousal-reducing relaxation techniques during the course of the intervention, including progressive muscle relaxation, imagery, deep-breathing exercises, autogenic training, and meditation. Participants were encouraged to practice the techniques presented each week outside of the group and were given structured homework exercises to facilitate practice. Weekly homework assignments typically consisted of one or more written self-monitoring assignments (e.g., a cognitive restructuring monitoring sheet) and daily relaxation practice. All of these materials were contained in a participant workbook.

Control Condition

Participants in the control condition completed pre–post assessments identical to those in the intervention condition. After their 10-week follow-up assessment, participants were invited to attend a 1-day group stress management seminar. All study analyses were conducted on data obtained before participants attended this seminar.[7]

Statistical Analyses

This study utilized a multivariate split-plot randomized experimental model, with group assignment (CBSM vs. control) as the between-participants factor and time (preintervention vs. postintervention) as the within-participants factor. Before conducting hypothesis-testing analyses, all outcome and predictor variables were checked for normality and the presence of extreme outliers. Next, the two groups were compared on a number of demographic and control variables to ensure they were equivalent. The groups were also compared on baseline values of the outcome measures. Additionally, baseline measures of the control variables as well as changes in the controls over the course of the intervention were correlated with changes in the outcome measures to determine the influence of potentially confounding variables. All control variable correlations with a significant level $<.05$ were controlled for in subsequent analyses. To evaluate the effects of CBSM, we conducted multivariate analyses of variance (MANOVA) on the distress indicator variables (POMS composite + BDI) followed by univariate ANOVAs and paired t tests ($p < .05$) as warranted. Similar analyses were conducted to test the effects of CBSM on intervention change process measures. Stepwise multiple regression analyses were used to delineate unique contributions of change process variables in predicting changes in total mood disturbance and depressive symptoms over the study period.

RESULTS

Sample Characteristics

Of 163 initially enrolled, only 127 met the inclusion criteria.[8] Participants were between the ages of 23 and 52, with a mean age of 35.81 ($SD = 7.1$). The majority of the men were Caucasian (55%) or Hispanic (33%) and had at least some college education (80%). The average length of time from HIV diagnosis to study enrollment was 4–5 years ($M = 53.95$ months, $SD = 38.1$), with the typical participant having

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[7]As there was psychological data for certain measures (COPE, SPS, POMS, BDI) available for many participants midway through the 10-week period, missing 10-week posttreatment psychological data were substituted using the mean delta scores (baseline to 5-week follow-up) for the participant's group (i.e., CBSM or control). For those participants with no 5-week psychological data available, missing 10-week data were not substituted. Missing baseline demographic or control variable data were not substituted.

[8]From an initial sample of 163 men, 17 were excluded because of a variety of reasons (e.g., CD4 # <200 cells/mm^3, abnormal liver function, bipolar disorder, etc.), and 21 dropped from the study prior to finishing their baseline assessment and before being assigned to a group.

Table I. Comparison Between CBSM and Control Groups on Baseline Demographics

Comparisons	Control ($N = 38$)	CBSM ($N = 62$)	Group
Age	$M = 35.77\ (6.8)$	$M = 35.83\ (7.3)$	$t(89) = -0.04, p > .10$
CD4 # cells/mm^3	$M = 394.68\ (168.3)$	$M = 462.24\ (253.1)$	$t(95) = -1.44, p > .10$
HIV medication status			$\chi^2(3) = 0.92, p > .10$
No medication	16	34	
1 Antiretroviral	6	8	
2 + Antiretrovirals	7	13	
Antiretroviral + PI	4	5	
Missing	5	2	
CDC HIV status			$\chi^2(1) = 1.09, p > .10$
Category A	16	37	
Category B	17	25	
Missing	5	0	
Ethnicity			$\chi^2(1) = 0.12, p > .10$
Caucasian	22	33	
Hispanic	12	21	
Other/missing	4	8	
Relationship status			$\chi^2(2) = 4.43, p > .10$
Single	1	10	
Open relationship	22	34	
Closed relationship	12	15	
Missing	3	3	
Living arrangements			$\chi^2(1) = 0.53, p > .10$
Live alone	12	28	
Live with others	19	32	
Missing	7	2	
Employment status			$\chi^2(2) = 1.60, p > .10$
Full or part time	23	47	
Student	3	2	
Unemployed	5	11	
Missing	7	2	
Education			$\chi^2(2) = 0.63, p > .10$
High school or less	2	6	
Trade school/some college	12	19	
College graduate/graduate degree	17	35	
Missing	7	2	

experienced 2–3 HIV-related symptoms ($M = 2.13$, $SD = 1.9$). Mean CD4 number at baseline was 436.47 cells/mm^3 ($SD = 226.0$).

Of the 125 eligible men who began the trial, 25 dropped out. Of the 100 participants who finished the study, 62 were randomized into the CBSM condition and 38 into the control condition.[9] There were no significant difference at baseline between those who did and did not complete the trial. Chi-square analyses revealed no significant differences between groups in baseline HIV medication status, CDC-based HIV disease stage, ethnicity, relationship status, living arrangements, employment status, or education (see Table I). Independent samples t tests also revealed that the groups did not differ significantly in age or CD4 cell number, nor on distress (POMS, BDI) or change process variables (e.g., coping, social support, dysfunctional attitudes, self-efficacy) at study entry, all ps > .05.

[9]Participants were randomized in a 2:1 ratio to facilitate within-CBSM analyses.

Changes in Mood State and Depressive Symptoms

We hypothesized that men in the 10-week CBSM condition would show decreases in psychological distress, whereas men in the control condition would show little change on these measures. Results suggest partial support for this hypothesis. A 2×2 MANOVA, with group assignment (CBSM or control) as the between-participants factor and time point (baseline and 10-week follow-up) as the within-participants factor, was conducted using the BDI and the POMS negative mood composite as the dependent variables. The MANOVA revealed a significant interaction effect between experimental condition and time, $F(4, 84) = 2.48$, $p < .05$. Univariate ANOVAs revealed significant Group $\times$ Time effects for POMS-TMD, $F(1, 88) = 4.33$, $p < .05$, and nearly significant Group $\times$ Time effects for BDI scores, $F(1, 90) = 2.66$, $p < .10$.

Follow-up paired samples t tests were then conducted on the BDI and the individual POMS-TMD within each condition separately. As hypothesized, there were significant decreases in BDI scores, $t(57) = 4.02$, $p < .01$, over the course of the 10 weeks in the CBSM group, whereas control participants showed little change ($p > .10$). Furthermore, POMS-TMD scores were found to decrease significantly in the CBSM group, $t(56) = 3.65$, $p < .01$, with little change occurring in the control group ($p > .10$) (see Table II for means and *SD*s).

Changes in Processes Associated With CBSM

Coping

A MANOVA using the 13 subscales of the COPE revealed a significant Condition $\times$ Time effect, $F(13, 76) = 3.52$, $p < .001$. Separate Univariate ANOVAs for the individual COPE scales hypothesized to be affected by CBSM revealed significant Group $\times$ Time effects for positive reinterpretation and growth, $F(1, 88) = 10.99$, $p < .01$, and seeking emotional social support, $F(1, 88) = 5.34$, $p < .03$. There was a marginally significant Group $\times$ Time effect for acceptance, $F(1, 88) = 3.06$, $p < .09$. Paired samples t tests within the CBSM group revealed significant increases in active coping, $t(55) = -2.04$, $p < .05$, and seeking emotional social support, $t(55) = -3.07$, $p < .01$, as well as marginally significant increases in positive reinterpretation and growth, $t(55) = -1.66$, $p < .10$. There were no other significant changes on any COPE scale within the CBSM group (all ps $> .10$). Within the control group, there were actually *decreases* in positive reinterpretation and growth, $t(33) = 2.83$, $p < .01$, and acceptance, $t(33) = 2.24$, $p < .05$, (see Table II for means and *SD*s).

Social Support

A MANOVA with the seven Social Support scales (Reliable Alliance, Tangible Social Support, Guidance, Attachment, Social Integration, Reassurance of Worth, and Belonging) also produced a significant Condition $\times$ Time interaction effect, $F(7, 80) = 2.20$, $p < .05$. Separate univariate ANOVAs for the individual Social Support scales revealed significant Group $\times$ Time effects for reliable alliance, $F(1, 88) = 5.74$, $p < .02$, and guidance, $F(1, 88) = 4.73$, $p = .03$. There was

Table II. Means and Standard Deviations for CBSM-Associated Change Process Variables and Outcome Variables

	Control		CBSM	
	Pre	Post	Pre	Post
COPE scales				
Positive reinterpretation	12.42 (3.1)	11.27 (3.3)	12.87 (2.2)	13.36 (2.4)
Active coping	10.74 (2.7)	10.62 (2.8)	11.56 (2.5)	12.23 (2.6)
Planning	10.73 (3.4)	10.54 (2.6)	12.00 (2.7)	12.27 (3.4)
Seek instr. social support	11.10 (3.5)	11.27 (3.6)	11.83 (3.3)	12.67 (3.1)
Seek emotional social support	10.22 (4.0)	10.07 (3.9)	10.55 (3.8)	12.08 (3.4)
Suppress comp. action	8.84 (2.7)	8.10 (2.6)	9.90 (1.9)	9.63 (3.0)
Religion	8.90 (3.6)	8.77 (4.5)	9.76 (4.0)	9.56 (4.3)
Acceptance	12.26 (2.5)	11.28 (2.9)	12.58 (2.7)	12.61 (2.4)
Mental disengagement	9.54 (2.1)	8.28 (2.5)	9.74 (2.3)	9.82 (2.5)
Venting	8.97 (2.7)	9.45 (3.1)	10.24 (2.9)	9.75 (3.1)
Behavior disengagement	7.02 (2.6)	6.77 (2.5)	6.81 (2.3)	6.55 (2.4)
Denial	5.83 (2.5)	5.18 (1.9)	6.06 (2.4)	5.93 (2.6)
Restraint	8.95 (2.5)	8.98 (2.8)	9.62 (2.3)	10.29 (2.8)
SPS/ISEL scales				
Attachment	11.99 (3.5)	12.02 (3.6)	11.47 (3.1)	12.30 (2.9)
Belonging	6.14 (1.6)	6.62 (1.3)	6.22 (1.6)	6.32 (1.6)
Guidance	13.26 (3.0)	13.14 (2.9)	12.75 (3.1)	13.61 (2.5)
Social integration	13.05 (2.8)	12.66 (2.6)	12.50 (2.5)	12.81 (2.3)
Reassurance of worth	12.58 (2.6)	12.71 (2.7)	12.25 (2.6)	13.02 (2.4)
Reliable alliance	14.14 (2.4)	13.60 (2.6)	13.44 (2.7)	13.82 (2.4)
Tangible SS	10.08 (2.0)	10.32 (1.6)	9.53 (2.1)	9.90 (1.9)
Total SS	81.85 (15.1)	81.66 (14.2)	78.05 (15.0)	81.67 (13.7)
CCSE scale	16.28 (4.2)	17.17 (4.8)	16.17 (4.3)	18.34 (3.1)
DAS	117.62 (39.1)	114.65 (32.3)	125.83 (31.3)	110.01 (26.0)
POMS scales				
Anxiety	12.07 (7.6)	11.29 (8.2)	12.14 (6.7)	8.77 (5.5)
Depression	13.49 (13.8)	12.39 (12.8)	13.05 (9.1)	9.50 (8.3)
Anger	10.60 (10.6)	12.21 (11.7)	12.13 (8.2)	8.78 (6.8)
TMD	37.24 (42.9)	36.98 (46.5)	37.86 (30.5)	23.62 (29.8)
BDI	9.14 (7.2)	8.03 (6.6)	10.32 (6.6)	7.01 (6.1)

Note. BDI = Beck Depression Inventory, CCSE = Cognitive Coping Self-Efficacy, DAS = Dysfunctional Attitudes Scale, ISEL = Interpersonal Support Evaluation List, POMS = Profile of Mood States, SPS = Social Provisions Scale, SS = Social Support, TMD = Total Mood Disturbance.

a marginally significant Group $\times$ Time effect for attachment, $F(1, 88) = 2.43$, $p = .09$. Paired samples t tests within the CBSM group showed significant increases in attachment, $t(55) = -3.07$, $p < .01$; guidance, $t(55) = -2.83$, $p < .01$; reassurance of worth, $t(55) = -3.44$, $p < .01$; and a marginally significant increase in tangible social support, $t(55) = -1.76$, $p < .10$. There were no significant changes in the other Social Support scales within the CBSM group (all ps > .10). Within the control group, there was a marginally significant decrease in reliable alliance, $t(33) = 2.00$, $p < .10$, but no significant changes in any other Social Support scale within the control group (all ps > .10).

Cognitive Coping Self-Efficacy

There was a marginally significant Group $\times$ Time interaction effect for CCSE scores, $F(1, 93) = 2.96$, $p < .10$. Follow-up analyses revealed a significant increase

in self-efficacy for CBSM participants, $t(58) = -4.92$, $p < .001$. Control participants showed no significant change in CCSE over the course of the 10 weeks ($p > .10$).

Dysfunctional Attitudes

There was a significant Group × Time effect for the DAS total score, $F(1, 76) = 4.13$, $p < .05$. Post hoc tests revealed a significant decrease in the DAS for CBSM participants, $t(47) = 3.69$, $p < .001$, whereas control participants showed no significant change ($p > .10$).

These analyses together support our hypotheses that CBSM can increase adaptive cognitive and behavioral HIV-specific coping strategies, increase perceptions of social support provisions, increase self-efficacy, and decrease dysfunctional attitudes. In some cases CBSM also appeared to buffer or mitigate detrimental changes in these processes that were occurring in the control group (e.g., decreased frequency of coping strategies such as positive reinterpretation and growth and acceptance as well as losses in social provisions). We now examine how changes in these processes relate to reductions in mood disturbance and depressive symptoms that occurred over this 10-week period. In that changes observed in process measures were accounted for by a combination of movements within both the CBSM and control groups, data for these two conditions were pooled for the remaining analyses.

Secondary Analysis of Processes Associated With Reduction in Mood Disturbance and Depressive Symptoms

Here we investigated which particular change processes (i.e., changes in coping, social support, self-efficacy, dysfunctional attitudes) were associated with changes in BDI and POMS-TMD scores over the 10 weeks of the study. These analyses were conducted via stepwise regression analyses, using the change processes as predictor variables and changes in the mood outcomes as the dependent variables. However, to keep the number of potential predictor variables to a minimum, only those predictor change scores that showed (a) significant Group × Time ANOVA effects and (b) at least marginally significant ($p < .10$) correlations with a dependent variable change score were considered for the regression analyses.[10] Correlations between the change scores of predictor variables and change scores of mood disturbance and depressive symptoms are shown in Table III.

Change Processes Associated With Total Mood Disturbance

Pearson correlation analyses revealed that Δ POMS-TMD was negatively correlated with changes in social provisions, such as attachment, guidance, reliable alliance, social integration; self-efficacy; and coping strategies, such as positive reinterpretation/growth, active coping, planning, and acceptance; and was positively correlated

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[10] A principal component analysis of the predictors was considered. However, although there were several relatively high correlations (i.e., $r > .50$) between predictor variables (e.g., positive correlations within SPS scales, positive correlations within COPE scales, negative correlations between DAS and several SPS scales, and positive correlations between several SPS scales and the COPE seeking social support scales), the value of this procedure as a data reduction strategy was outweighed by the potential loss of the meaningfulness of each individual predictor in the analysis.

Table III. Pearson Correlations Between Δ Distress Outcome Variables and Δ Change Process Variables

	Δ POMS-TMD	Δ BDI
Δ COPE scales		
Positive reinterpretation	−.28***	−.27***
Active coping	−.28***	−.21*
Planning	−.25**	−.13
Seek emotional social support	−.04	−.04
Seek instr. social support	−.20*	.02
Suppress comp. action	−.10	−.02
Religion	−.05	.02
Acceptance	−.32***	−.38***
Mental disengage	−.05	.00
Venting	.15	.05
Beh. disengagement	.33***	.17
Denial	.03	−.06
Restraint	.15	.08
Δ SPS/ISEL scales		
Attachment	−.33***	−.16
Belonging	−.06	.09
Guidance	−.32***	−.17
Social integration	−.23**	−.07
Reassurance of worth	−.15	−.03
Reliable alliance	−.23**	−.13
Tangible SS	.01	.15
Δ CCSE	−.42***	−.34***
Δ DAS	.22*	.26**

Note. BDI = Beck Depression Inventory, CCSE = Cognitive Coping Self-Efficacy, DAS = Dysfunctional Attitudes Scale, ISEL = Interpersonal Support Evaluation List, POMS = Profile of Mood States, SPS = Social Provisions Scale, SS = Social Support, TMD = Total Mood Disturbance.
*$p < .10$. **$p < .05$. ***$p < .01$.

with behavioral disengagement changes. All of the above variables were entered into a stepwise regression equation. Table IV indicates that increased self-efficacy and active coping and decreased behavioral disengagement predicted greater mood disturbance reductions, $R^2 = 33.1\%$; $F(3, 60) = 9.88$, $p < .001$.

Table IV. Final Stepwise Regression Analysis Predicting Changes in Mood Disturbance and Depressive Symptoms

Variable	Beta	p Beta	R^2	ΔR^2	$F \Delta R^2$	$p \Delta R^2$
Dependent variable: Δ POMS Total Mood Disturbance						
Δ CCSE	−.35	.002				
Δ Active coping	−.27	.014				
Δ Behavior disengagement	.25	.026				
Model			.331	.058	5.19	.026
Dependent variable: Δ Beck Depression Inventory						
Δ Acceptance	−.36	.001				
Δ CCSE	−.32	.004				
Δ DAS	.22	.044				
Model			.336	.045	4.23	.044

Note. DAS = Dysfunctional Attitudes Scale, CCSE = Cognitive Coping Self-Efficacy, POMS = Profile of Mood States.

Change Processes Associated With Depressive Symptoms

As can be seen in Table III, changes in BDI scores were negatively correlated with changes in self-efficacy, positive reinterpretation/growth, active coping, and acceptance, and were positively correlated with DAS dysfunctional attitude change scores. These five change scores were entered into the regression equation as predictors of change in BDI. The final model included increased acceptance coping, increased self-efficacy, and decreased dysfunctional attitudes predicting greater reductions in depressive symptoms. The equation accounted for a total of 33.6% of the variance in BDI decreases, $F(3, 63) = 4.23$, $p < .05$ (see Table IV).

Analysis of Potentially Confounding Variables

Of all the potentially confounding variables considered, only one, HIV medication status at baseline, was associated with psychosocial outcome variables in this study. Separate one-way ANOVAs were conducted with medication status (no medications = 0, one antiretroviral = 1, two or more antiretrovirals = 2, combination therapy with protease inhibitor = 3) as the between-participants factor and the baseline and delta scores for each of the dependent variables. Tukey's post hoc analyses were then conducted for any significant or marginally significant omnibus test. These analyses revealed that baseline POMS-TMD scores were higher for participants on one antiretroviral versus participants on no medications (ps $< .05$). However, when baseline medication status was controlled for in the regression analysis of POMS-TMD, the significant predictors did not change, although social support guidance entered as a significant predictor, whereas previously it had not.[11]

DISCUSSION

The purpose of this study was to (a) test the effects of CBSM intervention on mood, depressive symptoms; (b) test CBSM effects on hypothesized change processes including HIV-specific coping strategies, perceived social support provisions, self-efficacy, and dysfunctional attitudes; and (c) investigate the relative importance of changes in coping strategies, perceived social support, self-efficacy, and dysfunctional attitudes in predicting changes in overall mood disturbance and depressive symptoms in HIV-infected gay men. As expected, individuals who participated in the CBSM group demonstrated significant reductions in psychological distress, as measured by the POMS and BDI, over the course of the 10-week intervention. These findings are consistent with results from interim reports of a portion of this sample (Lutgendorf et al., 1997, 1998) and with other studies of cognitive–behavioral interventions in independent samples of HIV-infected men (Antoni et al., 1991; Blenkhorn, Silove, Margarey, Krillis, & Colinet, 1992; Eller, 1995; Kelly et al., 1993; Taylor, 1995).

[11]Self-efficacy entered first after the control variables, with active coping, guidance, and behavioral disengagement entered into the next three models, respectively. As compared with the analysis without medication status, the amount of variance in Δ POMS-TMD accounted for decreased slightly from 33.1 to 32.4% in the present analysis.

Our CBSM participants also changed their use of a number of important coping strategies. Specifically, they increased their use of active coping and seeking social support for emotional reasons. Just as important, participants in the control condition appeared to abandon their use of acceptance and positive reinterpretation and growth as coping strategies whereas CBSM participants maintained these. CBSM participants also demonstrated increases in their perceptions of social support attachment, guidance, reassurance of worth, although only a marginal increase in their perceptions of tangible support received. Finally, these CBSM participants showed increased self-efficacy and decreased distorted and dysfunctional attitudes (cognitive, appraisal processes) over time. These findings suggest that the intervention produced behavioral, social, and cognitive changes consistent with the components making up the individual modules of this CBSM program tailored for HIV+ men (Antoni, 1997).

Secondary analyses revealed that the different outcome measures (e.g., changes in mood disturbance and depressive symptoms) each had a unique pattern of associations with the various predictor variables, although CCSE was the only significant predictor of change for each outcome measure. The significant predictors of changes in BDI depression scores were similar to, but not exactly the same, those for POMS-TMD scores. BDI decreases were also related to increased acceptance coping and decreases in dysfunctional attitudes, whereas POMS-TMD reductions were related to increases in active coping and decreases in behavioral disengagement.

The slight differences in predictors between these two indices may be because the POMS is primarily an index of transient mood states, whereas the BDI assesses a wider range of depressive symptoms including mood, cognitive symptoms, and behavioral symptoms that tend to be more stable over time. The greater emphasis on cognitive symptoms within the BDI may explain the influence of increased acceptance and decreases in dysfunctional attitudes (cognitive processes) on this measure. On the other hand, the contribution of both active coping and behavioral disengagement to changes in POMS-TMD scores clearly points to the relevance of behavioral processes for altering positive and negative mood states.

Interestingly, increases in social support, while correlated with overall mood improvement, did not uniquely contribute beyond behavioral coping variables and self-efficacy in predicting decreases in total mood disturbance. Social support changes were not associated with reductions in depressive symptoms. It may be that social support changes facilitated continued efforts at using these adaptive cognitive and behavioral coping strategies (Sarason, 1979) and confronting cognitive distortions, thus paving the way for mood improvement (Zuckerman & Antoni, 1995). Taken in this light, social support increases may either catalyze or sustain the use of the cognitive and behavioral strategies taught in this CBSM intervention.

Some cognitive–behavioral interventions focus primarily on one technique or skill (e.g., relaxation training, assertiveness skills), whereas the present CBSM intervention is multimodal, teaching a number of different cognitive and behavioral techniques designed to help the participants better manage stress and improve their mood, quality of life, and health. Specifically, the intervention in this study includes instruction in cognitive restructuring, coping skills, assertiveness, anger management, social support utilization, and relaxation training, as well as other skills (Antoni,

1997). It is important to note that it remains unknown whether instruction in *all* of these skills is necessary to achieve beneficial results. It is also critical to consider that CBSM alone may not be sufficient as an intervention in situations (e.g., severe depression, substance dependency), where a combined psychological and pharmacological approach may be warranted.

These findings do suggest the relative importance of self-efficacy enhancement and reductions in cognitive distortions (a part of dysfunctional attitudes), in addition to improving cognitive and behavioral coping skills and building social support, for the beneficial psychologial effects observed during CBSM. Beck et al.'s theory of cognitive therapy (Beck et al., 1979) has received much empirical support over the years and self-efficacy has been found to predict improvements in mood and adaptive behaviors (e.g., Chesney et al., 1996; Rodin, Elias, Silberstein, & Wagner, 1988), whereas no empirical studies to date have tested the relative contribution of all of these variables in predicting mood improvements during cognitive–behavioral therapy in HIV-infected individuals.

These findings may be significant for clinical practice in that they suggest several relevant techniques and issues to address to achieve treatment gains. Furthermore, in the era of managed care and with pressure to provide more short-term treatments, these results suggest that such interventions can be successful. The time-limited nature and group environment of CBSM interventions may not be highly conducive to the extensive exposure to corrective information and exploration of historical antecedents that have been shown to precede the destabilization periods deemed critical for subsequent beneficial psychological outcomes (Hayes & Strauss, 1998). However, time-limited CBSM interventions do allow for examination of cognitive distortions and underlying dysfunctional attitudes, methods for changing them, and improvement in self-efficacy beliefs, and thus may provide significant opportunity for distress reduction.

Before applying these findings to other populations, it must be kept in mind that this sample is a highly selective sample of generally well-educated gay men who chose to participate in a fairly demanding study of stress management and HIV. Thus, these findings may not generalize to other HIV-infected men who are less motivated and/or educated. It is also not known whether the effects observed would generalize to men with more advanced HIV disease or other HIV-infected samples, such as women or individuals who got infected from injection drug use. Future research is needed to investigate the external validity of the present findings and the applicability of CBSM for these populations. More information is also needed about the change processes and mechanisms responsible for the observed CBSM-associated changes in distress.

Although it can be suggested from our results that the changes in the predictor variables observed resulted primarily from focus on that skill within the group, this cannot be stated conclusively. There are always nonspecific processes involved in any intervention, especially a group intervention, that may be at least partially responsible for the positive outcomes. These include, but are not limited to, attention from group leaders, feeling positive about taking part in such an intervention, upward and downward social comparisons, and feeling part of a cohesive group. In this study there was also continual overlap in the topics discussed each week in the group, such that improvements in one area may be due to repeated exposure to a concept within

different contexts or even due to exposure to a different skill altogether. Although it would be difficult to know exactly what was responsible for the positive outcomes of CBSM, this study suggests that changes in a number of individual skills and cognitive processes each uniquely contribute something beneficial. In addition to investigating aspects of what is taught and focused upon within the group, the contribution of other nonspecific aspects of the therapists, group environment, and individual meaning of group participation should be examined as well. Overall, this study supports the value of multimodal group-based CBSM interventions for HIV-infected individuals as a way to provide the most diverse range of stress management skills necessary to effect changes in psychological adjustment for persons dealing with this chronic disease.

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