

## Negative HIV-Specific Expectancies and AIDS-Related Bereavement as Predictors of Symptom Onset in Asymptomatic HIV-Positive Gay Men

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This study examined negative HIV-related expectancies, AIDS-related bereavement, and the interaction of expectancies and bereavement as predictors of the onset of significant HIV-related symptoms among previously asymptomatic HIV-positive gay men. From a longitudinal psychobiological investigation, 72 men were selected who had been HIV-positive and asymptomatic from study entry (approximately 3 years). Participants were followed for an additional 2½ to 3½ years after psychosocial assessment, with symptom status assessed every 6 months. The interaction of negative HIV-specific expectancies and bereavement was a significant predictor of symptom onset. Negative HIV-specific expectancies predicted the subsequent development of symptoms among bereaved men, controlling for immunological status, use of zidovudine, high-risk sexual behavior, substance use, and depression.

*Key words:* HIV, expectancies, stress, bereavement

Attempts to relate psychosocial variables longitudinally to disease progression in HIV have generated contradictory results. Although some studies have found no evidence of an association (e.g., Coates, McKusick, Kuno, & Stites, 1989; Kessler et al., 1991; Lyketos et al., 1993; Perry, Fishman, Jacobsberg, & Frances, 1992; Rabkin et al., 1991), others have found relationships between HIV progression and psychosocial factors, such as depression, denial, bereavement, personality, and active coping (e.g., Antoni, Baggett, et al., 1991; Burack et al., 1993; Cole, Kemeny, Taylor, &

Visscher, 1997; Ironson et al., 1994; Kemeny et al., 1995; see Cole & Kemeny, 1997, for review). These mixed results dictate the need for additional prospective longitudinal investigations that control for potential confounding biological and psychological variables.

A central dimension of psychosocial response to HIV concerns disease-related expectancies. Theoretical accounts of adaptation among individuals with life-threatening disease have diverged in terms of the adaptiveness of positive or optimistic expectancies, as opposed to more negative or realistic ones. Some accounts, based on stage models of response to loss (e.g., Bowlby, 1980; Klinger, 1975, 1977), have suggested that acceptance of one's disease and the reality of likely disease-related outcomes is adaptive (e.g., Kubler-Ross, 1969, 1987). Failure to achieve the stage of acceptance is often viewed as pathological (e.g., Osterweis, Solomon, & Green, 1984; Raphael, 1983). These accounts have had a substantial influence on clinical work with individuals with terminal disease. However, Taylor and others have argued that positive illusions, or beliefs that represent the self, the world, and the future as more positive than is actually the case, may be more adaptive than realistic or negative beliefs (Taylor, 1989; Taylor & Brown, 1988). In previous research with HIV-positive gay men, Taylor et al. (1992) found that unrealistically optimistic beliefs about the likely future consequences of HIV were associated with better psychological adjustment and with more active coping, without compromising health behaviors or risk-related sexual behaviors.

Moreover, there is evidence that realistic expectations regarding the consequences of HIV-related disease are associated with negative health outcomes. In a study of men with AIDS (Reed, Kemeny, Taylor, Wang, & Visscher, 1994), we identified a pattern of response to disease termed *realistic acceptance* that significantly predicted decreased survival time. Realistic acceptance represents a fundamen-

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tally cognitive response, related to negative disease-specific expectations in the context of AIDS. Median estimated survival time for participants with high scores on realistic acceptance was 9 months shorter than for participants with low realistic acceptance scores. This effect was not accounted for by time since diagnosis with AIDS, self-reported health status, number of CD4 T-lymphocyte cells, psychological distress, age, education, initial diagnosing condition, use of zidovudine (AZT), smoking, or alcohol and drug use.

This investigation (Reed et al., 1994) left a number of questions unanswered. One was whether relationships between such expectations and HIV progression could be observed at other points in the disease process. For men at earlier stages of the disease process, negative outcomes may be distant, abstract, and not based on personal experience and, consequently, might not be related to disease progression. A second unanswered question concerns whether depression may play a mediating role in the relation between realistic acceptance and survival. Although we controlled for baseline depression, possibly the development of depression over the follow-up period accounted for some portion of the effect we observed. This issue is important, given the controversy over the association between depression and HIV-related disease progression. Previous studies have yielded mixed results, but some of those investigations have looked over only a 6-month to 1-year follow-up period (e.g., Antoni, Schneiderman, et al., 1991; Perry et al., 1992; Rabkin et al., 1991), which may be insufficient time to observe immune system deterioration. Other studies have examined the relation of baseline ratings of depression as predictors of immunological parameters over several years (e.g., Burack et al., 1993; Lyketsos et al., 1993). It may be unreasonable to think that a baseline assessment of mood would be sufficient to show a relationship. Consequently, in the present investigation, depression was assessed longitudinally across the follow-up period.

Previous work (Coates, Stall, Ekstrand, & Solomon, 1989; Kemeny et al., 1995) has suggested that AIDS-related bereavement may be associated with markers of disease progression in HIV-infected individuals, although this finding has not been replicated consistently (Kessler et al., 1991). Moreover, the results of two previous studies suggest that the relationship between depression and immunological functioning differs for bereaved and nonbereaved men (Kemeny et al., 1994, 1995). These results suggest that it is important to assess bereavement status when examining the relationship of depression to health outcomes in HIV. Furthermore, we hypothesized that the experience of having lost close friends or primary partners might interact with negative disease-related expectations. Specifically, AIDS-related bereavement may potentiate the effects of such expectations by lending them greater strength, concreteness, and specificity.

The present study involved a new sample of men who were HIV positive and who had been asymptomatic with respect to major HIV-related symptoms over an approximately 3-year baseline period. Selection of this sample was guided by the observation that infected individuals who do not develop symptoms of HIV-related disease or do so very

slowly are a valuable subgroup for providing evidence concerning potential protective factors associated with HIV infection (e.g., Buchbinder, Katz, Hessel, O'Malley, & Holmberg, 1994; Easterbrook, 1994; Pantaleo et al., 1995; Solomon, Benton, Harker, Bonavida, & Fletcher, 1994); identification of such factors may yield psychotherapeutic implications (Solomon et al., 1994). In addition, sample selection was guided by the belief that negative expectations, bereavement, and their conjunction would predict symptom expression and illness course in a sample previously free of infection. Our hypotheses were as follows: We expected that high levels of negative HIV-specific expectancies would predict the onset of HIV-related symptoms among previously asymptomatic HIV-positive men over a 3-year follow-up period, controlling for immunological predictors of symptom onset at baseline. Furthermore, we expected that the interaction of the negative HIV-specific expectancies and AIDS-related bereavement would predict additional variance in symptom onset.

## Method

### *Participants*

*The Multicultural AIDS Cohort Study.* Participants were recruited from the University of California, Los Angeles (UCLA) site of the Multicenter AIDS Cohort Study (MACS). The MACS is a longitudinal study of the natural history of AIDS, which began in 1984 and included 1,759 gay or bisexual men, with no diagnosis of AIDS, no history of cancer (except skin cancer), and no history of radiation treatment at the time of recruitment. Participants ranged in age from 18 to 50 years at study entry, with a mean age of 32; 95% were White (including White Hispanic). The majority of participants had at least a college education (55%) and were employed in professional or managerial positions (51%). Nearly one half (49.5%) of the participants were HIV positive at enrollment. Participation in the MACS includes biyearly physical examinations, a detailed assessment of symptoms potentially related to HIV, serological samples, interviews, and behavioral questionnaires. For more detailed information regarding the sample characteristics and methodology of the MACS, see Detels et al. (1988) and Kaslow et al. (1987).

*The Natural History of AIDS Psychosocial Study.* Beginning in 1987, active MACS participants were recruited for the Natural History of AIDS Psychosocial Study (NHAPS). This study examines psychological appraisals of, emotional responses to, and methods of coping with the risk of HIV-related disease progression, as well as the impact of these processes on behavior and health. Between August 1987 and October 1988, 798 men were recruited into the NHAPS. The NHAPS sample is not demographically different from the UCLA MACS sample, with the exception that it included a somewhat lower proportion of HIV-positive men (42%). The NHAPS has been described in more detail elsewhere (e.g., Kemeny et al., 1994).

*The present sample.* For the present investigation, men were selected from the NHAPS sample who met the following criteria: (a) All participants were HIV positive. (b) All participants knew that they were HIV positive. (c) All participants had CD4 T-lymphocyte data available at the time of entry into the NHAPS. (d) All participants had follow-up data available over a 2½- to 3½-year follow-up period. (This wide follow-up window was included to maximize the number of eligible participants, whereas still permitting a long enough period of time to elapse for symptoms to

develop.) (e) All participants had been consistently asymptomatic with respect to significant HIV-related symptoms.

In order to define asymptomatic infection, exclusion symptoms were selected from the MACS interview that corresponded as closely as possible to symptoms listed in Category B of the Centers for Disease Control and Prevention (CDC) 1993 classification system for HIV infection (CDC, 1992). Category B designates significantly symptomatic HIV infection on the basis of the presence of constitutional symptoms attributable to HIV infection or other conditions indicative of a defect in cell-mediated immunity that are not among those conditions included in the AIDS surveillance case definition. These exclusion symptoms included herpes zoster or shingles, oral candidiasis or thrush, unintentional weight loss of 10 pounds or more within a 6-month period, diarrhea for a period of at least 2 weeks, persistent or recurring fever higher than 100° for a period of at least 2 weeks, and drenching night sweats for a period of at least 2 weeks. These symptoms are prognostically relevant for subsequent development of AIDS (e.g., Polk et al., 1987) and are unlikely to be due to independent causes. Category B requires that each symptom be present persistently for more than 1 month; for the present investigation, we used a more restrictive time period of 2 weeks.

The final sample included 72 men, all of whom fell within Category A of the CDC Classification System, indicating essentially asymptomatic infection. In order to confirm our definition of asymptomatic infection, we looked at the participant reports of all other symptoms assessed during the MACS interview across the approximately 3-year baseline period from MACS entry to entry into the NHAPS. Symptoms reported by participants during this time included shortness of breath, coughs, sore throats, skin rashes or discoloration (other than Kaposi's sarcoma), fatigue, headaches, and tender or enlarged lymph nodes. All of these symptoms fall within Category A of the CDC Classification System. At least one of these symptoms had been reported at some point during the baseline period by 58 (80.6%) of the 72 participants selected for this investigation.

## Design

At entry in the NHAPS, participants in the present investigation had been asymptomatic during the previous 3-year period ( $M = 3.1$ ,  $SD = 0.3$ , range = 2.5 to 3.9). Participants completed a detailed psychosocial questionnaire, including the assessments of negative HIV-specific expectancies and bereavement. After the psychosocial assessment, participants were interviewed about symptoms and examined every 6 months. Symptom data were obtained for each participant for an average period of 3.0 years ( $SD = 0.2$ , range = 2.5 to 3.5) after the psychosocial assessment. We examined the onset of significant HIV related symptoms across this follow-up period.

## Health Status Assessment

**HIV status.** Blood samples at each MACS visit were subjected to enzyme-linked immunosorbent (ELISA) tests, and positive tests were confirmed by Western blot. Only participants who knew they were HIV positive were included in this investigation.

**HIV-related symptoms.** As dependent measures, we examined the onset of HIV-related symptoms that had been used as exclusion criteria during the baseline period. Symptom onset was a dichotomous variable determined by whether participants reported any Category B symptom during the 2½ to 3½ year follow-up period. The number of different symptoms from Category B that participants reported over the follow-up period was also calculated.

## Psychosocial Assessment

**AIDS-related bereavement.** The NHAPS psychosocial assessment included items assessing whether an intimate, primary partner or close friend had died of AIDS within the previous year, and the dates of these deaths. Of the 72 participants (51.4%), 37 reported having experienced the death of a close friend or primary partner within 12 months prior to the psychosocial assessment. Bereavement was used as a bivariate variable in the analyses for this investigation.

**Psychological responses to the risk of disease progression.** The following measures were included in the psychosocial questionnaire administered at entry into the NHAPS.

**Coping with the risk of disease progression.** The questionnaire included the Responses to HIV Scale, a 47-item adaptation of Folkman and Lazarus's Ways of Coping Scale (e.g., Folkman & Lazarus, 1980; Folkman, Lazarus, Gruen, & DeLongis, 1986) designed for persons affected by HIV and AIDS. Participants were asked to rate each item on a 4-point scale reflecting the extent to which they had used that method of responding to the risk of HIV-related disease progression over the past month. A description of the construction of the Responses to HIV Scale, the factor analysis, and a complete list of items comprising each factor have been presented elsewhere (Reed et al., 1994).

**Emotional responses to the risk of disease progression.** The Emotional Responses scale asks respondents to make ratings on 7-point Likert scales indicating the degree to which they felt each of 25 affects (e.g., sad, anxious, confident, resigned) during the past month regarding the risk of HIV-related disease progression.

**Attitudes about the risk of AIDS.** A 28-item questionnaire assessed each participant's knowledge about AIDS and his sense of personal vulnerability to developing AIDS (see Taylor et al., 1992, for a description of the development of this scale and sample items). Respondents indicated their agreement with each item on a 5-point scale.

**Appraisals of the risk of disease progression.** Respondents rated their perceived risk of HIV-related disease progression and their perceived sense of control over disease progression on 7-point scales.

**Standard measures of psychological states.** Standard measures of mood and psychological states were selected on the basis of their high internal consistency and widespread use. (a) The Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) was used to assess current mood state. Respondents rate how much they have been feeling each of 65 affects over the past week on a 5-point scale. The following mood scores were derived according to standard scoring: anger-hostility, confusion-bewilderment, depression-dejection, fatigue-inertia, tension-anxiety, and vigor-activity, and a summary score for total mood disturbance (TMD). (b) The Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974) consists of 20 true-false items measuring generalized negative expectations about the future. (c) The UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) is a 20-item scale that measures feelings of isolation and satisfaction with social relationships.

## Baseline Immunological Measures

**Absolute number of CD4 helper-inducer T-lymphocytes.** Absolute numbers of CD4 helper-inducer T-lymphocytes were determined by the MACS using direct immunofluorescence with use of the monoclonal antibody Leu-3 (Becton Dickinson, Mountain View, CA) and two-color flow cytometry (Coulter Epics-C) on Percoll-density separated mononuclear cells. Absolute numbers of

CD4 T-cells were calculated with use of the white-cell count and differential. Number of CD4 T-cells is considered to be one of the best objective indicators of HIV progression (Detels et al., 1987; Polk et al., 1987) and, in the present study, served as one objective measure of health status at entry into the NHAPS.

*Percentage change in absolute number of CD4 T-lymphocytes over the baseline period.* Difference scores were calculated for each participant by subtracting his CD4 T-lymphocyte count at entry into the MACS from his CD4 count at the visit prior to the psychosocial assessment. These difference scores were divided by his CD4 count at entry into the MACS and multiplied by 100 to yield a percentage, reflecting the amount of change over the baseline period, with negative numbers indicating a decrease.

### Behavioral Measures

At each MACS visit, participants are given detailed interviews including extensive sections on medication use, smoking, alcohol use, recreational drug use, and sexual behavior within the past 6 months.

*Use of antiviral medication.* Antiviral medication use was measured by calculating the percentage of MACS study site visits at which the participant reported having taken AZT within the 6 months prior to the first report of HIV-related symptoms (AZT was the only antiviral medication available at this time).

*Unprotected receptive anal intercourse.* Men who have negative expectations about future disease-related outcomes may be more likely to engage in risky sexual behavior, placing them at increased risk for reinfection with HIV or exposure to sexually transmitted cofactors, which may accelerate the disease process (Fauci, 1988; Gendelman, Orenstein, Kalter, & Roberts, 1992). Accordingly, we assessed unprotected receptive anal intercourse, the most important such cofactor in the progression of HIV-related disease (Phair et al., 1992), by whether participants reported engaging in unprotected anal intercourse at all during the time between the psychosocial assessment and the time symptoms were first reported, and by calculating the number of times the participant reported engaging in this behavior over the same time period. Participants who reported that they had unprotected anal intercourse only within the context of a monogamous ongoing relationship with a partner they knew to be HIV negative were not coded as having engaged in receptive anal intercourse.

*Smoking, alcohol use, and drug use.* Smoking was calculated as the percentage of visits during which participants reported having smoked cigarettes regularly within the previous 6 months. Two variables related to alcohol use were constructed: the mean number of drinks per week the participants reported over this period and the percentage of MACS visits at which the participants reported drinking heavily (defined as more than two drinks per day) within the previous 6 months. Variables were also constructed representing the percentage of MACS visits at which the participant reported having used each of the following four recreational drugs within the previous 6 months: marijuana or hashish, cocaine, amphetamines or other "uppers," and nitrate inhalants or "poppers." No other drug was reported with sufficient frequency to justify inclusion in these analyses.

### Depression

An index of depression, the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was administered to MACS participants at each study site visit. The CES-D consists of a list of 20 symptoms of depression, which are rated on a 4-point scale according to proportion of time they were experienced within

the past week. The scale was scored according to standard criteria. Although the CES-D is not a clinical measure of depression, it has been widely used in epidemiological studies, with good reliability and validity. Three variables were constructed from MACS CES-D data. The first variable was the CES-D score at the time of the psychosocial assessment, reflecting depression concurrent with the assessment of negative HIV-specific expectancies. The second variable was the highest CES-D score obtained over the period of time from the MACS visit corresponding to the psychosocial assessment, up to but not including the visit at which participants reported having experienced a symptom within the previous 6 months (or throughout the entire follow-up period for participants who did not develop symptoms). The third variable was the mean CES-D score obtained over this period of time.

### Derivation of the Negative HIV-Specific Expectancies Index

Our original measure of negative expectations was a four-item index (Reed et al., 1994). To develop a broader measure for the present study, we began by conducting a meta factor analysis using standardized index scores of measures of psychological responses to the risk of HIV-related disease progression, using participants who knew they were HIV seropositive: Coping Responses to the Risk of Disease Progression (the Responses to HIV Scale), Emotional Responses to the Risk of Disease Progression, six subscale scores from the Profile of Mood States, and scores on the Hopelessness Scale and the UCLA Loneliness Scale. Using principal-components factor analysis with oblique rotation and an eigenvalue cutoff of 1, a three-factor solution was obtained, one of which was conceptually similar to our earlier measure and appeared to tap negative expectations. This factor included the original four-item Realistic Acceptance factor, Perceived Risk of Disease Progression, a negative loading for Perceived Control Over Risk of Disease Progression, a negative loading for Confidence About Risk of Disease Progression from the Emotional Responses to the Risk of Disease Progression Scale (e.g., hopeful, confident, in control), and a negative loading for AIDS-Specific Optimism from the Attitudes About the Risk of AIDS Scale. Internal consistency across these components was relatively high (Cronbach's  $\alpha = .79$ ). The components of the Negative HIV-Specific Expectancies factor, with factor loadings, are listed in Table 1.

All of the components appear to reflect appraisals, expectations, and attitudes consistent with negative disease-related expectations. Furthermore, this factor appeared to reflect cognitive evaluations of likely outcomes, rather than emotional reactions. None of the general measures of psychological adjustment or distress or specific negative emotions regarding AIDS risk loaded significantly on this factor. An index score for Negative HIV-Specific Expectancies was created by taking the mean of the standardized scores for each factor component.

Table 1  
Components of Negative HIV-Specific Expectancies  
Factor (Cronbach's  $\alpha = .79$ )

Measure	Factor loading
Perceived risk of disease progression	.79
Realistic acceptance (original four-item Coping factor)	.69
Confidence about risk of disease progression	-.44
AIDS-specific optimism	-.67
Perceived control of risk	-.71

### Analytic Approach

To examine the relationship between potential predictors and symptom development, hierarchical regression analyses were conducted. The dichotomous symptom-onset variable and the total number of different symptoms reported over the follow-up period were regressed separately on the predictor variables, each of which was entered as a separate step. The order of entry was as follows. Baseline immunological variables (i.e., at entry into the NHAPS) were always entered first. This is because of their importance as predictors of HIV progression, as well as to control for their levels in subsequent steps of the analyses. Bereavement status was entered next, as this is a stable event that temporally precedes the psychological and behavioral variables examined as predictors. Third, psychological and behavioral variables that were considered potential mediators or confounds of the relationship between symptom onset and negative HIV-specific expectancies were entered, to see if inclusion of these variables in the model diminished the predictive value of negative HIV-specific expectancies and the interaction of negative HIV-specific expectancies and bereavement. The variables reflecting the hypotheses of this investigation were entered last, to provide the most stringent test of their relationship to symptom development. Negative HIV-specific expectancies was the next-to-last step. The final step was the interaction of negative HIV-specific expectancies and bereavement. Because our hypotheses specifically concerned the amplification of the effect of negative HIV-specific expectancies among the bereaved group, the interaction term was constructed by assigning a value of 0 to nonbereaved participants, and a value of 1 to bereaved participants, and multiplying these by negative HIV-specific expectancies scores. Therefore, the final step tested the association of negative HIV-specific expectancies and symptom onset among bereaved participants only.

## Results

### Characteristics of the Sample

*Symptoms reported over follow-up period.* Over the follow-up period, 35 of the 72 participants (48.6%) developed one or more of the criterion symptoms. The maximum number of different symptoms reported during the follow-up period was four. The most common symptom reported was oral candidiasis (24.6%), followed by persistent diarrhea (20.3%), unintentional weight loss (17.4%), persistent fevers (8.7%), and persistent night sweats (7.2%). No participant reported herpes zoster during this time.

*Duration of study.* Durations of the baseline period, the follow-up period, and the total period of the study are shown in Table 2. As shown, these periods of time were virtually identical in length for participants who developed symptoms over the follow-up period and those who did not (all *ts* nonsignificant).

*Immunological characteristics at psychosocial assessment.* The mean number of CD4 T-cells at entry into the NHAPS and percentage of change in number of CD4 T-cells over the baseline period are also shown in Table 2. On average, participants exhibited little change in CD4 T-cell counts over the baseline period, although there was a wide range. There were slight differences in the mean levels of these parameters between participants who developed symptoms over the follow-up period and participants who did not, but these differences were not significant.

### Test of Hypotheses

A hierarchical logistic regression analysis was conducted to test the primary hypothesis. The following variables were entered: (a) absolute number of CD4 T-lymphocytes at the MACS visit prior to psychological assessment, (b) bereavement status, (c) negative HIV-specific expectancies, and (d) the interaction of negative expectancies and bereavement. This model was used to predict symptom onset (developed symptoms, did not develop symptoms) across the follow-up period. Only the interaction of negative HIV-specific expectancies and bereavement was a significant predictor of symptom onset (Wald  $\chi^2 = 4.03$ ,  $p < .05$ ), after controlling for the other variables in the model. Table 3 presents the results of the logistic regression analyses, controlling for potential biological and behavioral confounds.

In order to understand the nature of this interaction, participants were divided into high and low negative HIV-specific expectancies on the basis of a median split. Among bereaved participants, 56% of those in the high negative HIV-specific expectancies group developed symptoms over the follow-up period, compared with 42% of those in the low negative HIV-specific expectancies group. Among nonbereaved participants, on the other hand, 47% of participants in both the high and low HIV-specific expectancies group developed symptoms over the follow-up period. Therefore,

Table 2  
*Duration of Study Periods and Baseline CD4 Characteristics*

Variable	Total sample			Developed symptoms during follow-up			Asymptomatic over follow-up		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
Duration of asymptomatic baseline period (years)	3.1	0.3	2.5 to 3.9	3.2	0.3	2.8 to 3.9	3.1	0.3	2.5 to 3.7
Duration of follow-up period (years)	3.0	0.2	2.5 to 3.5	3.0	0.2	2.5 to 3.5	3.0	0.2	2.6 to 3.5
Total study period (years)	6.2	0.4	5.1 to 6.8	6.2	0.3	5.4 to 6.8	6.1	0.4	5.1 to 6.7
Absolute level of CD4 T-cells at psychosocial assessment	617	213	178 to 1,046	567	192	221 to 999	660	223	178 to 1,046
Change in level of CD4 T-cells over baseline period (%)	2.5	32.5	-55.9 to 121.5	-2.4	36.5	-55.9 to 121.5	6.9	28.4	-38.2 to 66.3

*Note.* There are no significant differences in these variables between participants who did and did not develop symptoms.

Table 3  
*Hierarchical Logistic Regression Analyses of the Interaction of Negative HIV-Specific Expectancies and Bereavement Predicting Symptom Onset, Controlling for Confounds*

Predictor variable	Wald $\chi^2$ <sup>a</sup>	Odds ratio
Baseline CD4 level	2.85	1.00
Bereavement	0.33	0.74
Expectancies	0.59	1.40
Expectancies $\times$ Bereavement	4.03	0.23
Controlling for		
CD4 decline pre-baseline	3.99	0.22
AZT use	4.17	0.12
Unprotected anal receptive intercourse	4.01	0.22
Cigarette smoking	4.08	0.23
Alcohol consumption	4.42	0.19
Marijuana use	4.23	0.21
Cocaine use	3.85	0.24
Amphetamine use	4.01	0.22
Nitrite inhaler use	4.17	0.20
CES-D depression at baseline	4.96	0.14
Highest CES-D during f/u	4.22	0.21
Mean CES-D during f/u	4.68	0.17

Note. AZT = zidovudine; CES-D = Center for Epidemiological Studies Depression Scale; f/u = follow-up.

<sup>a</sup>The first four table entries represent the basic logistic regression analysis. Only the interaction term is significant. Each subsequent  $\chi^2$  represents the relationship between the Expectancy  $\times$  Bereavement interaction term and symptom onset controlling for number of CD4 T-cells at baseline, the Expectancies factor, bereavement status, and the listed potential confound (all  $ps \leq .05$ ).

negative expectancies regarding one's future health were associated with a significantly greater likelihood of developing HIV-related symptoms over the follow-up period, but only among those who had recently been bereaved of a close friend or partner to AIDS.

#### Accounting for Additional Variables

A number of biological and behavioral factors could account for the relationship among expectancies, bereavement, and symptom onset: rate of CD4 decline during the 3-year asymptomatic baseline period; use of antiretroviral medication; the practice of unprotected receptive anal intercourse; health-compromising behaviors such as smoking, alcohol use, and drugs; and depression. To assess the possible contribution of each of these variables to the relationships observed between negative HIV-specific expectancies and bereavement and symptom development, additional logistic regression analyses were conducted including each of the potential confounding factors. The additional variable was added to the model above as a separate step, prior to the entry of the interaction term. In all cases, only the last step, the interaction of negative HIV-specific expectancies and bereavement, was a significant predictor of symptom onset (all  $ps < .05$ ; see Table 3).

#### Prediction of Number of Symptoms Reported

A set of hierarchical regression analyses was conducted predicting the number of different symptoms participants

reported over the follow-up period. The ordering of variables was identical to the logistic regressions described above. The pattern of results for these analyses was exactly the same as for the analyses described above predicting symptom onset as a dichotomous variable. The general model predicted 16.6% of the variance in number of symptoms, but only the interaction of negative HIV-specific expectancies and bereavement (the final step in the model) predicted significant variance in the number of symptoms (partial  $R^2 = .069$ ;  $\beta = .37$ ,  $p < .05$ ). In the models accounting for the effects of other potential confounding factors, the interaction of negative HIV-specific expectancies and bereavement continued to be a significant predictor of number of symptoms reported over the follow-up period (all  $ps < .06$ ).

#### Preexisting Health Status as a Predictor of Negative HIV-Specific Expectancies

Given these results, it is important to determine whether negative expectations might arise in response to preexisting health status. Using the less severe (CDC Category A) symptoms reported by participants during the baseline period (e.g., sore throat, tender or enlarged lymph nodes, headaches), we constructed three variables: whether the participant had reported each symptom for a period of 2 weeks or more at any time during the baseline period; the number of different symptoms participants reported having experienced for a period of 2 weeks or more during the baseline period ( $M = .81$ ,  $SD = .40$ , range = 0 to 7), and the percentage of MACS study site visits attended by participants during the baseline period at which any symptom was reported as having been experienced for 2 weeks or more ( $M = .32$ ,  $SD = .29$ , range = 0 to 1). None of these variables was significantly correlated with negative disease-related expectancies ( $r = .00$  to  $.16$ ).

In addition, two regression analyses were conducted, using baseline health status information to predict negative HIV-specific expectancies. These analyses also included variables reflecting participants' most recent immunological status and the extent of previous immunological decline. Participants are sent immunological information following each MACS study site visit, so they had knowledge of their CD4 T-cell level and the degree to which this had changed over time. Many individuals living with HIV attach great significance to CD4 T-cell levels and their pattern over time. Therefore, in addition to symptoms experienced, knowledge of the level and pattern of CD4 T-cells might contribute to negative expectations about the future course of HIV progression. In the first analysis, negative HIV-specific expectancies was regressed on the individual symptom variables, as well as on level of CD4 T-cells at the MACS visit before the psychosocial assessment and the percentage of change in CD4 T-cells over the baseline period. Health status variables did not predict significant variance in negative HIV-specific expectancies ( $R^2 = .22$ ,  $p = .84$ ). In the second analysis, negative HIV-specific expectancies was regressed on the number of different symptoms reported over the baseline period, the percentage of MACS visits at

which symptoms were reported, level of CD4 T-cells at the time of the psychosocial assessment, and the percentage of change in CD4 T-cells over the baseline period. Again, health status variables did not predict negative HIV-specific expectancies ( $R^2 = .05$ ,  $p = .51$ ). Thus, negative HIV-specific expectancies do not appear to be a response to preexisting health status.

### *Associations Among Negative HIV-Specific Expectancies, Bereavement, and Other Psychological Scales*

Because of the consistent association of negative HIV-specific expectancies with symptom onset in bereaved participants, but not in nonbereaved participants, we conducted additional exploratory analyses to attempt to clarify this interaction. Correlation coefficients between the negative HIV-specific expectancies index and the other psychological scales were calculated separately for bereaved and nonbereaved participants. We then determined whether there was a significance difference between the two groups in the strength of these correlations. Using a one-tailed test ( $p < .05$ ), there was only one significant difference between the bereaved and nonbereaved groups. Men high in negative HIV-specific expectancies who were also bereaved were significantly higher on the coping factor labeled Avoidance and Self-Blame ( $r = .27$ ) than men high in negative HIV-specific expectancies who were not bereaved ( $r = -.35$ ; see Reed et al., 1994, for a complete description of this factor). However, this test was not corrected for multiple comparisons, and the correlation coefficient itself was not significant for either bereaved or nonbereaved participants.

### Discussion

The interaction of negative HIV-specific expectancies and bereavement was a significant predictor of the onset of symptoms prognostically relevant for AIDS among previously asymptomatic HIV-positive gay men. Those individuals who held beliefs and attitudes reflecting negative expectations about their future health and who had lost one or more close friends or primary partners to AIDS within the previous year were more likely to develop symptoms over the follow-up period. It is important that expectations about future health did not appear to be based on previous experience with HIV-related symptoms or on immunological indicators of disease progression of which participants might have been aware. Thus, even among men who had few sources of information on which to base accurate predictions of their own HIV progression, expectancies were in some sense self-fulfilling, at least in the context of AIDS-related bereavement. These relationships were maintained even when controlling for other prognostically relevant variables, including prior CD4 decline, use of antiviral medication, high-risk sexual behavior, smoking, alcohol, and drug use. These effects do not appear to be mediated by depression, as assessed by baseline CES-D score, highest CES-D score over the asymptomatic follow-up period, and average CES-D score over the follow-up period.

This study provides an important, although partial, replication of our findings relating cognitive expectations about disease-related outcomes to the course of HIV-related disease, and extends our previous findings as well. We found that negative HIV-specific expectancies (in conjunction with bereavement) were related to health outcomes in a new sample, at the opposite end of the continuum of HIV-related disease from the men with AIDS we had studied previously (Reed et al., 1994), that is, men who had remained asymptomatic with respect to HIV-related symptoms. The present study amplified on the original four-item measure, and used a fuller, multidimensional, although still specific and coherent, construct. As in the previous investigation (Reed et al., 1994), this factor appears to represent a fundamentally cognitive phenomenon. A participant with a high score on negative HIV-specific expectancies typically considers himself to be at high risk of disease progression, perceives that he has little control over that risk, experiences a low level of confidence regarding the risk of disease progression, reports that he attempts to accept and prepare for the possibility of negative future health, and has a low level of optimism regarding the future course of HIV-related illness.

The results of this investigation diverge from our earlier findings in one important way. Although our hypothesis that the experience of AIDS-related bereavement would potentiate the effects of negative HIV-specific expectancies was confirmed, our hypothesis of a main effect of negative HIV-specific expectancies was not. In contrast to our earlier study of men with AIDS, negative HIV-specific expectancies were associated with subsequent health outcomes only in interaction with AIDS-related bereavement. This finding does not appear to be explained by different patterns of association between negative HIV-specific expectancies and other psychological processes for bereaved and nonbereaved participants.

One interpretation of this interaction is that AIDS-related bereavement may potentiate the effects of such expectations by lending them greater strength, concreteness, and specificity. A related explanation is that the relationship of negative HIV-specific expectancies and health outcomes requires activation of specific cognitive schemas underlying those expectancies. That is, it may not be sufficient for these expectations to be present; they may need to be actively engaged in some specific way. This interpretation is consistent with current work in the area of cognitive self-representation (e.g., see Carver & Scheier, 1990; Higgins, 1987; Markus & Ruvolo, 1989), which suggests that negative self-representations are most frequently activated by specific events. For men with AIDS, personal experience with HIV-related illness may provide such activation. For asymptomatic men who have no direct personal experience with HIV-related disease, the loss of friends and partners to AIDS may activate expectations regarding disease-related outcomes in one's own case. Particularly relevant to this interpretation is a laboratory study that provides evidence that activation of specific negative (and preexisting) patterns of self-representation is associated with short-term immunological changes (Strauman, Lemieux, & Coe, 1993). Of

course, these ideas are speculative and require empirical validation.

This study also casts additional light on psychosocial factors that may characterize individuals who do not exhibit significant HIV-related disease progression over a long period of time. The men in the present study who did not develop symptoms over the follow-up period were known to have been HIV positive for at least 6 years. Our data suggest that—at least among people who have lost close friends or partners to AIDS—positive expectations regarding one's future health, feelings of confidence and optimism, and a greater sense of control over one's disease are associated with a slower rate of progression of HIV-related illness. Thus, the results of this prospective study are consistent with retrospective studies that have suggested that long-term survivors of AIDS are characterized by a sense of optimism and hope (Rabkin, Remien, Katoff, & Williams, 1993; Remien, Rabkin, Williams, & Katoff, 1992).

Some limitations of the study warrant comment. This study is limited by its relatively small sample size, particularly for an investigation of the relationship between psychosocial factors and health outcomes. Although a strength of this study is its partial replication and extension of our earlier findings in a separate sample, both samples consisted of participants in the UCLA cohort of the MACS. It will be important to replicate these results in larger and completely independent samples. As in our investigation of men with AIDS, a serious limitation to the generalizability of these findings is that the present sample consisted largely of White, affluent, and well-educated gay men, most of whom had good access to high-quality medical care. One reason that a relationship between a psychological variable and survival time was detectable in this sample may be that the effects of psychological processes become apparent only when other important influences on disease progression—such as premorbid health status, nutrition, and quality of medical care—are maximized. In more diverse samples, the effects of biological contributors to disease outcomes may overwhelm those of psychological variables. Furthermore, although these results appear to rule out several potential explanatory factors, the mechanisms and mediators of the observed relationships remain unclear.

An unresolved issue concerns whether negative HIV-specific expectancies should be considered a realistic approach to disease or a negative approach to the disease experience. In our previous article (Reed et al., 1994), we suggested that negative expectations bear some similarity to "acceptance," often viewed as evidence of adaptation among persons with life-threatening disease. However, among the asymptomatic HIV-positive men in the present investigation, such outcomes are likely to be more distant and, consequently, this cognitive state may reflect a negative stance vis-à-vis disease rather than a realistic one. Of particular interest is the possibility that negative HIV-specific expectancies are related to rumination. Individuals with negative expectations who experience a bereavement event may find themselves getting "stuck" in the cognitive simulation of negative scenarios. The extent to which rumination or cognitive rehearsal of undesirable outcomes is

a component of the process by which negative HIV-specific expectancies are related to earlier onset of symptoms merits additional research.

Given that medical science as yet has no cure to offer to those affected by HIV, it is important to study any factors that are differentially associated with maintenance of health and with disease progression. Such research can inform the development of psychotherapeutic approaches that may contribute to the maintenance of health and to quality of life. This investigation suggests that additional work regarding the behavioral, affective, and immunological mechanisms through which negative HIV-specific expectancies may be related to health outcomes is particularly important. This investigation also suggests that, among gay men, responses to AIDS-related bereavement may be especially relevant. Research directed to understanding the cognitive dynamics underlying negative expectations, such as the involvement of rumination, may be helpful in highlighting the kinds of interventions that may ameliorate negative expectations or moderate their impact on health, or both.

In addition, the present work contributes to an increasing body of literature suggesting that positive psychological adjustment in people living with HIV and AIDS is associated with the maintenance of optimism, hope, and a sense of personal control, even in the face of extremely threatening circumstances (e.g., Rabkin et al., 1993; Reed, Taylor, & Kemeny, 1993; Taylor et al., 1992; see Taylor, 1989; Taylor & Brown, 1988, for more general discussions). Thus, therapeutic efforts that focus on the maintenance of hopeful expectations would appear to be well placed.

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