

Mind-Body Therapies and Quality of Life in HIV-1+ Individuals

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Abstract

Objectives: To investigate one-year change in self-reported quality of life (QOL) by use of 13 mind-body interventions including psychological, spiritual and energy therapies among HIV-1+ individuals.

Design: Prospective observational cohort.

Methods: 905 HIV-1 positive participants in the United States and using at least one form of complementary and alternative medicine (CAM) completed a 27-page self-administered questionnaire at baseline, six-months and one-year between 1995-98. Use of specific psychological, spiritual and energy activities over the previous six-months were inquired. Quality of Life (QOL) was measured using the Medical Outcomes Study HIV (MOS-HIV) Survey. Multiple linear regression evaluated associations between mind-body therapies and change in QOL from baseline to one-year.

Results: Use of spiritual activities, meditation, prayer, and visualization imagery was significantly associated with improvements in mental health. Psychological therapy use was associated with non-significant trends towards worsening mental health scores. No significant differences were found for energy therapies and no trends in one-year change of MOS-HIV physical functioning, social functioning, bodily pain or general health scores were found.

Conclusion: These longitudinal data provide evidence that participation in spiritual activities may improve mental health status for HIV+ individuals. This may be related to coping mechanisms used in dealing with HIV and its sequelae.

Background

Individuals with HIV infection are known to experience ongoing physical, psychosocial and social stress with resultant impact on quality of life (Bing et al. 2000; Cohen et al. 1998; Hays et al. 2000). The number of HIV-related symptoms, anxiety and depression, have been shown to negatively impact quality of life in HIV-positive individuals (Revicki et al. 1998). However, evidence also suggests that different coping mechanisms may elicit differential effects on psychological and physical health outcomes (Cruess et al. 2000; Psychd et al. 2000; Swindels et al. 1999). As mind-body medicine strives to achieve a balance between a sense of control with acceptance of that which cannot be controlled (Astin et al 1999), it follows that mind-body interventions should be effective in improving quality of life in individuals infected with HIV. In fact, two cross-sectional studies have documented a positive association between spiritual activities/well-being with higher quality of life in these populations (Sowell et al. 2000; Tuck et al. 2001). To our knowledge, no study has investigated whether use of mind-body therapies is related to longitudinal change in quality of life in HIV+ individuals.

Quality of life (QOL) measurement has become increasingly prominent as clinical researchers realize that response to therapy should not only be measured by clinical endpoints but

also by functional status and sense of well-being as experienced by the patient (Hays et al. 2000; Revicki et al 1998). Several QOL instruments specific to HIV/AIDS have been developed for this purpose (Chan et al. 1998). Among these, the Multiple Outcome Survey (MOS)-HIV questionnaire has been extensively used in longitudinal studies and clinical trials (Wu et al. 1997 (a); Wu et al. 1997 (b)) and has shown significant associations with clinical variables such as disease stage, number and severity of HIV related symptoms, drug-related adverse events and CD4 counts (Bing et al. 2000; Swindells et al. 1999).

The Alternative Medical Care Outcomes in AIDS (AMCOA) is a longitudinal observational study conceived to investigate complementary and alternative (CAM) therapies in order to identify the best candidates for more rigorous testing in the future (Standish et al. 1997). Thirteen of the CAM therapies included in these analyses have been categorized as mind-body interventions according to the NIH Office of Alternative Medicine (now National Center for Complementary and Alternative Medicine). Quality of life is a primary endpoint of AMCOA as measured by five of the MOS-HIV subscales. This paper explores potential associations between these 13 mind-body therapies listed in the AMCOA questionnaires and changes in MOS-HIV subscores over one year.

Methods

The AMCOA cohort consists of 1,666 HIV-1 positive men and women living in the U.S. using at least one form of complementary and alternative medicine (CAM) who were recruited to complete a 27-page self-administered questionnaire every six months for two years between 1995-1998. Detailed methods for this nationwide observational study of CAM use among HIV+ Americans have been reported elsewhere (Greene et al. 1999; Standish et al. 1997; Standish et al. 2001). Data was collected on use of CAM and conventional medicine, health status, demographics, and quality of life measurements utilizing five subscales from the Medical Outcomes Study HIV Health Survey (MOS-HIV). Sub-scores for self-perceived physical function, mental health, social function, bodily pain, and general health were calculated using a 0-100 scale with 100 designating a better score. Laboratory data including CD4+ lymphocyte count and HIV-RNA viral load were collected from participants' providers after obtaining a signed release of medical records from participants. A total of 905 participants completed three surveys: baseline, six-month and one-year follow-up. Data collected from these individuals were analyzed for this report.

In the questionnaire, among other items regarding use of CAM, subjects were asked about their use during the past six months of the following mind-body therapies: group psychotherapy, support groups, individual psychotherapy, spiritual activities (stated simply as "spiritual activities"), meditation, prayer, affirmations, visualization imagery, psychic healing, crystals, hands-on energy therapy, Reiki, and therapeutic touch. These 13 mind-body therapies were classified a priori into one of three categories: psychological, spiritual, or energy. Use of each therapy was then classified into continuous use, intermittent use, or non-use. "Continuous use" of each CAM mind-body therapy was defined as self-reported use of the specific therapy within the last 6 months at both the 6 and 12-month follow-up questionnaires. "Intermittent use" was defined as self-reported use at either of the two periods, 6 or 12-month follow-up, but not both. "Non-use" was defined as no use of the therapy at both the 6-month and one-year follow-up. One-year change in the five subscales of the MOS-HIV was calculated as the difference in scores between baseline and 12-month follow-up.

All analyses were conducted using SPSS for Windows, version 10.0 (Norusis 1993). Descriptive statistics for baseline characteristics of the sample were calculated. Differences between persons who dropped out of the study prior to completing the one-year questionnaire were evaluated using t-tests for continuous variables (age, CD4+ count, viral load and MOS-HIV scores) and chi-square tests for categorical variables (race, presence of clinical AIDS defined by Center for Disease Control {CDC} classification, and use of highly active antiretroviral therapy {HAART}). Differences in baseline MOS-HIV scores and change in scores over one year by levels of use of specific therapies were tested using analysis of variance.

Multiple linear regression was used to evaluate associations between the use of specific mind-body therapies and one-year change in self-reported MOS-HIV scores while controlling for other covariates. Each therapy was evaluated individually and as a grouping of the specific category (psychological, spiritual, or energy). Within each model,

continuous and intermittent use of the therapy was compared to non-users of the therapies within that category (e.g. continuous and intermittent use of meditation was compared to those who used none of the spiritual therapies).

Potential confounders were identified by careful assessment of individual variables on the models from the following: age, race, gender, education, income, use of alcohol, smoking status, baseline CD4 count, duration of HIV infection, use of HAART and MOS-HIV bodily pain score. Models were subsequently adjusted for variables found to have a substantial impact on the main effect and included the respective baseline MOS-HIV score corresponding to the particular MOS-HIV outcome, bodily pain score at one-year follow-up, income and use of alcohol. Because use of antiretroviral therapy (ART) and HAART was spreading rapidly at this time, use of these therapies at the one-year survey was chosen as a covariate to detect people who had any use during the one-year follow-up period. The bodily pain score was included in the model in an effort to isolate change in mental health from physical symptoms that a participant may have experienced at the time of the one-year questionnaire. Baseline mental health MOS-HIV score and self-reported bodily pain at the time of the one-year follow-up questionnaire were both highly significant confounders of the associations described here.

Due to potential effect modification by severity of disease, analyses were stratified by (done separately for) use of ART or HAART reported in the one-year follow-up survey. Use of ART was defined as self-reported use of any reverse-transcriptase inhibitor, non-nucleoside reverse-transcriptase inhibitor, or protease inhibitor. Use of HAART was defined as self-reported triple or more combination therapy with at least one protease inhibitor or non-nucleoside reverse-transcriptase inhibitor.

Results

Demographic Summary of the Cohort

Of 1,666 individuals completing the baseline AMCOA questionnaire, 905 (54%) returned both the 6-month and one-year follow-up questionnaires. The 905 participants analyzed were an average age of 40 years, primarily male (78%) with two-thirds being white (**Table 1** on following page). More than two-thirds earned less than \$20,000 per year. Over half reported drinking alcohol less than once per month. Use of HAART was reported by 33% of respondents at baseline and increased to 49% after one year. Although laboratory data was not available for a large percentage of participants (30% missing CD4 count and over half missing viral load), for those with data the mean CD4 count for individuals was 298 cells/mm³ (SD ± 229) and median viral load was 10,000 copies/mL.

Impact of Missing Data

The high percentage of individuals (46%) who completed the baseline AMOCA questionnaire but did not complete either the second or third questionnaire may be a cause for concern in a longitudinal study. In reviewing baseline characteristics of study "drop-outs", they were found to be only slightly younger (mean age 39.1 years, SD ±7.6) compared to those who completed one-year follow-up, (mean age 40.2, SD ±7.5) and were more likely to be of minority race (39.6% versus 33.1%).

Although no significant differences were found in HIV-MOS subscales for physical function, social functioning, bodily pain or general health, individuals who did not complete the second or third questionnaires had a mean mental health score 4 points lower than those who completed all three. However, no significant differences were found between drop-outs and those included in these analyses by income, CD4 count, viral load, use of antiretroviral therapies, or presence of clinical AIDS.

Longitudinal changes in MOS-HIV QOL

Associations between individual mind therapies and all five MOS-HIV subscales were assessed using multiple linear regression. Overall, few relationships were found between use of a therapy and physical function, social function, bodily pain and general health (**Table 2** on following page). Borderline associations that did not appear consistent across the three use categories were considered to be Type I error associated with multiple tests. Several trends, however, were found for associations between use of spiritual therapies and mental health (**Table 3** on page after next).

Overall a significant improvement of self-reported mental health over one year was associated with use of any spiritual activity compared to those who did none of these activities (Table 3). Mental health MOS scores were four points higher for participants who practiced any spiritual therapy continuously during the past year compared to those who did none (adjusted regression coefficient 4.0, s.e. 1.4). Specific therapies involved in this improvement included spiritual activities, meditation, prayer, and visualization imagery. For all of these interventions, continuous use was associated with a greater improvement than was intermittent use or no use. The adjusted regression coefficients showed that continuous users of these therapies reported an improvement in their mental health score ranging from 3.6 to 5.6 points higher than non-users of any spiritual therapy.

While all regression coefficients were positive for models assessing spiritual activities and change in mental health reflecting improvement over time, coefficients for use of psychological therapies were negative, indicating lower mental health scores over time. Only one of these associations, involving use of individual psychotherapy, was significant. No associations were found for use of any energy therapies although the coefficient for continuous use of crystals and therapeutic touch showed improvements similar to use of spiritual therapies. The power to detect associations with energy therapies may be limited by the relatively small number of participants using them.

Table 1. Selected characteristics of 905 HIV+ individuals utilizing CAM who completed questionnaires at entry into the AMCOA study and at six-month and one-year follow-up.

Characteristic	N	%
Age		
Under 35 years	213	23.5
35-39	227	25.1
40-44	230	25.4
45 and older	235	26.0
Gender		
Male	704	77.8
Female	201	22.2
Race		
White	605	66.9
African-American	145	16.0
Hispanic	84	9.3
Other	71	7.8
Income		
Under \$10,000 per Year	402	48.3
\$10,000 - \$19,999	199	23.9
\$20,000 - \$29,999	103	12.4
\$30,000 or More	128	15.4
Unknown	73	---
Use of Alcohol		
Less than once/month	499	57.7
2-3 times/month	146	16.9
1-2 times/week	114	13.2
More than 3 times/week	106	12.2
Unknown	40	---
Use of HAART at baseline *		
Use of HAART	296	32.7
Use of other ART	279	30.9
No use of any ART	329	36.4
Unknown	1	---
Use of HAART at 12 month Surveillance Survey *		
Use of HAART	446	49.3
Use of other ART	237	26.2
No use of any ART	221	24.5
Unknown	1	---
Clinical AIDS at Baseline		
No	523	57.8
Yes	382	42.2
Laboratory CD4 Count		
Under 200	251	39.7
200-500	278	43.9
Over 500	104	16.4
Unknown	272	---
Laboratory Viral Load		
Under 800	101	24.3
800-10,000	114	27.5
10,001-64,000	96	23.1
Over 64,000	104	25.1
Unknown	490	---

* Use of any highly active anti-retroviral drug, use of any other anti-retroviral drug, or use of no anti-retroviral drug.

Table 2. Association between continuous use of any psychological, spiritual or energy therapy (compared to no use of the therapy) and MOS-HIV subscales for physical functioning, social functioning, bodily pain, and general health in 905 HIV+ individuals. Continuous users reported using the therapy in the previous six months at both six-month and one-year follow-up.

Category	Psychological Therapy		Spiritual Therapy		Energy Therapy	
	Coefficient (Standard Error)	p	Coefficient (Standard Error)	p	Coefficient (Standard Error)	p
Physical Function*	3.6 (1.7)	.09	2.4 (2.3)	.3	0.3 (2.5)	.9
Social Functioning*	0.9 (2.1)	.7	-0.3 (2.3)	.9	1.7 (2.5)	.5
Bodily Pain**	-2.0 (2.2)	.4	-1.4 (2.4)	.6	0.5 (2.7)	.3
General Health*	-0.8 (1.5)	.6	0.2 (1.7)	.9	-1.1 (1.8)	.6

* Adjusted for baseline MOS-HIV score for each outcome, 12-month HIV bodily pain MOS score, income and use of alcohol.

** Adjusted for baseline bodily pain MOS-HIV score, income and use of alcohol.

Effect Modification by use of ART

As severity of illness and use of anti-HIV drug therapy have been reported to modify relationships with quality of life, associations were evaluated by use of antiretroviral therapy, including HAART. Those participants who reported continuous use of spiritual therapies including meditation, prayer, and affirmations showed improved mental health scores at one-year follow-up. However, HIV+ subjects who did not use any form of antiretroviral therapy were more likely to show greater improvements in one-year changes in mental health scores than those who were using an antiretroviral therapy (Table 4 on page after next). Although borderline improvement in mental health was also found for those on a drug regimen, those not using any drugs were found to have improvements of up to 13 MOS-HIV points higher than non-users. Interactions between use of the spiritual therapies and antiretroviral drugs were not significant, however, except for affirmations. We hypothesize that these findings may reflect greater severity of disease in individuals prescribed antiretroviral therapy to treat their condition. Data support this conjecture as individuals not on a drug regime were found to have significantly higher CD4 counts, lower number of reported symptoms, and fewer were diagnosed with clinical AIDS at baseline (data not shown). Viral load, however, was somewhat lower for AMCOA participants using ART or HAART and may reflect treatment actions of the drugs.

Discussion

To our knowledge, this is the first study to longitudinally investigate whether use of mind-body therapies is related to change in quality of life in HIV+ individuals. Results of this observational study of HIV+ men and women from 1995 through 1998 who used CAM and reported use of 13 mind-body CAM methods show that self-reported mental health scores improved in those who used spiritual therapies including meditation, prayer, and visualization/imagery. Improved mental health scores were not observed in those AMCOA participants who used psychological therapies including individual psychotherapy, group psychotherapy, or support groups. Neither were differences found for use of psychic healing or any energy therapy. The association between use of spiritual CAM therapies and improved mental health was strongest in those who used the therapy continuously for one year compared to both intermittent and non-users of spiritual therapies. The relationship between improved mental health scores at one year and use of spiritual therapies was modified by use of ART. Stratification by use of drug therapy showed that individuals not using drug regimens appeared to benefit the most, although only the

effect of affirmations on mental health differed significantly by use of ART.

The associations found here between spirituality and improvements in mental health are consistent with cross-sectional data reported in the literature. Using standardized scales to measure spirituality, a small correlational study (n=52) reported spiritual well-being to be positively related to quality of life in 52 HIV-positive men (Tuck et al. 2001). A larger study of 184 HIV-positive women reported as spiritual activities increased, emotional distress was decreased even when adjustments were made for other stress-related factors such as functional impairment and HIV-related symptoms (Sowell et al. 2000). A qualitative study of interviews with women diagnosed with either cancer or HIV/AIDS concluded that spirituality may be an essential component to feelings of well-being in persons with potentially fatal diagnoses (Fryback et al. 1999). A review of factors affecting quality of life in persons infected with HIV concluded that spiritual well-being may be an important predictor of quality of life for physical and psychological comorbidities, ART therapy, social support systems and coping strategies (Douaihy et al. 2001).

It has been suggested that the mechanism by which spiritual activities benefit persons with HIV and other serious illness may involve stress reduction and ability to cope with the disease. Several studies have demonstrated that stress management interventions decrease psychological distress in HIV-positive persons (Cruess et al. 2000; McCain et al. 1996). Further, a trial of symptomatic HIV-positive men randomized to a cognitive behavioral stress management intervention showed significant improvement in coping strategies, specifically acceptance of the HIV infection, which was also related to lower dysphoria, anxiety and mood disturbance (Lutgendorf et al. 1998). It has also been reported that highly distressed persons with HIV tend to cope in an "evasive-regressive" manner and report low quality of life (Leiberich et al. 1997). Strong relationships have been reported between spiritual well-being and higher quality of life, mental health, psychological adjustment and coping in persons living with HIV (Douaihy et al. 2001; Somlai et al. 1996; Tuck et al. 2001).

Spirituality has also been investigated in other life-threatening diseases, primarily cancer, and been found to be associated with improved ability to cope and better quality of life (Brady et al. 1999; Gioiella et al. 1998; Mytko et al. 1999; Strang et al. 2001). In a small randomized trial of breast cancer patients, use of imagery reduced stress and improved coping skills (Richardson et al. 1997). The benefits of meditation in reducing pain, depression, anxiety and increasing quality of life in several dimensions have already been documented in

Table 3. One-Year mean change in HIV Mental Health MOS Score for HIV+ individuals using different levels of specific mind-body therapies. Continuous users reported using the therapy in the previous six months at both six-month and one-year follow-up; intermittent users reported use in one of the questionnaires; and non-users reported no use of the therapy in both questionnaires.

Category	Therapy	N	Mean change (SD)	p*	Coefficient** (Standard Error)	p***
Psychological	Group Psychotherapy	No Use: 307	0.5 (16.0)	.9	(ref)	.6
		Intermit. Use: 120	0.9 (18.2)		- 0.7 (1.6)	
		Cont. Use: 48	0.8 (15.6)		- 2.3 (2.4)	
	Support Groups	No Use: 307	0.5 (16.0)	.9	(ref)	.8
Intermit. Use: 206	-0.2 (18.4)	- 0.8 (1.4)				
Cont. Use: 212	0.4 (18.7)	- 1.0 (1.5)				
Psychological	Individual Psychotherapy	No Use: 307	0.5 (16.0)	.5	(ref)	.04
		Intermit. Use: 179	-1.6 (21.2)		- 3.2 (1.6)	
		Cont. Use: 187	0.1 (18.7)		- 3.3 (1.6)	
	Any Psychological Therapy	No Use: 307	0.5 (16.0)	.6	(ref)	.3
Intermit. Use: 254	- 0.9 (19.3)	- 1.7 (1.4)				
Cont. Use: 331	0.1 (18.4)	- 1.9 (1.3)				
Spiritual	Spiritual Activities	No Use: 167	- 3.1 (16.6)	.02	(ref)	.003
		Intermit. Use: 176	1.3 (18.6)		3.2 (1.7)	
		Cont. Use: 188	1.6 (16.2)		5.6 (1.6)	
	Meditation	No Use: 167	- 3.1 (16.6)	.03	(ref)	.03
		Intermit. Use: 229	1.2 (17.2)		3.2 (1.6)	
		Cont. Use: 265	0.9 (18.2)		4.1 (1.6)	
	Prayer	No Use: 167	- 3.1 (16.6)	.03	(ref)	.005
		Intermit. Use: 170	- 0.3 (19.2)		1.1 (1.8)	
Cont. Use: 425		1.2 (17.9)	4.4 (1.5)			
Psychic Healing	No Use: 167	- 3.7 (19.0)	.9	(ref)	.6	
	Intermit. Use: 69	- 2.6 (19.3)		0.0 (2.3)		
	Cont. Use: 27	- 3.1 (16.6)		3.6 (3.4)		
Affirmations	No Use: 167	- 3.1 (16.6)	.09	N/A ****	----	
	Intermit. Use: 139	- 0.2 (19.8)				
	Cont. Use: 187	1.1 (18.0)				
Visualization Imagery	No Use: 167	- 3.1 (16.6)	.09	(ref)	.009	
	Intermit. Use: 168	- 0.4 (19.3)		2.6 (1.7)		
	Cont. Use: 174	1.0 (17.1)		5.4 (1.7)		
Any Spiritual Therapy	No Use: 167	- 3.1 (16.6)	.04	(ref)	.003	
	Intermit. Use: 163	- 0.2 (18.8)		0.4 (1.8)		
	Cont. Use: 552	0.9 (17.9)		4.0 (1.4)		
Energy	Crystals	No Use: 588	- 0.7 (16.8)	.5	(ref)	.3
		Intermit. Use: 67	- 1.7 (18.2)		- 0.7 (2.0)	
		Cont. Use: 45	2.2 (22.2)		3.5 (2.4)	
	Hands-On-Energy Therapy	No Use: 588	- 0.7 (16.8)	.9	(ref)	.8
		Intermit. Use: 104	0.2 (20.9)		0.7 (1.7)	
Cont. Use: 54		- 0.5 (16.6)	1.4 (2.3)			
Reiki	No Use: 588	- 0.7 (16.8)	.5	(ref)	.8	
	Intermit. Use: 107	1.3 (22.0)		1.2 (1.7)		
	Cont. Use: 70	- 1.2 (18.8)		0.2 (2.0)		
Therapeutic Touch	No Use: 588	- 0.7 (16.8)	.7	(ref)	.5	
	Intermit. Use: 76	- 0.9 (20.8)		0.3 (1.9)		
	Cont. Use: 26	1.9 (16.7)		4.0 (3.2)		
Any Energy Therapy	No Use: 588	- 0.7 (16.8)	.4	(ref)	.4	
	Intermit. Use: 203	1.4 (20.1)		1.5 (1.3)		
	Cont. Use: 137	0.1 (18.5)		1.3 (1.5)		

* P-value for ANOVA comparison of means.

** Adjusted for baseline HIV mental health MOS score, 12-month HIV bodily pain MOS score, income and use of alcohol.

*** P-value from multiple regression for the categorical "use" variable.

**** Significant interaction between affirmations and use of anti-retroviral therapy (p=.04); results by use ART/HAART in Table 4.

Table 4. Relationship between one-year mean change in HIV Mental Health MOS Scores for HIV+ individuals using different levels of specific mind-body therapies by use of anti-retroviral drug therapy (use of anti-retroviral therapy or use of no drug).					
Category	Therapy	No Use of ART Drugs* Coefficient ** (Standard Error)	p	Use of ART or HAART* Coefficient ** (Standard Error)	p
		N=219		N=672	
Psychological	Group Psychotherapy	(ref)	.5	(ref)	.7
	No Use				
	Intermittent Use	2.2 (3.6)		-1.2 (1.9)	
	Continuous Use	-4.5 (4.8)		-1.7 (2.8)	
	Support Groups	(ref)	.8	(ref)	.7
	No Use				
	Intermittent Use	1.9 (3.2)		-1.3 (1.7)	
	Continuous Use	0.5 (3.0)		-1.3 (1.7)	
	Individual Psychotherapy	(ref)	.3	(ref)	.1
	No Use				
	Intermittent Use	-4.0 (3.0)		-2.9 (1.8)	
	Continuous Use	-3.7 (3.3)		-3.2 (1.8)	
Any Psychological Therapy	(ref)	.9	(ref)	.3	
No Use					
Intermittent Use	0.3 (2.8)		-2.2 (1.6)		
Continuous Use	-1.0 (2.7)		-2.2 (1.5)		
Spiritual	Spiritual Activities	(ref)	.01	(ref)	.1
	No Use				
	Intermittent Use	7.3 (3.6)		2.0 (1.9)	
	Continuous Use	10.0 (3.3)		3.9 (1.9)	
	Meditation	(ref)	.09	(ref)	.1
	No Use				
	Intermittent Use	7.3 (3.4)		1.9 (1.9)	
	Continuous Use	6.0 (3.3)		3.6 (1.8)	
	Prayer	(ref)	.007	(ref)	.08
	No Use				
	Intermittent Use	5.5 (3.6)		-0.1 (2.1)	
	Continuous Use	9.6 (3.0)		3.1 (1.7)	
	Affirmations	(ref)	.001	(ref)	.3
	No Use				
	Intermittent Use	4.2 (4.0)		2.8 (2.1)	
	Continuous Use	13.6 (3.6)		2.7 (2.0)	
	Psychic Healing	(ref)	.3	(ref)	.8
	No Use				
Intermittent Use	3.8 (4.6)		-1.5 (2.8)		
Continuous Use	9.4 (6.6)		0.7 (4.0)		
Visualization Imagery	(ref)	.09	(ref)	.07	
No Use					
Intermittent Use	6.8 (4.2)		1.8 (1.9)		
Continuous Use	8.1 (3.8)		4.5 (2.0)		
Any Spiritual Therapy	(ref)	.03	(ref)	.03	
No Use					
Intermittent Use	3.8 (3.5)		-0.9 (2.1)		
Continuous Use	7.7 (2.9)		3.0 (1.6)		
Energy	Crystals	(ref)	.1	(ref)	.8
	No Use				
	Intermittent Use	1.0 (4.0)		-1.6 (2.4)	
	Continuous Use	8.0 (3.9)		1.0 (3.1)	
	Hands-On-Energy Therapy	(ref)	.5	(ref)	.6
	No Use				
	Intermittent Use	-2.2 (3.1)		1.9 (2.0)	
	Continuous Use	3.6 (4.5)		0.2 (2.6)	
	Reiki	(ref)	.5	(ref)	.4
	No Use				
Intermittent Use	-3.2 (3.5)		2.6 (2.0)		
Continuous Use	2.2 (3.8)		-1.0 (2.5)		
Therapeutic Touch	(ref)	.7	(ref)	.2	
No Use					
Intermittent Use	-1.4 (4.4)		1.0 (2.2)		
Continuous Use	-5.2 (7.0)		6.2 (3.6)		
Any Energy Therapy	(ref)	.3	(ref)	.3	
No Use					
Intermittent Use	-1.6 (2.8)		2.4 (1.5)		
Continuous Use	3.4 (2.8)		0.0 (1.9)		
* Use of anti-retro viral therapy (ART) or highly active anti-retro viral therapy (HAART) at the 12-month questionnaire.					
** Adjusted for baseline HIV mental health MOS score, 12-month HIV bodily pain MOS score, income and use of alcohol.					

controlled trials with seriously ill patient populations (Delmonte 1985; Kabat-Zinn et al. 1985; Speca et al. 2000; Taylor et al. 1995). The increased sense of control that comes from improved coping skills may derive from the use of self-regulating mind-body therapies such as imagery and meditation as discussed by Astin et al (1999) and Harmon et al. (1999). Of course, improvements in mental health may reflect other benefits of spiritual activities which cannot be measured biologically. It has been suggested the reported benefits of spirituality may call for placing religion and spirituality into end-of-life medical care (Daaleman et al. 2000).

The decrease in mental health scores found here for users of psychological therapies (significant only for users of group therapy) is puzzling and may reflect confounding by indication. The psychological impact of the stressors with individuals with HIV can elicit a variety of responses (Chesney, et al. 1994; Douaihy et al. 2001). It's possible that persons with more severe depression and psychological distress get referred to more traditional treatments such as psychotherapy and support groups. Beneficial effects of therapy for individuals with more severe mental health problems may be more difficult to measure using self-reported instruments or may take more than one year. It is also possible that therapies that are self-performed and self-directed, thus allowing more personal control, may have a different impact on mental health compared to treatments performed by others that require a therapist or group. While our use of baseline mental health in the regression models controls, to some extent, group differences at the initiation of the one year change, other aspects of mental health not related to this measure may differ between the groups.

Data in this study also suggest higher levels of HIV-related symptomatology, and possibly the side effects of ART, interfere with the psychological benefits of spiritual practices. It may also indicate that mind-body influences on health are more difficult to achieve as disease severity increases. Perhaps one is able to more effectively influence his/her own health prior to the onset of late-stage of disease or the side effects that treatment of the disease may cause. As physical pain and fatigue increases, it may be more difficult to maintain and increase a positive attitude even though coping may be enhanced by specific activities. It should be noted, however, that spirituality was generally associated with improvements in mental health in those using ART/HAART although these were much smaller in magnitude than individuals not on a drug regimen.

Several limitations in this study should be acknowledged. The data from the AMCOA cohort consisted of self-reported information collected from a sample similar to that collected in other HIV research studies (Duggan et al. 2001; Kaslow et al. 1997). Only a little over half of those initially enrolled in the study remained to complete questionnaires over the next year. Although some differences (age, race and mental health MOS) were found between study drop-outs and those who completed one-year follow-up, clinical characteristics did not differ. The higher baseline MOS-HIV mental health score suggests that our cohort may reflect members of the HIV+ population with less depression or more positive attitude. Regardless, these factors should not affect generalizability of study results as primary conclusions involve detected associations between a therapy and an outcome rather than estimates of measured percentages for a population. Results reported here are similar in generalizability to those reported

in other studies using methodologies such as a hospital-based case-control design where patients are included in a study through an undefined referral mechanism (including self-referral). In such a design, the source population cannot be identified although risk factors for disease or other outcomes can be effectively identified. The volunteer and physician referral mechanisms used to recruit the AMCOA cohort have become a common study design (Duggan et al. 2001; Kaslow et al. 1987).

Other issues related to interpretation of results should be considered. The self-selection of therapeutic activities in an observational study such as this prevents the ability to distinguish the effects of the therapy itself from other factors that may be inherent in individuals who choose to use them. It should also be noted that the time period in which these data were collected, 1995 through 1998, was an interval bridging the introduction of HAART in 1996. Data were collected during a time of great change in the management of HIV disease and makes the interpretation of the interaction of HAART with CAM more difficult. Finally, AMCOA subjects were self-identified as CAM users and comparisons with HIV+ populations not using CAM are not possible here.

This study also has many strengths. It is the first longitudinal study with repeated measures of both CAM use and medical outcomes in a large national cohort of HIV-infected individuals. The sample is one of the largest studies to investigate use of mind-body therapies in an HIV+ population. The longitudinal nature of the study also allowed calculation of different levels of activity (continuous, intermittent, no use of each therapy) so dose-response relationships could be investigated. The study necessitated the development and implementation of a standardized questionnaire to describe use of CAM. The questionnaire covered use of ART and HAART therapy and thus, in the analyses, it was possible to statistically control for the effect of these recently introduced treatments. This instrument is suitable for use in other clinical epidemiology studies of CAM in HIV/AIDS and is available from the investigators. The study, even with the limitations placed on interpretation, has produced preliminary data that has generated the hypothesis that spiritual CAM therapies improve mental health in HIV+ individuals.

The results of the Bastyr AMCOA study provide evidence that participation in spiritual activities such as prayer and meditation is associated with improvements in a clinical outcome measure, mental health QOL, and that these improvements can be detected in an observational study. Further research is needed to evaluate associations of spiritual therapies with other clinical outcomes including change in progression to AIDS rates, survival, CD4 counts, viral load and survival. Such analyses will help address the question of whether improved mental health associated with the use of spiritual-type CAM therapies translates into or correlates with improved clinical and laboratory markers of HIV/AIDS morbidity and mortality. These preliminary data provide a rationale for further investigations to measure the nature of associations between spiritual practices and psychological quality of life in HIV-infected persons and corollary improvements in physical health.

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Commentary

This report extends previous data that indicates self-reported mental health improved in HIV positive individuals who had taken part in any spiritual activity in the past year. Also, a dose-response effect was evident in that continuous use of a spiritual activity resulted in more favorable outcomes. This study included a large sample, had carefully planned methods and found a strong treatment effect that appeared to have dose-response properties. While I will not comment on the specific methods of this study, it must be noted that observational studies can only suggest causality. The major problem with this sort of cohort study is that we can argue that some unknown variable, not controlled for in the analyses, may in fact be responsible for the results.

Literature exploring spirituality and related concepts often confounds multiple concepts. There are many characteristics or self-conceptions that relate to these ideas. For example, spirituality and religiosity are empirically and theoretically distinct concepts that are confounded in the literature. We must be careful to be specific with our language and measurement tools when asking questions about these concepts. With that said, the volumes of research in these areas highlight the need for practitioners of all kinds to be sensitive to spiritual and religious contributions to and correlates of our patient's health. Surveys indicate that most of our patients express a desire for their physicians to talk with them about spiritually. This must be done with sensitivity, tact, and compassion. So, let us actualize our lip service to spirituality and consider the spiritual and religious history as a core component in our case history taking.

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