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Research on psychoneuroimmunology: tai chi as a stress management approach for individuals with HIV disease

Jo Lynne W. Robins, RN, ANP, PhD^{a,b,*}, Nancy L. McCain, RN, DSN, FAAN^b, D. Patricia Gray, RN, PhD^b, R.K. Elswick Jr., PhD^{b,c}, Jeanne M. Walter, RN, MS, FAAMA^b, and Elizabeth McDade, MFA, CRM^d

a Integrating Wellness, Inc., Richmond, VA 23235, USA

b School of Nursing, Virginia Commonwealth University, Richmond, VA 23298, USA

c School of Medicine, Virginia Commonwealth University, Richmond, VA 23298, USA

d Circle Communications, Ashland, VA 23005, USA

Abstract

Psychoneuroimmunology is a framework for mind–body practice and research that combines cutting-edge scientific exploration with holistic philosophy to appreciate and understand stress responses. The rapidly growing research literature provides a foundation for building an integrative stress management model with the potential to positively influence the stress–disease relationship and, ultimately, health outcomes. This article introduces a novel tai chi intervention and provides quantitative and qualitative data from a randomized clinical trial indicating its effects on psychosocial variables in individuals living with various stages of HIV disease.

1. Introduction

Psychoneuroimmunology (PNI) is a framework for mind–body practice and research. It is an integrative approach combining cutting-edge scientific exploration with holistic philosophy. Psychoneuroimmunology facilitates the appreciation and understanding of stress responses. Such understanding helps us recognize and begin to control our psychological and physiological responses. The research literature provides a foundation for building an integrative stress management model that includes strategies to positively influence the stress–disease relationship and, ultimately, health outcomes.

As a stress management strategy, tai chi may enhance one’s coping ability and potentially impact neuroendocrine responses and, ultimately, immune function. We investigated this mind–body intervention, along with two other intervention groups and a wait-listed control group, in a randomized clinical trial to discover its specific biopsychosocial effects in individuals living with various stages of HIV disease. This article focuses on the novel tai chi intervention and provides preintervention and postintervention quantitative and qualitative data related to its use as a stress management strategy among persons with HIV disease. Longitudinal and physiological data reports of tai chi and the effects of the other interventions are forthcoming.

* Corresponding author. Richmond, VA 23235, USA. Tel.: +1 804 323 0312.

2. Psychoneuroimmunology, stress, and HIV disease

Psychoneuroimmunology is concerned with multifaceted psychological–neuroendocrine–immune system interactions. These include the influence of psychosocial factors such as stress perception and coping on immunologically mediated and moderated diseases (e.g., HIV infection and malignancies). Chronic stress and associated psychological responses can activate the hypothalamic–pituitary–adreno-cortical and sympathetic–adrenomedullary systems, potentially inducing immunosuppression. A growing body of research suggests that immunosuppression associated with perceived stress may adversely affect the clinical course of HIV disease (reviewed by Cole & Kemeny, 1997).

Psychological stress has been directly linked with increased depressive mood and other indicators of psychological distress or negative affect in several studies with the HIV population. Furthermore, there is increasing evidence of associations between psychological distress and immunosuppression or disease progression in persons with HIV disease. On the other hand, research on stress and coping indicate that a variety of coping strategies (including relaxation, exercise, meditation, social support, spirituality, and acquisition of positive meaning) used in response to stress enhance psychosocial functioning, quality of life, and physical health (Antoni, 2003; Folkman, 1997).

Stress management through coping mechanisms such as relaxation, exercise/movement, and meditation, along with making meaning through cognitive restructuring and spiritual growth, may determine individuals' perceptions of stressors and subsequent psychological adaptation, at least in part, by their enhancement of such positive coping strategies. In addition to enhancing coping skills, stress management interventions also may reduce stress levels and enhance psychosocial functioning by modifying stressor appraisals (perceptions; Astin, 1997), supporting the creation of meaning (Folkman, 1997), enhancing spirituality (Ironson et al., 2002), and fostering inner strength, an aspect of spirituality defined as relating to one's personal resources and a sense of the sacred (Roux, Bush, & Dingley, 2001). In addition, there is recent evidence that adherence to HIV treatment, a critical factor in disease management, is influenced by social support and a positive state of mind (Gonzalez et al., 2004). Tai chi may be useful in a PNI paradigm as a stress management strategy for enhancing psychosocial function and, ultimately, neuroendocrine–immune function and disease progression.

2.1. Tai chi background

Tai chi was originally developed by Taoist monks to honor and cultivate one's innate healing ability and one's connections with others and the natural world. In the West, tai chi is practiced as a moving meditation. Using breath and balanced moving postures, practitioners facilitate the flow of chi (life force energy) to restore internal balance and harmony. Many of the movements are influenced by and derived from the natural world. In addition, the practice finds its foundation in the precepts of living life from a mindful and balanced perspective. Tai chi is considered a low-level physical exercise that teaches participants to be mindful of the capacity to ultimately perceive greater self-control and empowerment.

The body of research on tai chi is growing, and there is empirical evidence that it positively influences multiple physical states. In a review of 31 studies, Li and Chan (2001) found that tai chi had beneficial effects on cardiorespiratory and musculoskeletal function, posture control, balance, and frequency of falls in elderly persons. In one study involving older women with osteoarthritis, Song, Lee, Lam, & Bae (2003) demonstrated that 12 weeks of tai chi practice decreased pain and stiffness, enhanced ability to perform activities of daily living, and increased abdominal muscle strength and balance. Wolf et al. (1996), among others, have consistently reported improved strength, balance, and posture with subsequent reduction in falls and fractures for the elderly persons. The psychophysiological benefits of tai chi are

equally impressive. In experimental studies, tai chi practice has been associated with an elevation in heart rate and urinary norepinephrine, decreased salivary cortisol, less total mood disturbance and state anxiety, and increased feelings of vigor (Jin, 1989). In a study by Jin (1992), tai chi, brisk walking, and meditation resulted in statistically significant increases in heart rate, decreases in salivary cortisol, and improvement in mood states across all treatment groups. In summary, there is a growing body of evidence that tai chi provides a moderate level of aerobic exercise while also inducing a meditative state, which may enhance its psychophysiological benefits. In searching the health sciences literature, we found no report on the therapeutic use of tai chi among persons with HIV disease.

3. Tai chi intervention

Tai chi has been identified to be within the parameters of safe exercise for individuals with even severely compromised energy reserves (Fontana, 2000). In consideration of the potential physical limitations of our participants, we developed a focused short form of tai chi involving eight movements for use in this study. The tai chi group met for 10 weekly 1-hour sessions. Each session began with 15 minutes of deep breathing and guided imagery, followed by a review of previously introduced movements and the introduction of a new movement for that session. The introduction of each movement included exploration of the meaning of the movement and a related reading from *Embrace Tiger, Return to Mountain* (Huang, 1973) or the ancient *Tao Te Ching* (Tzu, 1997). Through the movements, participants were encouraged to explore different perspectives and responses to life stress. Each movement began with a deep breath in a grounded stance followed by a deep breath in a centered stance to emphasize living from a mindful and balanced perspective. Each session began and ended with the tai chi bow, a complex movement encompassing several of the common principles of tai chi practice. (See Appendix A for descriptions of the specific movements and weekly sessions.)

The tai chi movements related to and built on each other in philosophy and technique. Each of the movements conveyed a particular component of the underlying philosophy of tai chi practice as well as a particular meaning for that specific movement. For example, the movement entitled “Embrace Tiger, Return to Mountain” speaks of revisiting issues that are unresolved, recognizing that issues can be resolved when they are approached from a loving, heart-centered space, thereby enabling participants to return to a place of peace. The movements can be practiced individually or sequentially, creating a form. Movements were taught in a sequence that allowed repetitive instruction as well as progressive skill building. Training videotapes were produced and distributed to participants for weekly and ongoing tai chi practice.

4. Design and methods

The overall purpose of this randomized clinical trial, Alternative Stress Management Approaches in HIV Disease (National Institutes of Health; R01 AT000331), was to determine whether three short-term stress management interventions (tai chi training, spiritual growth groups, and cognitive-behavioral stress management) improved psychosocial functioning, quality of life, and neuroendocrine-immune function in persons living with varying stages of HIV disease. In addition, qualitative interviews were conducted with a randomly selected subset of participants to explore their unique stress experiences as well as responses to and thoughts about the study. Reported here are the preintervention-to-postintervention changes among the participants randomly assigned to the tai chi intervention group.

4.1. Sample

Each participant was fully informed of all study procedures and participation requirements, and each one's consent to participate was confidentially documented. The study was continuously approved and monitored by the university/medical center institutional review

board. To be eligible for study inclusion, participants had to be at least 18 years old, able to read and speak English, previously aware of their diagnoses of HIV disease, and deemed likely to be physically capable (through clinical screening for Karnofsky performance scores of at least 60) of attending the intervention sessions and completing a 12-month follow-up requirement. Potential participants were clinically screened and excluded for significant psychiatric illness or significant cognitive impairment. Because gender might influence both perceptions and experiences of psychosocial stressors as well as group interactions, men and women were enrolled in separate intervention groups. Gender subgroups were stratified by prebaseline CD4⁺ cell counts into subsets with less than 99, 100–199, 200–299, 300–399, 400–499, or 500 or more cells/ μ l to ensure an equivalent baseline HIV disease progression status across intervention groups.

Participant recruitment and retention were enhanced by a program of incentives. Parking fees or round-trip bus tickets and childcare services were provided as needed to enhance participation, particularly among persons with a lower socioeconomic status. Direct incentives for participation and for reducing attrition included prorated participant honoraria.

4.2. Data collection procedures

Descriptive demographic and cofactor data collected from participants were on race, marital/partner status, educational level, risk factors, age, sex, current medications and dates of initiation, use of alcohol or psychoactive drugs, current and usual healthy weight, exercise patterns, previous and current experiences with stress management or complementary/alternative strategies, and date of first acquisition of knowledge on their HIV-seropositive status. Health status data were investigator evaluated using the Centers for Disease Control classification system, the Karnofsky performance index, and historical as well as concurrent HIV-specific symptom status as measured by the revised HIV Center Medical Staging Scale (McCain et al., 1998). Medication adherence was evaluated using the 1999 AIDS Clinical Trial Group Adherence Questionnaire, the standard instrument for assessing adherence at the time of the study.

4.3. Psychosocial instruments

The psychosocial–spiritual concepts of interest were measured by established instruments, all of which had previous reports of validity and reliability. The instruments were chosen based on the PNI-driven theoretical framework. Reliability coefficients for each instrument are shown in Table 2. Stress levels and coping patterns were assessed by the Dealing with Illness Scale (DIS) (McCain & Gramling, 1992). The DIS was qualitatively derived from persons with HIV disease and has been kept current through psychometrically driven revisions in 1994 and 1999. The DIS is composed of stress and coping subscales. Participants indicate perceived stress specifically related to their HIV disease for two periods: (1) since the time of their diagnosis (historical score) and (2) within the past month (concurrent score). The revised 40-item coping subscale of the DIS reflects the theoretical dimensions of problem-focused, emotion-focused, and appraisal-focused coping.

The revised Social Provisions Scale (SPS) was used as a measure of social support (Cutrona & Russell, 1987). The SPS is a 24-item, 4-point Likert-type measure of six social provisions or components of social support: reliable alliance, attachment, guidance, nurturance of others, social integration, and reassurance of worth. Although it was not possible to discern any effect of group interactions alone in this study on group-format interventions, the subscale score for social integration and the overall score for social support were used to evaluate any differential or perhaps untoward effect of the interventions on social support.

Psychological distress specific to living with HIV disease has been previously documented as avoidant and/or intrusive thoughts related to the illness (McCain et al., 2003) using the Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979). Because of its specific nature and previous sensitivity to psychosocial interventions, the IES was used to measure the subjective impact of living with HIV disease. The IES is a 15-item instrument with response options that indicate how frequently within the past 7 days each distressing thought occurred. Higher scores on the intrusive and avoidant subscales indicate higher psychological distress.

Health-related quality of life is defined as the impact of illness experiences on physical, psychological, social, and spiritual, or existential well-being. The Functional Assessment of HIV Infection (FAHI) Scale is a multidimensional measure of quality of life in people with HIV infection (Peterman, Cella, Mo, & McCain, 1997). The 44 items of Version 4 of the FAHI are grouped into subscales of physical, functional and global, and social well-being; emotional well-being/living with HIV; and cognitive functioning. Thus, the scale reflects both general health-related and HIV-specific quality of life, with higher scores representing a greater quality of life.

Spiritual well-being refers to the dimension of quality of life that reflects affirmation of life in a holistic relationship with God or a higher being, self, others, and nature or “the whole.” Spiritual well-being was measured by the Spiritual Well-Being Scale (Paloutzian & Ellison, 1982). As a general measure of spiritual well-being, the 20-item Likert-type scale consists of 11 positively worded and 9 negatively worded statements comprising religious well-being and existential well-being, with higher scores indicating greater well-being.

5. Findings

A total of 59 participants completed the tai chi intervention group. Demographic data on the participants are shown in Table 1. In comparisons of participants at baseline, those who chose not to participate in or complete the group intervention were slightly more symptomatic, but not in the range of clinical significance. However, they also had significantly lower scores on the functional and global well-being subscale of the FAHI than did those who completed the intervention ($M = 29.3$ vs. 34.0 ; $p = .03$). Their Centers for Disease Control category scores were not significantly different, but the noncompleting participants perceived themselves to have a lower quality of life in the realm of functional abilities.

Using paired t tests, preintervention-to-postintervention comparisons (Table 2) indicated that, upon completing the intervention, the tai chi group had (1) higher overall quality of life ($p \leq .001$), largely accounted for by higher emotional ($p \leq .001$) and social ($p \leq .05$) well-being; (2) lower HIV-related psychological distress ($p \leq .05$); and (3) more frequent use of appraisal-focused coping ($p \leq .05$; see Table 1). These differences were not attributable to changes in social support, problem-focused or emotion-focused coping, or spiritual well-being.

5.1. Qualitative findings

Qualitative interviews were conducted with a randomly selected subset of participants in the study. Interviews were conducted immediately before and after completion of the 10-week intervention. The comprehensive purpose of the qualitative interviews was to obtain information about the experience of participating in this clinical trial within the stress and coping framework. Open-ended interview questions focused broadly on the experiences of stress and coping within the context of having an HIV disease and on those related to the clinical trial. Interviews were conducted in a private setting after the completion of the quantitative questionnaires. The interviews were audiotape recorded and transcribed; the verbatim transcriptions served as the basis for data analysis. A constant comparative method was used

to identify themes within and across interviews. The data reported here are focused on the group's experiences of participating in the study.

A total of 18 participants in the tai chi group completed preintervention and immediate postintervention interviews. Demographic data are shown in Table 1. Participants indicated that they had enrolled in the study for one of three reasons: (1) it was recommended to them by their health care provider, social worker, friend, or someone who had been a study participant; (2) they wanted to work again with the study's principal investigator based on prior experiences of working with her; or (3) they wanted to learn tai chi. All interviewed participants were pleased with their random assignment to the tai chi group. This contrasted with participants assigned to the other intervention groups, many of whom expressed disappointment that they were not assigned to the tai chi group. During the initial interview, three participants noted that their involvement in this study was their first time to publicly associate with other HIV-infected individuals. They feared that participation in the study itself would be stressful because it would create situations in which their confidentiality could be compromised, although this was not their experience during the study.

All of the participants believed that the group was beneficial. Most attributed a great deal of its effectiveness to the group leader. They described her as someone who was more than an instructor: "She had an accepting air about her that opened doors for people." Participants in the tai chi group experienced numerous benefits. Overall, the benefits were described in terms of their effects on reducing stress or enhancing coping with stressors. One man indicated that he was a loner and that tai chi was something he could give himself and "wash the stress right on out." One woman remarked, "I know now that if I feel stressed out, I can just get into my own little world and relax."

Participants also reported unexpected benefits. For example, one participant commented with surprise, "It really works! While I thought I would learn something new, I find myself actually utilizing the techniques." Another participant noted that she had unexpectedly experienced a reduction in the number of headaches she had: "Before I got in the tai chi group, I had headaches two or three times a week and I don't have that anymore. I would get stressed out and feel it all in the back of my neck. It's not like that anymore." One woman shared that she taught the intervention to her family and they practiced it together, "so the whole house is beginning to become stress free." Finally, learning tai chi allowed participants to have less attachment to how others behaved, thus making life more stress free.

A few participants indicated that there were some aspects of the tai chi intervention that they would like to see changed. Group size was the most frequently mentioned aspect. For some participants, the group size was too small because they did not want to stand out individually during the practice sessions. Another participant was disappointed with the small group size because he had hoped to use participation in this study as a way to reach out to a larger number of other people with HIV disease.

6. Discussion

These data indicate that the tai chi intervention may account for clinically meaningful improvements in psychosocial functioning. There were statistically significant improvements in quality of life, HIV-related psychological distress, and appraisal-focused coping. Tai chi practice encompasses several potentially therapeutic aspects. Learning to experience the world from a mindful, balanced place and exploring stress responses through meaningful meditative movement encourage proactive instead of reactive responses to perceived stress. Also, there is an aspect of therapeutic relationship between researcher and participant, nurse and client. The fundamental nature of the nurse-client relationship involves helping clients interpret the

meaning of their illness and fostering self-help behaviors. These findings were corroborated by feedback from participants during qualitative interviews. Altering one's perception of stress may be the key component in ultimately impacting neuroendocrine-immune responses and health outcomes.

The absence of statistically significant changes in social support is consistent with the study hypothesis that tai chi intervention effects would not be attributable to an effect of group-related social support. Similarly, the absence of significant changes in spiritual well-being could be because the focus of the intervention was not spiritual in nature. The philosophical framework was discussed as a different world view, but the impact of this view on the spiritual aspects of life was not emphasized.

The strength or "dose" of the tai chi intervention likely contributed to the absence of other significant findings. Participants consistently voiced wanting the intervention to last longer and involve more complicated, advanced movements.

7. Directions for future research

In future research, use of an intervention lasting longer than 10 weeks and including more advanced movements would enable a more in-depth exploration of the practice of tai chi, potentially increasing the strength of the intervention. As mentioned, smaller group sizes were perceived to be less satisfying to participants. Small group sizes were not intended in this study and were related to factors such as recruitment and retention challenges in the HIV population. In large part because of the success of protease inhibitors in slowing the progression of HIV disease, many individuals are leading more productive lives, including working and raising families, making participation in research studies less feasible. Conducting sessions in the evening or on weekends is one strategy that should be explored in future studies.

8. Conclusion

From the holistic perspective of PNI, the stress process is a dynamic interaction between an individual, social-environmental factors, and stressors. This interaction influences stress perception, coping patterns, and, ultimately, neuroendocrine-immune processes. In individuals living with HIV disease, PNI recognizes that psychological distress results in immunosuppression and, potentially, disease progression. Mind-body stress management approaches may be effective in addressing these interactions. The quantitative data in this study were corroborated by the interview data for participants in the tai chi group, who described physical, emotional, spiritual, and social benefits of participating in the group. These findings indicate that the tai chi intervention may account for clinically meaningful improvements in psychosocial functioning. Ultimately, it may be shown that tai chi moderates the progression of HIV disease through enhanced quality of life and coping mechanisms.

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Appendix A. Focus of Weekly Tai Chi Sessions

A.1. Week 1: Introduction to Tai Chi

1. Data collection

2. Introductions among group members; discussion of the group process and expectations for participation
3. Brief discussion of the nature of tai chi as an approach to stress management

A.2. Week 2: Breathe Work and Posture and Introduction of the Tai Chi Bow

1. Discuss use of diaphragmatic breathing and a balanced posture to maximize body balance and minimize joint stress. Emphasize all movements beginning and ending in the grounded position with bent knees, hip width apart, and hands resting at the sides of the body.
2. Discuss the philosophy and principles of movement in tai chi, with introductory readings from the text *Embrace Tiger, Return to Mountain* (Huang, 1973).
3. Introduce the tai chi bow. The tai chi bow is a complex movement focusing on honoring self, others, and a higher power or spirit, balancing the complementary and opposing forces of yin and yang as well as connecting with the earth and sky.
4. Begin by now encircling hands into a prayer position, allowing the thumbs to rest over the heart. The first bow honors the self. Allow the hands to make a circle, finishing with the thumbs resting over the heart. Make a fist with the right hand covered by the left. Take a small step forward on the right foot followed by the left foot while allowing the hands to make a circle once again; finish with the thumbs resting over the heart. The second bow honors others. Make a fist with the left hand enclosed by the right. Take a small step backward on the left foot followed by the right foot while allowing the hands to make a circle; finish with the thumbs resting on the heart. The third and final bow honors spirit, ending with the thumbs resting over the heart. Finally, keeping the thumbs and index fingers touching, form a triangle with the hands in front of the heart. Bring the triangle down, rotating it to rest upside down in front of the pelvis.

A.3. Week 3: Introduce movement entitled “Embrace Tiger/Return to Mountain”

1. This movement focuses on revisiting, from a heart-centered place, difficult issues so that they may be transformed and released, allowing the individual to return to a place of peace.
2. Begin with hands resting one on top of the other in front of the symphysis pubis; bring the hands to the level of the eyes; then, turn palms outward, opening arms overhead and circling around to starting position; then, lift hands to the level of the heart, reach arms out, and open hands, circling around and then resting at the sides of the body.

A.4. Week 4: Introduce movement entitled “Gathering Earth and Heaven Energy”

1. This movement involves arm movement paired with breathing to center oneself while fostering a connection with the earth and heaven or sky.
2. Gently lift arms out to the sides then in front of the body (gathering earth energy) and down; then, gently lift arms overhead (gathering heaven or sky energy) and down.

A.5. Week 5: Introduce movement entitled “Smoothing the Waters”

1. This movement allows relaxation of the neck and shoulders while mentally focusing on smoothing out the tensions in the mind and body.
2. Hold hands at waist height (neck and shoulders relaxed), with movement in a horizontal circular pattern in front of the body, gently swaying side to side.

A.6. Week 6: Introduce movement entitled “Carrying the Ball of Energy”

1. This movement emphasizes awareness of the presence of energy in and around us as well as the position and movement of the body in space.
2. Imagine holding a ball of energy between the hands and moving it from side to side, front to back, or overhead and down.

A.7. Week 7: Introduce movement entitled “Yin/Yang Moving Meditation”

1. This moving meditation incorporates breathing and arm movements tracing the yin/yang symbol, representing the opposite yet complementary and balancing forces in nature.
2. Use the left arm to trace the dark yin side of the circle and the right arm to trace the light yang side of the circle. Because yin and yang exist in relation to each other, each arm traces its side as well as the rest of the circle. Lift the left arm out to the side of the body and overhead, sweep the arm in an “S” shape across the center of the body and around overhead; allow the arm to sweep back to the beginning position. Sweep the right across the body and up followed by tracing the “S” shape; complete the circle with the arm overhead; then, allow the arm to sweep back to the starting position.

A.8. Week 8: Introduce movement entitled “Separating the Clouds or Cloud Hands”

1. This movement focuses on parting the clouds to facilitate a “clear vision.”
2. Beginning with hands down at sides, bring right hand across the right thigh to the center of the body and trace the hand up the midline of the body, looking at the palm as it passes the face. Once the arm is extended overhead, rotate the palm outward and bring the arm back to the side in a relaxed, sweeping movement as if separating clouds.

A.9. Week 9: Introduce movement entitled “Tai Chi Walk”

1. The tai chi walk involves slow, contemplative walking, focusing on the placement of heel then toe on the ground as well as awareness of all sensations in the body and mind.
2. Review all movements including continuous form (all movements done together in sequence).

A.10. Week 10: Group Termination

1. Any necessary review
2. Data collection

Table 1

Sample demographic data

<i>Quantitative sample</i>	
Sex (<i>n</i>)	
Female	24
Male	35
Age in years [<i>M (SD)</i>]	42.3 (8.3)
Race [<i>n (%)</i>]	
African American	48/59 (81)
Caucasian	11/59 (19)
Stage of illness [<i>n(%)</i>]	
Asymptomatic	16/59 (27)
Symptomatic, not AIDS	15/59 (25)
AIDS	28/59 (48)
<i>Qualitative sample</i>	
Sex (<i>n</i>)	
Female	8
Male	10
Age in years [<i>M (SD)</i>]	41.6 (10.9)
Race [<i>n (%)</i>]	
African American	16/18 (89)
Caucasian	2/18 (11)
Stage of illness [<i>n(%)</i>]	
Asymptomatic	8/18 (44)
Symptomatic, not AIDS	5/18 (28)
AIDS	5/18 (28)

Table 2
Internal consistency and preintervention and postintervention mean values for the psychosocial–spiritual variables

Variable/Scale	Cronbach's α	Preintervention	Postintervention	Difference [M(SD)]	P
Quality of life					
Total	.94	113.28 (32.8)	123.30 (33.9)	10.02 (19.7)	<.001
Physical		29.14 (9.2)	29.63 (9.1)	0.49 (7.0)	.607
Emotional		23.94 (9.1)	27.66 (9.2)	3.71 (8.2)	.001
Family		33.69 (11.3)	35.25 (10.6)	1.56 (8.9)	.185
Social		20.49 (8.7)	22.01 (8.8)	1.52 (4.9)	.026
Cognitive		8.04 (2.9)	8.76 (2.8)	0.73 (2.6)	.042
Psychological distress	.92	33.53 (11.9)	30.07 (11.2)	-2.83 (10.4)	.044
Perceived stress					
Total	.91	29.36 (11.3)	28.16 (13.8)	-1.21 (11.9)	.443
Negative		14.74 (8.6)	12.69 (10.7)	-2.05 (11.7)	.188
Coping					
Problem	.80	39.73 (7.7)	41.08 (6.1)	1.36 (7.4)	.165
Emotion	.59	34.59 (6.1)	33.41 (4.5)	-1.19 (5.5)	.103
Appraisal	.89	45.81 (10.1)	49.51 (6.9)	3.69 (9.1)	.003
Social support					
Total	.89	61.60 (12.1)	61.88 (12.3)	0.28 (7.9)	.788
Alliance		11.04 (2.5)	11.02 (2.6)	-0.02 (2.0)	.947
Attachment		9.86 (3.1)	10.05 (2.7)	0.19 (2.2)	.502
Guidance		10.56 (3.1)	10.88 (2.6)	0.32 (2.6)	.368
Nurturance of others		9.88 (2.2)	9.43 (2.9)	-0.44 (2.3)	.150
Social integration		10.18 (2.4)	10.21 (2.6)	0.04 (2.7)	.923
Reassurance of worth	.93	10.09 (2.5)	10.28 (2.4)	0.19 (2.1)	.489
Spiritual perspective		4.96 (0.9)	4.82 (1.0)	-0.14 (0.8)	.206
Spiritual well-being	.91	91.88 (17.1)	93.71 (18.7)	1.83 (13.7)	.308