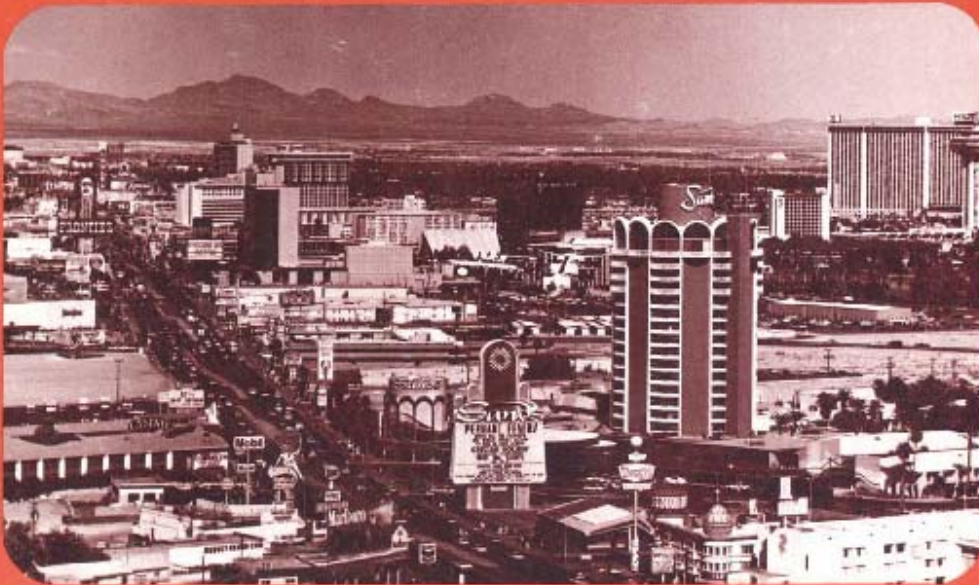


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Physical Therapy and Dance in the Surgical Management of Breast Cancer

A Clinical Report

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This report describes a creative therapeutic exercise program that is part of a preoperative and postoperative regimen prescribed for patients with breast cancer surgery. Since August 1982, physical therapy has been offered as part of a multidisciplinary breast cancer program at our acute-care hospital. Our physical therapy department provides preoperative and postoperative evaluations and treatment for patients with breast cancer surgery. This treatment is offered on an outpatient basis and includes group dance sessions that are supervised by a licensed physical therapist and a licensed dance teacher. Physical therapy for patients with breast cancer surgery need not be limited to traditional wall-climbing exercises. Early physical therapy intervention should be directed at the unique emotional and physical problems encountered by these patients. Through dance, patients may experience the freedom of total body movement that enhances their adjustment to a new body image. An organized group setting provides a support mechanism that enables patients to share their experiences, fosters a positive attitude toward exercise, and facilitates psychological adjustment to the diagnosis of breast cancer.

Key Words: Mastectomy, Physical therapy.

Dancing has been linked to the practice of medicine in primitive cultures. Dance was used as a form of worship to please the intangible forces influencing the various aspects of life, including fertility, birth, sickness, and death. Some primitive forms of dance were used in certain rites to promote healing; medicine dances assured the return of good health.¹

Recently, dance has been used as an innovative physical therapy modality in the treatment of arthritis, cerebral palsy, and psychiatric disorders.²⁻⁵ Walter and Miller note that "physiotherapy [for patients with mastectomies] has a short, limited goal. The program is structured but because each movement has no connection to the body as a whole, the process is mechanical. . . . There is, in short, no flow."⁶ They recommend a daily regimen of exercises set to music to create a graceful flow of movement, to develop flexibility, coordination, and a full range of motion. We share this philosophy and have adapted such an exercise program to the hospital setting. The purpose of this report is to describe an outpatient dance exercise program for women who have undergone mastectomy or lumpectomy for the treatment of breast cancer.

DESCRIPTION

In the Breast Cancer Rehabilitation Program at Albert Einstein Medical Center-Northern Division, dance is used for both physical and psychological benefit. Combining ballet and jazz movements, the program emphasizes good posture and balance in addition to controlled, isolated shoulder and trunk movements. The music is a source of encouragement for free-flowing movements, a release of tension, and a decrease in pain. Dancing provides the patient with an emotional stimulus that emphasizes her femininity and sexuality during her adjustment to a new body image. Schain et al, of the National Cancer Institute, cite numerous reports documenting the psychosocial problems associated with the surgical treatment of breast cancer.⁷ The needs of patients with breast cancer surgery to feel "whole again, to be comfortable with a changed body image, and to remain a functional part of society" are all important. The positive attributes of a group activity for these patients are well established.⁸⁻⁹ We believe that dancing and the interactions of group therapy aid in the rehabilitative process.

In 1982, our physical therapy department, in conjunction with a professional dancer, developed an outpatient dance program for patients who have had a mastectomy or a lumpectomy. We concentrate on using those muscles affected by the mastectomy: the pectoralis major and minor, shoulder girdle, neck, and trunk musculature. Body symmetry, coordination, posture, and balance are also emphasized.

Classical ballet makes total use of the human body. It is slow and disciplined. It gives the control and body placement needed for good posture and standing balance. We use ballet to emphasize isolated, symmetrical upper extremity movements and to promote stretching of the entire body (Fig. 1). Isometric exercise can be incorporated using the ballet barre

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Fig. 1. Stretching of the entire body is emphasized during the ballet routine.



Fig. 2. Total body movement and coordination are encouraged with modern jazz dancing.

(parallel bar) for support. This phase of the exercise program takes 25 to 30 minutes to complete with rest periods as needed. Inpatients are brought to the gym to observe the dance program and are encouraged to participate in the ballet routine.

Modern jazz dancing is faster and less disciplined. It provides an excellent opportunity for full body movement and coordination. Emphasis is placed on the range of motion of the affected arm and on the speed of movement, giving a feeling of rhythm and harmony. Although modern jazz dance is less structured than classical ballet, it provides the patient with a comparable freedom of expression (Fig. 2).

Standard and functional exercises (wall-climbing, ironing, pulling, pushing, and unweighted pendulum motions) are incorporated into the dance routines. This phase also takes 25 to 30 minutes to complete but affords more frequent 2- to 3-minute rest periods, depending on the pace of the music and patient tolerance. Heart rate is monitored during the sessions, in addition to blood pressure, if indicated.

After hospital discharge, the patient may be referred for outpatient physical therapy. This one-hour, biweekly dance program is conducted by the dance specialist in the physical therapy gym. Initially, we suggested that the patients wear leotards and tights, but the women were hesitant to do so. Interestingly, their hesitancy was not because of their breast surgery but because they believed they did not have a dancer's figure. We compromised by wearing bright sweat suits or slacks and a loosely fitting top. The music is changed monthly for variety.

The patient is examined initially by a physiatrist and by the physical therapist for range of motion, muscle strength, active function, sensation, upper extremity girth, pain, posture, balance, and skin changes. If other treatment is required, such as lymphedema management or exercise and mobilization for chronic shoulder tightness, it is given in addition to, or in place of, the dance program. Again, treatment is given on the basis of the individual needs of each patient. A woman who has undergone immediate breast reconstruction may have restrictions dictated by her plastic surgeon. Outpatient charts are reviewed weekly. The upper extremities of patients with lymphedema are measured weekly and increases in swelling are treated with elevation, compression, and exercise.

Patients with limited upper extremity motion are especially encouraged to attend the dance sessions to increase their range of motion. Those with full motion use the dance program to maintain the range that has been restored. Some patients participate in the program until they are ready to resume their normal work activities. Many women feel the need to continue with a group activity to motivate themselves for exercise. They often state that they lose their range of motion if they do not continue to exercise at home.

Patients who are receiving chemotherapy or radiation therapy often exhibit sporadic attendance—some patients attend the sessions once a week; other patients remain absent during the entire week they are receiving chemotherapy or radiation therapy because the unpleasant side effects restrict their activity. Most of the dancers regard such side effects as merely a temporary setback and, therefore, plan to miss some sessions. They do want to continue the dance program despite their treatment, and they find that dancing acts as an outlet for maintaining their self-confidence and self-esteem during the trying times of primary or adjuvant cancer treatment. They continue to participate with the expressed permission of the oncologist or radiation therapist.

DISCUSSION

Since August 1982, the physical therapists in our department have treated 216 patients with breast surgery. Thirty-seven of those patients have returned for the dance program. The majority of those returning to the program are patients with mastectomies rather than lumpectomies because the former have a harder time restoring their full range of motion as a result of the greater extent of their surgery. The age range of the women in the program is 30 to 81 years. Almost all the women have started the program with some deficits in range of motion of the affected arm. All except three patients have attained their full active range of motion. The problems that those three patients experienced were secondary to longstanding lymphedema weighing down their affected arm or to anatomical limitations imposed by radical surgery.

We believe that, in addition to improved range of motion and functional abilities, participants in the dance program enjoy many important psychological benefits. Their camaraderie and heartfelt concern for each other is evident throughout the sessions. The patients noncompetitively compare ranges of motion, newly purchased prostheses, reconstructive scars, chemotherapy regimens, and side effects and how to handle them. They can laugh at themselves and with each other as they learn new and more complex dance routines, although all participants are encouraged to dance at their own pace with individual attention given as necessary. The atmos-

there is very positive and the participants quickly learn that postsurgical exercise can be fun when it is given in the right circumstances. More important, the dance program brings the patients together to establish a common bond through shared experiences. Indeed, lasting friendships have resulted from in-hospital encounters and the psychological benefits of such friendships are immeasurable. The dance class also has been of great benefit to the inpatients who observe it postoperatively. They have an opportunity to speak with women who have "been there" and to witness the potential functional abilities and range of motion they can attain.

Although early detection and treatment have resulted in improved cancer survival rates, breast cancer still accounts for more than 38,000 deaths a year.¹⁰ The dance group has had to deal with the loss of a few of its participants because of the progression of the disease. Group members are encouraged to discuss the loss of their peers with the psychosocial counselor and the subject frequently arises during the course of a dance session. The subject has brought the group closer together, and they know they have a support system among the members of the rehabilitation team and with each other.

CONCLUSION

Physical therapy involvement in the preoperative and postoperative management of patients with breast cancer can be a major factor in the early attainment and maintenance of full functional upper extremity range of motion and strength.

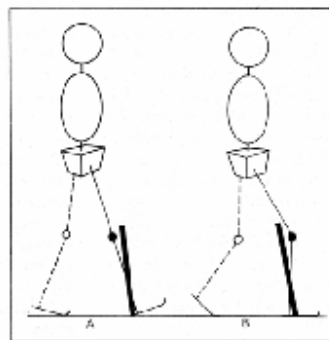
A group dance program for these patients is a nontraditional way to encourage continued exercise. The program supports a healthy view of a changed body image and promotes feelings of femininity, grace, and sexuality that may be threatened by the nature of the surgery. In addition, the group setting provides a support system for newly diagnosed cancer patients who need a stable environment while coming to terms with their disease.

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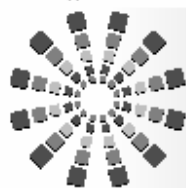
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Dance and Movement Program Improves Quality-of-Life Measures in Breast Cancer Survivors

KEY WORDS

Breast cancer survivor

Dance

Movement

Quality of Life

A pilot research study was conducted at 2 cancer centers in Connecticut to determine the effect of a dance and movement program on quality of life and shoulder function in breast cancer survivors treated within the prior 5 years. Thirty-five women completed the trial that included a 12-week intervention, using The Lebed Method, Focus on Healing Through Movement and Dance. The study design was a randomized control trial with a wait list control group crossover to active treatment in weeks 13 to 25, with the treatment group receiving the program in weeks 1 to 12, and no program in weeks 13 to 25. Outcome measures were the Breast Cancer Quality of Life (FACT-B), Shoulder range of motion (ROM), and Body Image Scale. FACT-B significantly improved in the intervention group at 13 weeks from 102.0 ± 15.8 to 116.7 ± 16.9 , compared to the wait list group 108.1 ± 16.4 to 107.1 ± 21.3 (time \times group effect, $P = .008$). During the crossover phase, the FACT-B score increased in the wait list group and was stable in the treatment group. The overall effect of the training at 26 weeks was significant (time effect, $P = .03$), and the order of training was also significant ($P = .015$). Shoulder ROM increased in both groups at 13 weeks— 15° and 8° in the intervention and wait list groups (Time effect, $P = .03$; time \times group, $P = .58$). Body Image improved similarly in both groups at 13 weeks (time effect, $P = .001$; time \times group, $P = .25$), and at 26 weeks. There was no significant effect of the order of training for these outcome measures. A dance movement program that addressed the physical and emotional needs of women following treatment for breast cancer substantially improved a breast cancer-specific quality-of-life measure. Larger studies are justified to determine the acceptability of this therapy as part of the continuum of care for breast cancer survivors.

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Increasing numbers of women are living with breast cancer and adjusting to the changes that accompany survivorship. Disturbances in body image, shoulder range of motion (ROM), and psychological well-being profoundly affect survivors' quality of life. Women with breast cancer report distress, depression, and anxiety at greater rates, and these symptoms persist in a substantial number of women for many years following treatment. Body image changes vary with the surgical procedure, but occur in essentially all women who undergo lumpectomy, mastectomy, or mastectomy with breast reconstruction.¹⁻³ Functional limitations such as reduced shoulder ROM or frozen shoulder prevent women from fully engaging in everyday activities and may result in depression and/or the assumption that quality of life will always be diminished.⁴ Advances in surgical procedures have reduced the frequency of lymphedema, but lymphedema continues to occur in women with extensive surgery and axillary lymph node dissection.⁵ There is growing recognition among healthcare providers, breast cancer survivors, and public policymakers that more attention and research need to focus on life after diagnosis and treatment.⁶⁻⁸ Women are seeking more information about lymphedema prevention and exercise programs that promote continuous healing and improved quality of life.

■ Dance and Movement in Healing

The roots of dance in healing go back to ancient societies in which dance rituals frequently accompanied major life changes.⁹ Dancing, religion, music, and medicine were inseparable in the early years of civilization.¹⁰ Cotter¹¹ proposed that dance may help the healing process as a person gains a sense of control through (a) spiritual components of dance; (b) mastery of movement; (c) escape from stress and pain by a change in emotion, states of consciousness, and/or physical capability; and (d) confronting stressors.

An experienced dancer recently described her healing work with patients with cancer, using movement and imagery.¹² In a qualitative study, Halprin reported that when participants expressed emotions through dancing, she observed positive changes in their attitudes and will to live. In a study to determine the effectiveness of dance/movement in psychological adaptation to breast cancer, Dibbell-Hope's quantitative findings were not statistically significant although the subjects' qualitative reports were positive. The study was small and non-controlled.¹³ Serlin investigated the effectiveness of dance/movement therapy on psychological and spiritual adaptation in women with breast cancer. The intervention was an existentially based program using kinesthetic imaging. Although the quantitative and subjective outcomes were similarly encouraging, the study was also small, nonstandardized, and noncontrolled.¹⁴

While there is evidence that body image is improved with long-term dance training in healthy women,¹⁵ there are no studies testing dance interventions on body image and health-related quality of life in patients with breast cancer. Lebed-Davis developed a program of arm movements designed to restore the

ROM of the shoulders and reduce lymphedema, coupled with dance movements designed to restore a sense of body symmetry, as well as femininity, grace, and sexuality. A descriptive article reported that the participants were engaged by the program and observed outcomes were positive, but this was a noncontrolled intervention without validated outcomes.¹⁶ The program is currently known as "The Lebed Method™, Focus on Healing Through Movement and Dance."¹⁷ It combines structured exercises with dance movements to music that are designed to promote a flow of energy through the body.

Dance and movement therapy has face validity to be part of the care of people with serious diseases or disabling conditions. However, there is very little quantitative information on the effects of dance and movement on the morbidity associated with treatment of breast cancer. The specific goal of this trial was to determine if a movement and dance program that was designed to address the challenges faced by breast cancer survivors would improve quality of life, body image, and shoulder function.

■ Methods

Recruitment

The investigators worked with the Cancer Care Partnership of MidState Medical Center (MidState) and the University of Connecticut Cancer Center (UConn). Both sites had the active support of the cancer center leaders, who identified 2 persons to lead recruitment at each center. The cancer center staff and investigators presented the program to the surgeons, oncologists, and radiation oncologists. Every surgeon supported the program, and letters to the surgeons' patients were sent describing the program with the signature of the surgeon. Patients who had received treatment for breast cancer in the prior 18 months received an invitation to join the program.

In addition, both health centers promoted the program through newsletters and brochures. The program was also announced and advertised in local print media. Training sites were exercise spaces adjacent to the cancer centers.

Inclusion Criteria

Initially, inclusion criteria were women who had a diagnosis of breast cancer and who underwent a lumpectomy or more extensive breast surgery at least 1 month earlier. A 1-month delay allowed for initial recovery and completion of physical therapy if ordered by the surgeon.¹⁸ All patients with surgery within 3 months prior to beginning the program required the approval of their surgeon. Breast reconstruction, lymph node dissection, lymphedema, chemotherapy, and radiation therapy were recorded but were neither inclusion or exclusion criteria. The initial inclusion criteria were limited to women who had had breast surgery within the prior 18 months. Because of difficulty in recruitment, and the need to have at least 8 participants in each group to achieve a sense of a group process, inclusion criteria were extended to women who had surgery within 5 years.

Exclusion Criteria

These included women diagnosed with metastatic breast cancer and/or the inability to stand independently for 3 minutes.

Human Subjects Protection

The study was reviewed and approved by the institutional review boards (IRBs) at the University of Connecticut Health Center and Midstate Medical Center. All subjects reviewed and signed the informed consent forms that were approved by the respective IRB committees.

■ Study Design

The study design was a randomized control trial, with a wait list control and crossover at 13 weeks. Volunteers who met inclusion criteria and completed baseline testing were randomized to either the program or the "wait list." Randomization was done by computer-generated random numbers, with a separate list for each cancer center. Sequential sealed envelopes were opened at the conclusion of baseline testing. The wait list group was asked to maintain their usual activities during weeks 1 through 12. At week 14, the wait list group crossed over and performed the movement program during weeks 14 through 25, whereas the intervention group continued their usual activities. Both programs were led by the same instructor and performed the same exercises and dance movements.

■ Intervention

The movement intervention was based on The Lebed Method,¹⁷ and sessions were led by the author (S.S.), a registered dance/movement therapist and a certified lebed method instructor. The program was 12 weeks in duration, with 2 sessions per week for the initial 6 weeks and one session per week for an additional 6 weeks, for a total of 18 sessions. The duration of the program was designed to permit women undergoing or recovering from radiation or chemotherapy to miss sessions due to fatigue or side effects and still be able to attend sufficient sessions to benefit from the program.

Program Expectations

At the first class and subsequent sessions, expectations were clearly stated. They included "take your time, move at your own pace, stop if something is painful, don't worry about coordination, and most importantly, have fun." Chairs were available and movements could be done sitting in a chair if a participant felt weak or fatigued.

Warm-up (10 to 15 Minutes)

Every session began with breathing and stretching designed to improve lymphatic drainage.¹⁷ This included deep breathing,

head and neck stretches, shoulder rotations, torso contractions, side-to-side arm extensions, body torso lengthening, and large arm circles. This was usually done sitting in a circle, to percussion music orchestrated for these movements. Bilateral stretching exercises in a standing position followed, using a chair for support. During the first few weeks, lower body movements alternated with upper body movements.

Core Exercises

Upper extremity movements of the shoulder, elbow, and wrist were performed bilaterally to music, with 4 or fewer repetitions per side. Imagery was used to encourage a progressive increase in the ROM in shoulder abduction, forward and backward flexion, and adduction (eg, "reaching for the stars," "lifting a tray of fruit"). Images were playful, sometimes sensual, and often evoked laughter or comments from the women. Lower body movements, such as side-to-side hip swings, walking around with various attitudes, and balance exercises with chairs, were inserted to provide rest from upper body exertion and to increase energy flow. Exercises using resistance bands were introduced in the fifth week.

Dance Movements (25 to 30 Minutes)

The dance components were designed to address, in a subtle way, the existential challenges that most women report following the diagnosis and treatment of breast cancer: body image, sexuality, sense of control, meaning in life, grief, and loss. Movements were simple and designed for women with no dance experience, and who may have poor balance or no confidence. Initially, 4 simple movements were taught to music and repeated several times as a "routine." As the women learned a repertoire of familiar dance moves (by the fifth week), they were able to follow the instructor's lead in a more spontaneous flowing dance. Each cohort identified their favorite songs and dances and would request them.

The dances used a variety of musical traditions including Celtic, American, Jazz, Afro-Cuban, Reggae, Middle-Eastern, and Cajun. Rhythmic patterns based on multiples of 4 beats were most adaptable to the tempo of the movements; a waltz rhythm in multiples of 3 beats was also successful. No fast movements were performed although fast music was used.

A large, tubular stretch band made of blue jersey was introduced into the group dance to provide an external focus and decrease anxiety (ie, something to hang onto). As each cohort progressed, they became less reliant on such props and more comfortable with moving their bodies. A long, translucent piece of silk material was also used, especially with Middle-Eastern music and a few simple belly dance moves. No other props or equipments were used.

The leader (S.S.) strove to create a safe and accepting environment that encouraged each participant to engage at her level of comfort. There was no attempt to elicit sad or angry feelings although some were spontaneously expressed. The focus was on positive expression, recovery, and celebration. From the beginning, the women requested "upbeat" music and a desire to have fun.

Two or Three Water Breaks (5–7 Minutes)

During the breaks, there was unstructured conversation about a variety of topics ranging from breast cancer treatment to family and social activities.

Wrap-up (10 Minutes)

Each session closed with a seated ritual using gentle stretching, meditative movements, and quiet music. Finger rolls and extensions were performed. The final activity was focused breathing with soothing music, mirroring the beginning of the session. As the music ended, the leader asked the group how they were feeling and whether there were any questions. A spontaneous exchange resulted, which lasted from 10 to 30 minutes, often with sharing information about treatment, concerns, and questions to one another.

■ Outcome Measure

All outcome measures were obtained at baseline, 13 weeks, and 26 weeks. All questionnaires were self-administered.

Functional Assessment of Cancer Therapy—Breast questionnaire (FACT-B, version 3) was the primary outcome measure.¹⁹ The FACT-B was developed from the FACT-G, a disease-specific quality-of-life measure used in cancer research. The FACT-B has been validated in multiple studies in several countries. The FACT-B includes 4 subscales of the FACT-G on well-being in physical, social, functional, and emotional domains, and 9 questions specific to breast cancer. General health-related quality-of-life was measured using the SF-36; the physical and mental health summary scales are reported.²⁰

The Body Image Scale, which was validated in a large study of patients with breast cancer, was a secondary outcome measure.^{21,22}

Shoulder ROM and arm circumferences were measured by an experienced physical therapist who was blind to group assignment. Reproducibility trials were not performed for this study. Shoulder ROM in abduction, forward flexion, and rotation was measured in the supine position on a therapy table. Shoulder extension was measured in a sitting position. Arm circumference was measured at the metacarpo-phalangeal joints, wrist, and at standardized points on forearm and arm. The summed ROM in 5 directions and the summed arm circumferences are reported. The summed measures of the shoulder and arm on the side of surgery are reported, and the right shoulder ROM and arm circumference results are reported for the 4 subjects with bilateral surgery.

■ Statistical Analysis

Data review was performed in Access databases, and imported into SPSS (version 11.0), where data transformations and analyses were performed.

An intention to treat analysis was used. Women were encouraged to complete all outcome measures regardless of

attendance rates at the class. Between-groups comparisons at baseline were performed using chi-square tests for binomial variables, and independent *t* tests for continuous variables. Because of the nonnormal distribution of the time from surgery, a Mann-Whitney *U* test was used. Paired *t* tests compared the arm circumference and ROM on the side involved in surgery compared to the uninvolved side. General linear models determined responsiveness of the subjective and objective outcomes to the program. The primary analysis was from baseline to week 13. Repeated measures ANOVA were used to determine overall time effect and time \times group effects.

The crossover design permitted measuring if the “wait list” group would have similar improvements in measures compared to the intervention group, and if the intervention group maintained the changes during the 13 weeks following the intervention. It was uncertain whether the intervention group changes during the intervention period would return to baseline at the 26-week measure, or be stable at a new level. There was no assumed symmetry of the crossover design. Therefore, exploratory analyses were performed using all 3 time points. First, a graphical review was done to visually assess for trends over time. There was no evidence that the intervention group measures returned to baseline during the period (13–26 weeks) where they had no intervention.

Repeated measures ANOVA were then used to determine the overall change in outcomes over the 26-week period, and if the order of the training had any impact on the outcomes at 13 and 26 weeks. The training order effect was assessed using a quadratic time \times group repeated measures ANOVA. This analysis tested whether there was a significant difference between the groups, comparing the change from baseline to week 13 to the change from weeks 13 to 26. The analysis was considered exploratory, as this pilot study did not measure the outcomes in the wait list group at 39 weeks, which would have permitted a more definitive analysis.

■ Results

A total of 38 women met entry criteria, completed baseline testing, were randomized, and began exercising. Thirty-seven subjects completed measurements at 13 weeks, and 35 completed measurements at 26 weeks (19 in the intervention group and 16 in the wait list group). Twenty-nine subjects had all 3 measures of shoulder ROM and arm circumference. Reasons for dropping out included fatigue, other commitments, and one participant reported shoulder discomfort. An evaluation by an independent physical therapist, who was not associated with the study, determined that the discomfort was related to a preexisting shoulder condition, and was unlikely related to the program. No falls or acute injuries occurred during the dance/movement sessions.

At baseline, groups were comparable on all measures (Table 1). The age range of subjects was from 38 to 82 years, with a mean age of 61. There was a wide range of time from surgery to joining the program. The median number of days was 331 for the intervention group and 336 for the wait-list group

Table 1 • Baseline Characteristics

Variable	Intervention Group (n = 19)	Wait List Group (n = 19)	Statistics
Age	59.7 ± 9.8 (43–75)	59.5 ± 13.3 (38–82)	<i>P</i> = .96
Time from surgery, d	331	336	Mann-Whitney <i>U</i> = 0.62
Median (range)	(46–1487)	(90–1219)	
Type of surgery (no.)			
Mastectomy	10	6	χ^2 = 0.41
Partial mastectomy	8	11	
Lumpectomy	1	2	
Lymph node removal	16	14	χ^2 = 0.32
Breast reconstruction	5	3	χ^2 = 0.90
Current radiation therapy (no.)	1	2	χ^2 = 0.48
Current chemotherapy (no.)	4	1	χ^2 = 0.21

(Mann-Whitney *U* test, *P* = .62). Breast cancer surgery was on the right side for 21 women, the left side for 17 women, and bilateral for 4 women.

Health-related Quality of Life

Quality-of-life outcomes are listed in Table 2. FACT-B, the breast cancer–specific health-related quality-of-life measure, improved significantly in the intervention group compared to the wait list group at 13 weeks. The total score for the intervention group increased from 102.0 ± 15.8 to 116.7 ± 16.9, whereas the wait list group was unchanged (108.0 ± 17.3 to 106.1 ± 22.3). The time × group effect was significant (*P* = .008). The magnitude of the improvement in FACT-B was large: the 14.7-point increase represents approximately 0.8 of the standard deviation of the FACT-B measure at baseline (Fig 1 and Table 2). During the crossover phase, weeks 13 to 26, the wait list group, which was participating in the dance/movement program, increased 7.4 points (from 106.1 ± 22.3 to 113.5 ± 18.0), and the FACT-B score in the intervention group was stable. The exploratory analysis found that at 26 weeks, the overall sam-

ple had significant improvement in FACT-B scores (Time effect, *P* = .003; and the training order effect was also significant, *P* = .015). Figure 1 illustrates that the improvement in FACT-B scores in both groups occurred after the dance/movement program.

Body Image Scale

The score of the Body Image Scale improved in both groups at 13 weeks (lower scores reflect improvement). There was a significant time effect, but no time × group effects. Improvement continued at 26 weeks, but there was no training order effect. The mental health summary scale of the SF-36 increased slightly in the intervention group at 13 weeks (3.5 points), but this was not significantly different from the wait list group (time × group effect, *P* = .19) (Fig 2A). The mental health summary score improved further in weeks 13 to 26, while the overall time effect was significantly better (*P* = .006) and there was only a trend for a training order effect (*P* = .17). The physical function summary score of the SF-36 improved similarly in both groups at 13 weeks, but not at 26 weeks (Fig 2B).

Table 2 • Change in Health-related Quality-of-Life Measures and Body Image During Intervention Periods*†

	Intervention (Weeks)			Wait List (Weeks)			Weeks 1–13		Weeks 1, 13, and 26	
	1	13	26	1	13	26	Time Effect	Time × Group Effect	Time Effect	Training Order Effect
	FACT-B	102.0 (±15.8)	116.7 (±16.9)	117.4 (±16.6)	108.0 (±17.3)	106.1 (±22.3)	113.5 (±18.0)	0.057	0.008	0.003
SF-36										
Mental Health										
Summary	48.8 (±10.2)	52.3 (±10.9)	54.9 (±6.9)	45.4 (±10.8)	43.9 (±14.4)	51.3 (±10.8)	0.38	0.19	0.006	0.17
Physical										
Summary	44.8 (±7.8)	47.3 (±6.4)	47.0 (±6.9)	47.3 (±10.2)	51.3 (±7.8)	49.3 (±7.3)	0.012	0.542	0.06	0.20
Body Image										
Summary	19.4 (±6.7)	15.2 (±6.1)	14.5 (±4.9)	19.7 (±7.1)	16.9 (±5.2)	15.5 (±6.7)	0.001	0.253	0.001	0.45

*Values in parentheses represent SD.

†Repeated Measures ANOVA. Linear analysis for time and time × group effects. Quadratic analysis for training order effect.

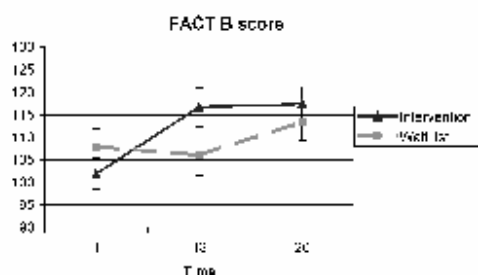


Figure 1 ■ FACT-B (Functional Assessment of Cancer Therapy – Breast) summary score. Significant improvement in intervention compared to wait list control group at 13 weeks, time \times group effect, $P = .017$. Significant improvement at 26 weeks' time effect, $P = .003$; training order effect, $P = .015$. Error bars = 1 SEM (standard error of the mean).

Shoulder ROM and Arm Circumference

At baseline, there were significant differences between the ROM in the shoulder on the side of breast surgery, compared to the uninvolved shoulder. This is illustrated in Figures 3A and 3B. Paired t tests found significant differences in 4 of the 5 individual shoulder ROMs. The shoulder ROM (sum of ROM in all 5 directions) of the involved side was 36° less than the uninvolved shoulder ($523^\circ \pm 50^\circ$, compared to $559^\circ \pm 40^\circ$, paired t test, $P < .001$).

Overall, the improvements in involved shoulder ROM were progressive, and not related to the order of training (Figs 3A and 3B and Table 3). In the involved shoulder, total shoulder ROM at 13 weeks increased 15° in the intervention group and 8° in the wait list group (time effect, $P = .03$), but the time \times group effect was not significant ($P = .58$). At 26 weeks, total shoulder ROM increased in both groups— 26° in the intervention group and 20° in the Wait List group (time effect, $P = .006$; training order effect, not significant). At 26 weeks, the overall absolute improvement in both groups was greater in the involved shoulder than in the uninvolved shoulder (23° vs. 12°), but the differences were not statistically significant (time \times involved side, $P = .23$).

Arm Circumference/Lymphedema

In all subjects, the summed arm circumference at baseline in the arm on the side of breast surgery was 2.4 cm larger than the arm not involved in surgery (118.6 ± 12.1 cm and 116.2 ± 9.8 cm, paired difference, $P = .004$). Three women reported lymphedema; one wore a compression sleeve and one had worn a sleeve in the past. Seven subjects, including the 3 subjects with reported lymphedema, had differences in arm circumference between the involved and noninvolved arm at baseline that were greater than 5 cm. There were no changes in individual measurements or summed arm circumference at 13

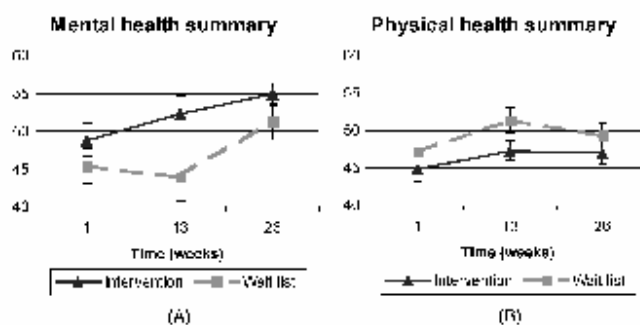


Figure 2 ■ Change in SF-36 Mental Health (A) and Physical Health (B) Summary scores. Error bars = 1 SEM (standard error of the mean).

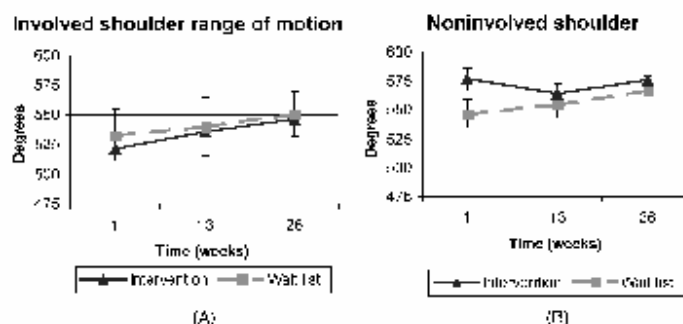


Figure 3 ■ Change in summed shoulder range of motion (abduction, extension, flexion, internal and external rotation). Extension in the involved shoulder (A), and noninvolved shoulder (B). Error bars = 1 SEM (standard error of the mean).

Table 3 • Change in Shoulder Range of Motion and Arm Circumference During Intervention Periods*

	Intervention (Weeks)			Wait List (Weeks)			Weeks 1–13		Weeks 1, 13, and 26	
	1	13	26	1	13	26	Time Effect	Time × Group Effect	Time Effect	Training Order Effect
Involved shoulder ROM	520 (50)	535 (56)	546 (42)	526 (51)	534 (42)	546 (44)	0.03	0.58	0.006	0.75
Uninvolved shoulder ROM	575 (28)	564 (27)	576 (24)	541 (49)	550 (39)	564 (38)	0.57	0.07	0.04	0.22
Involved arm circumference-summed, cm	120.1 (10.1)	120.1 (9.3)	120.1 (10.1)	112.8 (10.1)	113.6 (7.8)	114.0 (8.7)	0.366	0.325	0.29	0.81

*Repeated-measures ANOVA. Linear analysis for time and time × group effects. Quadratic analysis for training order effect. Values in parentheses represent SD.

or 26 weeks in either group, in either involved or noninvolved arms.

■ Discussion

A 12-week dance and movement program designed for women with breast cancer achieved substantial increases in a breast cancer-related quality-of-life measure compared to a wait list control group. The FACT-B questionnaire was chosen as the primary outcome because it was designed to capture the impact of breast cancer and breast cancer treatment on the lives of patients and has been validated in several studies in different countries.¹⁹ The magnitude of improvement in the FACT-B in the intervention group compared to the wait list control group was both clinically and statistically significant. The intervention group improvement of 14 points at 13 weeks is substantial. The improvement represented approximately 0.8 standard deviation of the distribution of the FACT-B score at baseline in our sample and in the large sample of women in the FACT-B validation study.¹⁹ The experience of the control group during the crossover portion of the trial was similar to the experience of the intervention group in the first portion of the trial. The similar improvement in the wait list group during the crossover phase strengthens the findings. The finding that the intervention group maintained higher scores during the crossover phase is also encouraging and suggests that the improvement was not transient. However, a longer follow-up period is needed to determine the long-term impact on quality of life. The statistical results confirm the positive comments about the program that the participants spontaneously reported after the trial was completed.

Other health-related quality-of-life and Body Image measures improved over the course of the trial as well. However, the timing of the improvements was similar in the wait list and intervention groups, and no training order effects were found. Body image improved in both groups at 13 and 26 weeks, and the mental health summary score of the SF-36 at 26 weeks. While the graphical presentation of the data of the SF-36 Mental Health summary is similar to the FACT-B, there was greater variability in the changes in the SF-36 scores, reflected in only a slight trend for a training order effect. It is not clear if these improvements were

due to the usual healing process, or if the improvement is somehow related to participation in this study. Improvement in the FACT-B subscales and Body Image measures have been reported with simple support interventions during the first 6 months following surgery.¹ However, the median time from surgery in the present study was greater than 10 months. It is possible that the decision to join the program, meeting other women at the orientation session, and/or other unmeasured experiences related to joining the study may be responsible for some of the improvements in the SF-36 and Body Image Scale.

Shoulder ROM increased significantly in both the involved and noninvolved shoulders at 13 and 26 weeks. Unprompted comments such as "I can move my shoulder more" and "I can do more with my shoulder" were frequent at the parties following the conclusion of the study. While the absolute improvement in ROM was 7° greater in the intervention group than in the wait list group, the variability of shoulder ROM was too large to determine if these differences were significant. It is unlikely that the increase in shoulder ROM was due to natural recovery from surgery, as a recent cross-sectional trial found persistent subjective shoulder limitations at 1 to 5 years.²⁰ It is also unlikely that the wait list group started shoulder ROM exercises spontaneously, as wait list subjects were requested not to start any new exercises. Some of the improvement could be due to experimental subjects being more relaxed at 13-week testing than at baseline testing, but improvements continued between weeks 13 and 26. Repeating baseline shoulder ROM measures would strengthen future study design.

Arm circumference did not change during the program. However, only a small number of participants reported a diagnosis of lymphedema or had substantial differences in summed arm circumferences. A trial of women with lymphedema will be required to determine if this program will have any additive effect on current treatments for lymphedema.

■ How Dependent Are These Results on the Leader?

Dr Sandel, author and The Lebed Method instructor, has made significant contributions to the understanding of dance/movement therapy and is an experienced dance/

movement therapist and psychotherapist.²⁴⁻²⁶ It is likely that her expertise in facilitating group process contributed to the quality and sensitivity of the program to the participants' needs. However, there was no attempt to conduct this as a typical dance/movement therapy program, but rather as a supportive, recovery-oriented model that is the basis of The Lebed Method. Most patients with breast cancer who undergo surgery face challenges to their femininity, sexuality, and body image, which contribute to feelings of being alone. From the beginning of history in nearly all civilizations, there are records of women dancing in groups as part of religious, healing, and celebratory rituals.²⁷ It is likely that the group process of women who had a shared experience (breast cancer survivors) participating in a well-designed program had a more powerful effect than the leadership style of the instructor.

■ Why Did the Women Improve?

The results of the study raise several questions. What portion of the improvement is simply due to the act of joining and believing that you can feel better? What portion is due to the actual movements versus what part is due to the feeling of participation, of a shared purpose and positive experience? What effect did the music have on mood and affect? How important were the discussions that occurred at the end of class? A pervasive theme of the informal discussions was the lack of information the participants had received about physical recovery and lymphedema. Several women mentioned that this program would have helped their recovery if it were offered soon after surgery. Some women who were receiving chemotherapy during the program believed that it helped them tolerate the treatments and reduced feelings of isolation.

■ Limitations and Future Research

The range of delay from surgery to participation in the study and the small study size limit the conclusions to be drawn about the impact of the dance/movement program. There was no active control group that would help differentiate between the effect of increasing physical activity and the effects of the dance/movement program. However, this study does provide sufficient evidence of benefit to justify larger studies that would test the program using several program leaders in women of varying social or ethnic backgrounds. A study design comparing The Lebed Method, an exercise program without music and dance and a verbal support group, would further differentiate the particular benefits of the intervention. Given the evidence of enduring losses of shoulder function and diminished quality of life following surgery and treatment for breast cancer,^{28,29} the authors also recommend a clinical trial with women who are 3- or more year survivors beyond treatment.

Prospectively, it is also important to determine what time in the course of breast cancer treatment would be most beneficial

for women to participate in this type of program. Studies should be performed to determine the usefulness of this intervention on quality of life for breast cancer survivors during and after treatment.

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*Additional references and information can be provided upon request.