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Stress management training for breast cancer surgery patients

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Abstract

Objective: **This study evaluated the psychological effects of a pre-surgical stress management training (SMT) in cancer patients.**

Methods: **Stress management training comprised four sessions in total: on 5 days and 1 day pre-surgery and on 2 days and 1 month post-surgery. Patients also received audio CDs with relaxation and coping skills exercises. Patients were randomly assigned to the SMT ($N = 34$) or a regular care condition ($N = 36$). Depression, anxiety, quality of life, perception of control, fatigue, pain, sleep problems, and surgery-related somatic symptoms were measured at Day 6 and Day 1 pre-surgery, and Day 2, 5, 30 and 90 post-surgery.**

Results: **Depression and fatigue decreased in the intervention group and increased in the control group, leading to significant group differences at Day 2 (fatigue) and Day 5 post-surgery (fatigue and depression). It also appeared that surgery-related symptoms had increased more in the control group 3 months post-surgery than in the SMT group. No intervention effects were observed for anxiety, pain, and sleep problems.**

Conclusion: **The use of a short psychological intervention is effective in reducing depression and fatigue in the post-surgical period, although the effects are of short duration.**

Keywords: surgery; breast cancer; psychological intervention; stress management training; oncology

Introduction

For many patients, cancer implicates a confrontation with physical, emotional, social, and spiritual problems. In particular, the period of diagnosis and medical treatment is threatening to many patients. Longitudinal studies have found higher levels of anxiety, worrying, and depression during this period compared with 3 to 6 months after the end of treatment [1–5].

The efficacy of psychological interventions aimed at alleviating distress in cancer patients has been evaluated in many studies and has been summarized in several reviews and meta-analyses [6–12]. Sheard and Maguire summarized 53 studies in a meta-analysis and found a moderately high effect size for anxiety and large effect sizes for anxiety and depression if only patients with high initial distress levels were included [10]. The authors of a more recent review, however, were considerably less enthusiastic in their conclusions on the favorable effect of psychological interventions for cancer patients than were in older reviews [9]. Lepore and Coyne, who summarized all the available evidence, were even more negative and concluded that well-designed studies found no or only a few indications for the efficacy of psycho-oncological interventions [8].

A more effective intervention could be achieved if delivered before or shortly after surgery or during chemotherapy or radiotherapy when patients experience most distress. We were inspired by a successful pre-surgical intervention in non-cancer patients [13]. The aim of Manyande's intervention was to reduce anxiety and dampen the immunosuppressive responses to abdominal surgery. In their first study, Manyande *et al.* used audio-recorded relaxation instructions. Relaxation generally leads to anxiety reduction. Their instructions did indeed cause a reduction in anxiety, as well as a reduction in pain, use of pain medication and blood pressure responses. However, the cortisol and adrenaline responses during recovery appeared to be higher in the intervention group [14], whereas the intervention was aimed to lower these endocrine responses. When discussing this unexpected response, Manyande and coworkers concluded that surgery may be considered a specific condition characterized by passivity and low control. As

these feelings may be strengthened by relaxation, they adapted their intervention, this time asking for a more active contribution. The patients who faced minor abdominal surgery were asked to imagine surgery-related discomforts, and suggestions were given how to deal with these discomforts. The patients who had listened to these instruction tapes indeed showed the expected lower cortisol levels during recovery. There was no difference in anxiety level between the intervention and control group, although pain, use of pain medication and heart rate responses were lower in the intervention group [13].

To ascertain whether this intervention was successful, we decided to replicate and extend the second successful intervention of Manyande *et al*. Our stress management training (SMT) included two face-to-face pre-surgical sessions instead of the one pre-surgical audiotape-supported session in the study by Manyande *et al*., and we added two post-surgical sessions to strengthen the effect on psychological and immunological outcome.

This study is part of a larger study also analyzing the effects on a range of immunological and hormonal variables [15]. Although the present report focuses on the psychological outcome variables, we have used the same sample of participants to be able to better interpret the associations between changes in psychological and immunological variables. The focus of the SMT intervention was alleviating distress and strengthening the patient's feelings of control. Therefore, the primary outcome variables that we used to evaluate the psychological effects of SMT were distress (anxiety and depression) and perception of control. Although Manyande *et al*. found a reduction in pain and use of pain medication as a result of their SMT intervention [13,14], we have chosen pain as a secondary outcome and have not assessed use of pain medication. Our main interest was in psychological variables that were associated with immunological and hormonal intervention effects. These have been found for anxiety [16], depression [17–20], and perception of control [21]. The outcome variables, considered secondary, were well-being, quality of life, fatigue, sleep problems, pain, and breast cancer-related symptoms.

Methods

Patients

The patients with clinically-proven breast cancer stage I–III, based on triple diagnostics (physical examination, mammography, and cytological or tru cut biopsy) were recruited in one regional hospital (Medical Centre Alkmaar).

Surgery involved a lumpectomy or mastectomy with a sentinel node procedure or axillary lymph node dissection. Except in the case of an axillary lymph node dissection, the patients were discharged within 1 day after surgery. An anesthesia, analgesia, and nausea protocol was applied to all patients.

Exclusion criteria were (i) age > 75 years, (ii) serious psychiatric disorder, (iii) immune related comorbidity, (iv) other malignant tumors now present or in patient's history, (v) chemotherapy or immunotherapy, and (vi) use of steroid medicines, primperan or non-steroid anti-inflammatory drugs, because of their potential immunomodulatory effect.

Approval to conduct this study was confirmed by the Medical Ethics Committee, and all participants gave their written informed consent. The physician researcher (MB) was not involved in treating the patients.

Intervention—stress management training

Subjects were randomly assigned to the intervention and control condition by using block randomization. The first week, patients were allocated to the intervention condition and the next week to the control condition, and so on. This procedure was used to prevent contact between intervention and control subjects as much as possible. The control group received care as usual without any contact with the psychologist who delivered the training in the intervention group. The intervention delivered was an SMT consisting of four sessions of relaxation, guided imagery techniques, and counseling that aimed to promote active coping, alert relaxation, and a positive attitude to change. The training sessions were conducted by the same trained clinical psychologist at Day 5 and Day 1 pre-surgery, and at Day 2 and Day 30 post-surgery (Figure 1). The sessions lasted 45–60 min each and took place in the hospital.

The first session was a meditative exercise to learn how to let go of thoughts and judgments and to increase bodily awareness. The patient was instructed to focus her attention successively on all body parts, including the breasts, and to simply "observe" her experiences, to abandon judgments and then to return her attention to her calm breathing pattern. An audio CD player and audio CD with the same instructions were given to the patient to use at home. The patient also received an audio CD at the end of the second and third sessions. The second session on the day before the operation was the most important and was the only session of our four-session intervention that was based on the protocol of the one-session intervention applied by Manyande. We presented our instructions face-to-face, whereas Manyande offered her suggestions on tape that were to be listened to during the few hours leading up to the operation. Key to this second session was a positive

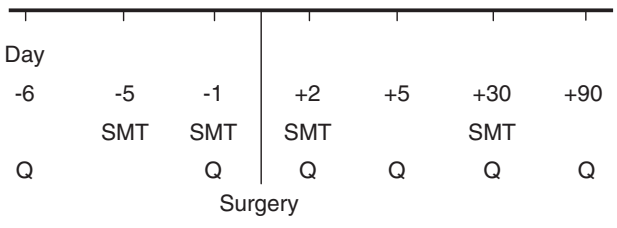

Figure 1. Time schedule of questionnaires (Q) and stress management session (SMT)

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mental attitude, acceptance of uncertainty and discomfort, and an active coping style. These were prompted by getting the patient to imagine what was going to happen before and after the operation to prepare oneself for any pain and other discomfort, and to reflect on the suggestion that one can take control of what happens during the surgical period, for example, after awakening from anesthesia one can alleviate pain by asking a nurse for assistance or advice. Prior to making these suggestions, a short period of relaxation was incorporated. At the end of this session, the patient was instructed to practice with the audio CD during the following hours leading up to the operation.

The third session, at Day 2 post-surgery, included a discussion with the patient on her reactions to the operation, a meditation exercise and a visualization exercise. During the meditation exercise, the patient was instructed to focus on any changes in bodily sensations and emotions and to deal with these changes in an active way. The visualization exercise included a relaxing image, such cool, clear water. The aim of this session was to combine increased awareness of changes and an active coping style, with the addition of an anxiety reducing element. During the fourth session, the final discussion was held with the patient, in which the patient and therapist reviewed what was learned.

Questionnaires

A questionnaire was administered at six measurement points: at Day 6 and Day 1 pre-surgery, and at Day 2, Day 5, Day 30, and Day 90 post-surgery (Figure 1). At the first three measurement points, the patient completed the questionnaire in the hospital, whereas the last three questionnaires were sent to her home and returned by post. Because adjuvant therapy (chemotherapy, radiotherapy or hormonal therapy), if administered, is generally initiated at about 1 month after surgery, the measurement at 3 months post-surgery could be influenced by the impact that the various adjuvant treatments have on the patient.

The internal consistency values of all questionnaires were above 0.86, except for breast-cancer related symptoms (see succeeding text). Several questionnaires were not administered at all moments. Somatic problems seemed only relevant at specific measurements points. Pain was measured at Day 2 and Day 5 post-surgery, and breast cancer related symptoms at Day 5, 30, and 90 post-surgery. The SMT evaluation scale was obviously omitted at the first measurement point, and the well-being scale was omitted at the second and third measurement points to reduce the burden on the patients.

(i) Anxiety: The state scale from the State-Trait Anxiety Inventory (Dutch version; [22]) was used, which includes 20 items.

(ii) Depression: The eight-item depression subscale from the Profile of Mood States was used (POMS; Dutch abridged version; [23]).

(iii) Quality of Life was measured using the three general quality of life questions from the European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire (EORTC; [24]).

(iv) Well-being: The Joy-in-Life subscale from the Health and Disease Inventory-General Functioning was used, which includes 12 items [25].

(v) Perception of Control was measured by a four-item questionnaire designed by us that asks how much one has experienced control over one's situation in the past few days. The four items ran as follows: "These last days I had the feeling that ... (i) I could do something about what is happening to me; (ii) I could influence what is happening to me (at home or in the hospital); (iii) I was in control of things happening to me; (iv) I am well-informed of what is going to happen with me". Answers were given on a 5-points response scale, ranging from "not at all" to "very often".

(vi) Fatigue: The six-item Fatigue subscale from the POMS was used.

(vii) Sleeping problems were measured using the Subjective Sleep Quality Scale [26,27], which includes 15 items about quality of sleep and one question about the use of sleep medication.

(viii) Pain: Two 10-point scales referring to intensity (ranging from "no pain" to "unbearable pain") and duration of pain (ranging from "no pain" to "continuous pain") were used. The two answers were combined to represent one score.

(ix) Breast-cancer related symptoms: Four questions of the EORTC [24] have been used concerning breast symptoms that may occur as a consequence of surgery. This scale was completed by 53 women who had undergone lumpectomy. Internal consistency of this scale is somewhat low (range = 0.56–0.82), but the questions concern quite different complaints, and high internal consistency is, therefore, not expected or required.

(x) Evaluation of the SMT and audio CDs: We designed our own questionnaire, which included 12 closed questions and two open questions. The patient was asked to rate (i) her satisfaction about the meetings with the clinical psychologist, (ii) her opinion of the therapist, and (iii) the emotional, informational and coping value of the sessions. If an SMT session coincided with the presentation of a questionnaire (Figure 1), the patient had to complete this questionnaire before the start of the session.

(a) Satisfaction was scored on a 10-point scale.

(b) The patient was asked to score whether the therapist was experienced as warm, interested, competent, understanding, and calm on a 4-point scale ("not at all", "somewhat", "reasonably" and "very much so").

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(c) The question about coping value was "Have you learned to cope better with tension, worrying and/or problems?" to be answered on a 3-point scale ("yes-certainly", "yes-somewhat" or "no").

The patient was also asked whether she was satisfied with the contents of the three audio CDs given to her after the sessions (10-point scale), and whether she valued their coping value by asking "Did the CDs help you to deal better with tension, worrying and/or problems?" (3-point scale: "yes-certainly", "yes-somewhat" or "no"). In addition, patients were asked how many times per week they had used the audio CDs (4-point scale: "not at all", "yes-once a week", "yes-twice a week", or "yes-more often").

Statistical analysis

Baseline values of the intervention and control group have been compared with *t*-tests or with Mann–Whitney *U*-tests in case of skewed variables. The repeated measures were analyzed with multilevel modeling (MLM), using the program MLwin version 1.0a. Using MLM for the analysis of longitudinal data is preferred above the more traditional approaches, particularly repeated measures multiple analysis of variance (MANOVA) [28]. In the event where data were missing, as in our study, MLM is advised because this statistical procedure uses the data efficiently by taking account of the hierarchical structure of the data (measurements within patients). Traditional statistical procedures do not take into account the variance within participants, because they aggregate the data over individuals.

To determine within-group changes, baseline values (the first measurement, often at Day 6 pre-surgery) were compared with all of the subsequent measurements, using MLM. To determine between-group differences, changes with respect to baseline values were compared for the SMT and control group (group x time interaction), also using MLM.

In case of significant between-group differences, effect sizes have been calculated according to the formula advised by Morris: [(mean baseline values—mean post-treatment or follow-up values of the intervention group) – (mean baseline values—post-treatment or follow-up values of the control group)]/pretreatment standard deviations pooled from the treatment and control groups. The formula also includes a correction factor to obtain an approximately unbiased estimate [29]. The significance level was set at $p = 0.05$.

There is no power calculation available for multilevel analysis, but our statistical tests can be compared with an *F*-test of the within-between interaction (time x group) term of a repeated measures MANOVA, applied to the baseline and the four post-surgery measurements. Because possible intervention effects were tested four times, a Bonferroni correction was applied. The program GPower [30] was used to produce a power calculation: Based on an alpha of 0.0125, a minimal detectable effect size of $d = 0.50$, and a power of 0.80, total sample size should be 65.

Results

A total of 121 patients were eligible to participate in our study, 36 of whom declined. The remaining 85 patients were randomly assigned to the intervention and control group. Afterwards, 15 patients were removed from the data file: The immunological data of six patients were unreliable because of transport problems, three patients were excluded because of medical complications (blood transfusion during surgery and post-operative infection), blood could not be obtained from one patient, and five patients were removed because they appeared not to fulfill the exclusion criteria for drug use (steroid medicines, primperan or non-steroid anti-inflammatory drugs). Of the remaining 70 patients, 34 patients had been assigned to the intervention group and 36 to the control group (see Figure 2). The first two sessions, the most important ones, were attended by all members of the intervention group.

The intervention and control groups were similar in terms of demographic characteristics (age, education, partnership, children at home, and employment), negative events during the past 3 months, health behavior (body mass index, tea and coffee consumption, smoking, vitamin intake, and hours sleep) and disease characteristics (tumor stage, lymph node involvement, surgical procedure, menopause, hypertension, and comorbidity), with the exception of alcohol use that was higher in the SMT group (Table 1). The two groups did not differ in baseline values for anxiety, depression, quality of life, or fatigue.

Patients' opinions on SMT

The patients were very satisfied about the meetings with the clinical psychologist and scored 8.1–to 8.6 on a 10-point scale (Table 2). They also appreciated the emotional, informational, and coping value of the sessions (score 2.1 to 2.7 on a 3-point scale). The therapist was viewed as warm, interested, competent, understanding, and calm (score 3.3–3.9 on a 4-point scale). Over time, some changes occurred in the patients' evaluations, namely for satisfaction with the sessions and appreciation of their informational value ($F = 2.90$, $p = 0.05$ and $F = 5.17$, $p = 0.007$, respectively). Some other measures showed a nearly significant change. This occurred for coping value of the sessions and of the CDs, and competence of the therapist ($F = 2.79$, $p = 0.06$; $F = 2.67$, $p = 0.06$; $F = 2.58$, $p = 0.06$, respectively).

During the first month, the patients used the audio CDs quite often. On the questionnaire completed in hospital on Day 2 post-surgery, 86% of the patients indicated that they had used the audio CD at least twice during the previous week, although three patients (9%) had not used them at all (Table 2).

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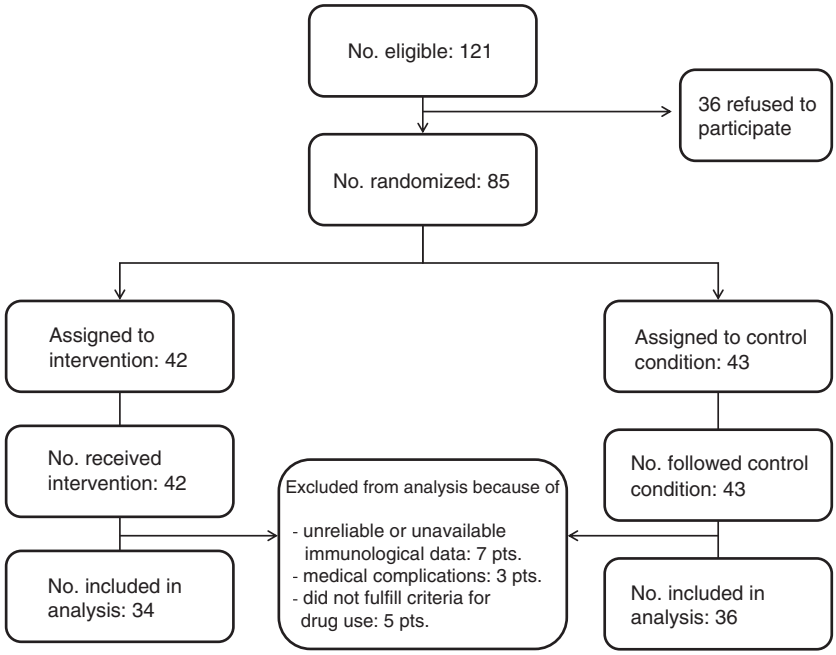

Figure 2. Numbers of patients assigned to intervention and control conditions, refusers and dropouts.

Table 1. Patients' characteristics. Within brackets: standard estimates of the mean

	Stress management training *N* = 34	Control *N* = 36	*p*-value
Age (years)	52 (1)	54 (1)	0.31
BMI (kg/l^2) [a]	26.3 (0.7)	25.8 (0.6)	0.76
Alcohol (U/day)	1.5 (0.5)	0.3 (0.1)	0.01
Lymph-node metastasis	41%	36%	0.66
Tumor stage			
0	9%	0%	
I	32%	44%	
II	38%	44%	
III	21%	11%	0.74
Surgical procedure			
Ablatio	12%	14%	
Lumpectomy + SNP [b]	82%	71%	
BCT [c]	0%	3%	
MRM [d]	6%	11%	0.29

[a]BMI, body mass index,
[b]SNP, sentinel node procedure,
[c]BCT, breast conserving therapy, and
[d]MRM, modified radical mastectomy.

Psychological outcome variables

Anxiety decreased after surgery, but similarly so in the intervention group and the control group (Table 3 and Figure 3). Depression clearly decreased after surgery in the intervention group. The control group showed a decrease only at 3 months post-surgery. The difference between both groups was significant at Day 5 post-surgery (effect size = 0.47). Quality of life increased at Day 2 and Day 30 post-surgery in the intervention group, whereas no postsurgical improvements were found in the control group. However, there was no significant between-group difference.

The participants in the SMT condition experienced more control after surgery (significant increase with respect to baseline level at Day 2, 5, 30, and 90 post-surgery). No increase was observed in the control group, except at 1 month post-surgery (Table 3 and Figure 3). However, the between-group difference was not statistically significant.

Somatic symptoms outcome variables

Fatigue increased in the control group and was significantly above baseline level at 3 months post-surgery (Table 3 and Figure 4). Fatigue decreased in the SMT condition and was significantly below baseline level at Day 2 and Day 5 post-surgery (effect size = 0.36 and 0.49, respectively). At these 2 days, the changes from baseline levels were significantly different between the two groups. Sleep problems and pain remained at the same level. Breast cancer surgery complaints increased in the control group at 3 months post-surgery, whereas they remained on the same level in the intervention group. The two groups showed a significant difference at this measurement point (effect size = 0.76).

The intervention effect may be dependent on the frequency with which the audio CDs have been used by the participants. To test this possibility, correlation coefficients have been determined for CD-use, which have been assessed at four time points, and the change in outcome variables between baseline and these four time points. Only two correlation coefficients showed a trend: more frequent use of CDs seemed to be associated with a larger decline in fatigue at Day 2 post-surgery ($r = -0.32$; $p = 0.07$) and in sleep problems at Day 90 post-surgery ($r = -0.31$; $p = 0.07$).

Discussion

The SMT, evaluated in this study, included several exercises that were carried out face-to-face during the sessions and practiced at home daily with the

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Table 2. Patients' evaluation of the sessions, the clinical psychologist and the audio CD contents, and the use of audio CDs. Within brackets: standard estimates of the mean

	Range	Day −1	Day +2	Day +30	Day +90	rmMANOVA	
		N = 32-33	*N* = 33-34	*N* = 33	*N* = 33-35	*F*	*p*
Opinions about sessions							
Satisfaction	1–10	8.1 (0.4)	8.6 (0.4)	8.5 (0.3)	8.3 (0.4)	2.90	0.05
Emotional value	1–3	2.6 (0.2)	2.6 (0.2)	2.6 (0.2)	2.4 (0.2)	0.80	0.50
Informational value	1–3	2.4 (0.2)	2.7 (0.2)	2.6 (0.1)	2.1 (0.3)	5.17	0.007
Coping value	1–3	2.3 (0.2)	2.7 (0.2)	2.5 (0.2)	2.3 (0.3)	2.79	0.06
Opinions about therapist							
Warm	1–4	3.3 (0.2)	3.5 (0.2)	3.5 (0.2)	3.4 (0.3)	1.54	0.21
Interested	1–4	3.6 (0.2)	3.8 (0.1)	3.7 (0.2)	3.6 (0.2)	0.89	0.45
Competent	1–4	3.6 (0.2)	3.8 (0.1)	3.8 (0.2)	3.6 (0.2)	2.58	0.06
Understanding	1–4	3.6 (0.2)	3.8 (0.1)	3.8 (0.2)	3.6 (0.2)	1.38	0.26
Calm	1–4	3.8 (0.1)	3.9 (0.1)	3.8 (0.1)	3.7 (0.2)	1.81	0.18
		N = 32	*N* = 31	*N* = 29	*N* = 23		
Opinions about audio CD contents							
Satisfaction	1–10	7.7 (0.5)	7.8 (0.6)	7.6 (0.5)	7.7 (0.5)	0.59	0.63
Coping value	1–3	2.4 (0.2)	2.7 (0.2)	2.6 (0.2)	2.6 (0.2)	2.67	0.06
		N = 33	*N* = 34	*N* = 33	*N* = 35		
Number of patients who used the audio CD							
Zero times per week		3%	9%	12%	34%		
Once a week		9%	6%	21%	6%		
Twice a week		6%	21%	6%	23%		
More often		82%	65%	61%	37%		

help of audio CDs. The SMT and the therapist were highly valued. The patients commented that the intervention was comforting, calming, and helpful, and it taught them to cope better with tension, worrying, and problems. The audio CDs were also highly appreciated.

Table 3. Perisurgical changes in psychological and somatic symptoms outcome variables, expressed as Means and Standard Estimates of the Mean

	Day −6	Day −1	Day +2	Day +5	Month 1	Month 3
Anxiety						
Control	48.9 (2.3)	48.6 (2.1)	40.6 (2.1) ***	43.8 (2.3) **	38.6 (2.4) ***	37.0 (1.9) ***
SMT	47.1 (1.9)	48.0 (1.7)	39.2 (2.3) ***	40.4 (2.4) ***	41.4 (2.6) **	37.8 (2.2) ***
Depression						
Control	53.1 (9.6)	44.1 (8.6)	37.5 (7.8)	[b] 52.4 (11.2)	42.0 (9.0)	34.0 (9.8) *
SMT	78.2 (15.5)	72.8 (16.3)	46.7 (13.9) **	42.1 (12.8) * **	54.9 (14.3) **	49.1 (13.6) **
Quality of life						
Control	76.5 (4.3)	82.9 (3.1) *	78.2 (3.2)	76.4 (2.9)	78.2 (3.2)	72.9 (3.8)
SMT	74.4 (4.2)	77.4 (4.3)	80.4 (3.3) *	78.4 (3.7)	81.0 (3.4) *	75.5 (3.6)
Well-being						
Control	55.7 (1.6)	—	—	54.9 (1.7)	54.9 (2.1)	56.0 (1.6)
SMT	53.0 (2.4)	—	—	55.8 (2.0)	55.6 (2.2)	55.6 (2.2)
Experienced control						
Control	13.1 (0.8)	13.7 (0.6)	14.3 (0.7)	14.3 (0.7)	15.0 (0.7) *	14.0 (0.8)
SMT	12.6 (0.8)	13.6 (0.8)	15.2 (0.7) ***	14.7 (0.8) **	15.3 (0.8) ***	15.3 (0.7) ***
Fatigue						
Control	46.3 (12.5)	53.7 (15.2)	[a] 52.3 (12.3)	[c] 59.7 (11.6)	62.9 (12.1)	98.7 (17.0) ***
SMT	79.7 (16.3)	66.1 (18.2)	54.4 (15.5)*	50.6 (12.1) * **	67.2 (18.7)	95.6 (19.0)
Sleep problems						
Control	—	20.8 (0.6)	20.4 (0.7)	21.4 (0.8)	19.9 (0.8)	18.9 (0.7) *
SMT	—	20.4 (0.8)	19.7 (0.8)	19.6 (0.7)	20.4 (0.9)	19.1 (0.9)
Pain						
Control	—	—	4.9 (0.8)	5.3 (0.9)	—	—
SMT	—	—	2.9 (0.6)	3.4 (0.7)	—	—
Breast complaints						
Control	—	—	—	7.6 (0.3)	7.3 (0.6)	[a] 9.2 (0.6)**
SMT	—	—	—	6.9 (0.4)	6.9 (0.5)	7.0 (0.4)

Significant change with respect to baseline
*$0.01 < p \leq 0.05$
**$0.001 < p \leq 0.01$
***$p \leq 0.001$
Changes with respect to baseline significantly different for the two groups: (a) $0.01 < p \leq 0.05$ (b) $0.001 < p \leq 0.01$ (c) $p \leq 0.001$.
SMT, stress management training.

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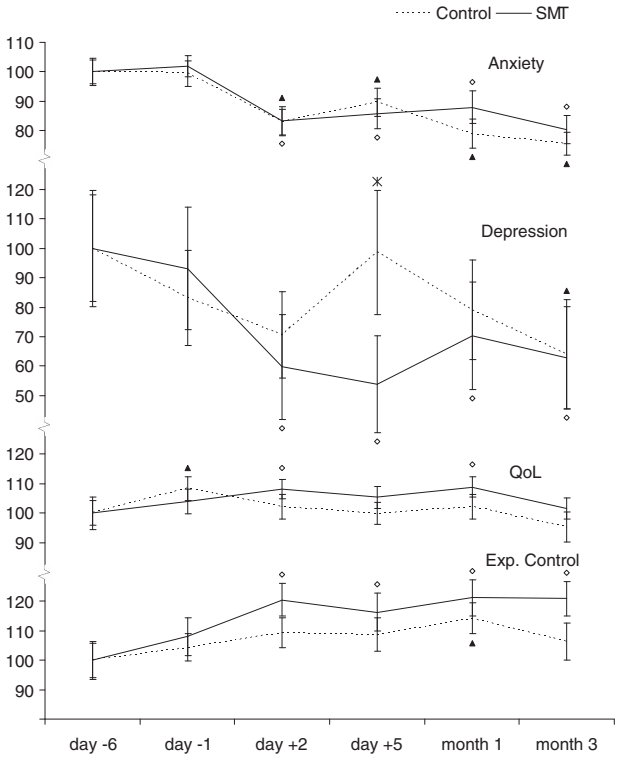

Figure 3. Perisurgical changes in anxiety (State-Trait Anxiety Inventory), depression (Profile of Mood States), quality of life (European Organization for Research and Treatment of Cancer), and perception of control. Baseline levels (day −6) set at 100%. ◊ = Significant changes with respect to baseline in the stress management training group, ▲ = significant changes with respect to baseline in the control group, and * = changes with respect to baseline are significantly different between groups

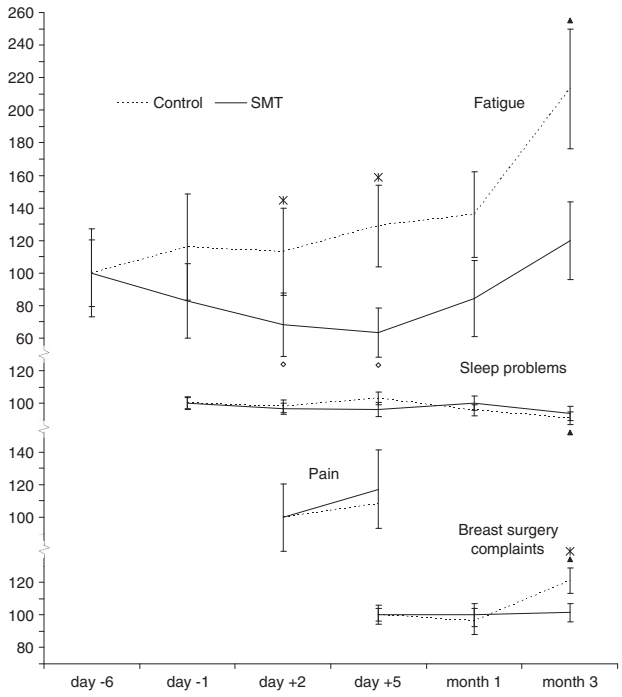

Figure 4. Perisurgical changes in fatigue, sleep problems, pain and breast surgery complaints. Sleep problems, pain, and breast surgery complaints were not assessed on all measurement points (e.g., pain is only relevant on the initial post-surgical days). Baseline levels (Day −6) set at 100%. ◊ = Significant changes with respect to baseline in the stress management training group. ▲ = Significant changes with respect to baseline in the control group and * = changes with respect to baseline are significantly different between groups

Despite these positive observations, we found the intervention effects to be modest. After surgery, depression and fatigue decreased significantly more in the intervention group compared with the control group, but the effects were short lasting. There was also a favorable intervention effect for breast surgery symptoms, although only at the last measurement point. The patients in the intervention group experienced more control during the measurement period; whereas in the control group, the perception of control remained largely at the same level. These patterns suggest an intervention effect, but the between-group differences were not significant. The effect was only seen in one of the primary outcome variables; it occurred in depression, but not in anxiety or perceived control.

Limitation of this study is its small sample size, though the power analysis presented in the method section indicated that the sample size was large enough to detect at least modest effects. Another limitation is that we are unable to determine whether the participants in the intervention have improved from the content of the sessions or from having spent time with a clinical psychologist.

We have compared the effects of our intervention with those of other presurgical interventions, evaluated in a randomized design, to see whether our modest outcome was an exception or has been often observed. The psychological effects of the intervention of Larson *et al.* were even smaller than the effects of our intervention. An intervention effect was only found in one out of 17 psychological outcome measures [31]. Parker *et al.* could not demonstrate any intervention effect, [32] and the psychological effects of the presurgical intervention delivered by Manyande *et al.* were limited to pain and the use of pain medication [13]. Thus, our intervention seemed even more efficacious than was found in earlier studies.

Interventions have more often been delivered during the postsurgical treatment period, namely during chemotherapy [33–35], radiotherapy [36–39], or bone marrow transplantation [40], and included patients with breast cancer [33,35,38,40], patients with gynecological cancer [41] or patients with various types of cancer [34,36,37,39]. This short overview is restricted to randomized and controlled studies that appeared after 1994. With respect to psychological outcome measures (anxiety, depression, distress, and mental well-being), four studies were successful [35,38,39,41],[1] whereas five studies found no intervention effect [36] or an effect in only one out of several outcome measures [33,40]. Jacobsen *et al.* investigated the effect of a single "deep breathing" session, which was applied by a professional or self-administered. Only the self-administered training was successful [34], but this effect could not be convincingly replicated in a newer study [37]. An intervention effect was only observed in one out of four outcome measures and was short-lasting. In summary, the efficacy of interventions delivered during the post-surgical treatment period has also

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not been convincingly demonstrated with respect to psychological outcome. One conclusion drawn from our study is that its modest intervention effects are in line with the outcome of other studies that evaluated the efficacy of interventions delivered before or shortly surgery. In any case, there is no reason to assume that interventions delivered during medical treatment are more efficacious than interventions delivered some time after treatment. The modest effects observed in our study could be interpreted as confirmation of Lepore and Coyne's skeptical view [8], regarding the usefulness of psychological interventions. A more optimistic conclusion is that a simple and inexpensive intervention resulted in less fatigue and less depression during the patients' stay in hospital.

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Note

1. Yoo *et al*. claim that there intervention was successful with respect to mood and quality of life, but this does not convincingly appear from their statistical analyses: none of the Treatment * Time interaction terms was significant [35].

Conflict of interest

The authors have declared that there is no conflict of interest.

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