Title:

The effect of psychological intervention on personality change, coping and

psychological distress of Japanese primary breast cancer patients.

–Controlled clinical trial of the counseling method using the structured association

technique-

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Abstract

The purpose of the study is to estimate the effectiveness of the psychological intervention on personality change, enhancing perceived emotional support, and ultimately to assist in the adaptive coping and psychological well-being of Japanese primary breast cancer patients. The intervention consists of 3 sessions that include providing medical and psychological information and counseling using the structured association technique. The subjects were 28 primary breast cancer patients (14 for the experimental group and 14 for the control group). Subjects were assessed at 3-4 days after surgery (pre-intervention), 3 months (post-intervention) and 6 months (follow-up) by 5 scales: the self-repression scale, the Japanese version of the self-esteem scale, the emotional support scale, the Japanese version of the MAC Scale, and the Japanese version of the HAD Scale.

The results showed significant $(p<0.01)$ group-by-time interaction in self-repression, self-esteem and fighting spirit. Significant differences between groups were found in emotional support $(p=0.03)$, anxiety $(p=0.06)$ and depression $(p=0.08)$. Dunnnett's test of multiple comparisons revealed significant $(p<0.05)$ improvement within the experimental group in self-repression, self-esteem, fighting spirit, helplessness/hopelessness, fatalism and depression in both the 3-month and 6-month

assessment periods. The control group showed significant improvement only in fatalism and only at 6 months.

The intervention seemed to have enhanced the short-term personality change, adaptive coping, and psychological well-being of primary breast cancer patients. However, further trials will be needed with larger samples to corroborate the findings.

Breast cancer is the most common cancer among Japanese women. It is estimated that approximately 50,000 Japanese women will develop breast cancer per year by 2020[1].

The diagnosis and treatment of breast cancer is extremely stressful life events, and 4 years post-treatment, approximately 30% of breast cancer survivors still reported psychological distress[2]. Thus, it is widely recognized that cancer survivors need psychological support.

Various risk factors which may affect the psychological status of breast cancer patients have been identified. For instance, maladaptive coping toward cancer (low fighting spirit, high level of helplessness/hopelessness) has been reported to cause psychological distress[3, 4]. Being young[5, 6], unmarried[6, 7], and illness-related factors (disease severity, treatment options, health status), have also been identified as risk factors[8-10]. Personality and psychosocial aspects that might be the predictors of psychological distress of breast cancer patients include repressive behavior[4,11,12], self-esteem[13-15], and social support[14,16,17].

Bardwell et al [6] identified the risk factors for depression in breast cancer patients from multiple perspectives (such as biomedical, demographic, and psychosocial variables) with a large sample size (N=2595). The results showed that psychosocial factors (such as stressful life event, less optimism, ambivalence over expressing negative emotions, sleep disturbance, and poorer social functioning) had a significant effect on depressive symptoms, but biomedical variables did not. This finding suggested that psychological intervention for breast cancer patients should be focused on managing daily stress and developing appropriate coping style.

In Western countries, various psychological interventions have been reported since the 1980's. Recently, intervention models developed in the West have been applied to Japanese breast cancer patients and their effectiveness has been reported. For example, Fukui et al [18] applied the psycho-educational intervention developed by Fawzy et al [19], which consisted of 6 weekly 90-minute sessions, including health education, coping skills training, and stress management, to primary breast cancer patients in Japan, with little alteration. Hosaka et al [20, 21] applied 5 weekly 90-minute sessions, including psychological education, psychological support, problem-solving techniques, relaxation and guided-imagery. The results of these studies indicated that group intervention was effective for reducing the psychological distress of Japanese breast cancer patients.

On the other hand, Hosaka[22] pointed out that the Japanese tend to be unwilling to talk about private matters (e.g. sexuality [23]) in front of others. In this regard, an individual approach may be more helpful to the patients. However, there have been very few individual intervention studies conducted for breast cancer patients in Japan.

Greer and Moorey [24] successfully applied a type of individual intervention called adjuvant psycho therapy to reduce anxiety and feelings of helplessness in cancer patients by inducing fighting spirit, emotional expression and getting support from important others. Eysenck and Maticek [25], who advocate "Type C personality" to be "cancer prone", applied behavioral therapy to people who tended to be emotionally suppressed and unable to cope with various interpersonal stresses, which led to feelings of helplessness, hopelessness and depression. They pointed out the effect of the intervention on preventing cancer death and emphasized the importance of behavior modification.

The present study focused on previous findings that repressive patterns[4,11,12], low self-esteem[13-15], and low perceived social support [14, 16, 17] might affect the psychological vulnerability of breast cancer patients. Individual psychological intervention was applied to Japanese breast cancer patients. The intervention consisted of providing medical and psychological information and structured counseling aimed at enhancing emotional expression, self-esteem and perceived emotional support.

The purpose of the study was to estimate the effectiveness of the psychological intervention on personality change and enhancing perceived emotional support, and how it may ultimately lead to adaptive coping and psychological well-being.

Conceptual framework and hypothesized intervention model

The current study was guided by Lazarus and Folkman's model[26], which views psychological distress as being stress response that is mediated via the process of stress appraisal and coping. They stated that an individual's psychological symptoms are the results of relationships between the individual and an environment that is appraised as taxing or exceeding his/her resources and endangering his/her well-being by the individual[26].

Self-repression and self-esteem may be personal factors in this model. Self-repression is defined as the tendency to repress emotions or feelings and prioritize others' wishes because of a desire to avoid interpersonal conflict[27]. Higher self-repression causes one to be more vulnerable to stress, and may eventually cause distsress.[27] The relationship between emotional repression and psychological distress in Japanese breast cancer patients was verified by Iwamitsu et al[11, 12].

Self-esteem is a component of self-concept and is defined as an individual's feeling of self-worth.[28] It may possibly act to buffer the stress that cancer patients experience and lower their level of depressive symptoms, and contribute to better health and positive social behavior[14, 15]. An inverse correlation between repression and self-esteem was found in some studies [29, (30)].

Social support is treated as an environmental factor in the model. It may help to buffer the negative consequences of the illness and its treatment and improve depression in cancer patients[16]. Perceived availability and satisfaction with social support are positively related to self-esteem, and can be predictors of lower levels of depressive symptoms and high levels of well-being in cancer patients[14 15]. These factors may influence stress appraisal, coping toward cancer and psychological outcomes.

A hypothetical intervention model was developed (Figure 1). The model suggests that an intervention to ameliorate self-repressive patterns, to improve self-esteem and perceived emotional support, and to reduce uncertainty about cancer and its treatment may be able to help improve the way that stress is appraised, which would eventually lead to better adaptive coping and psychological well-being.

Method

Design, Setting **and** *Subjects*

The study design was controlled clinical trial. Subjects were 28 primary breast cancer patients who were recruited (at first, experimental group [n=15] but 1 dropped out later, then control group [n=14]) from August 2005 to October 2006 at a general hospital in eastern Japan. The subjects were assigned to either the experimental group or the control group, in the time order of their surgery. The study protocol was reviewed and approved by the institutional ethical committee of the hospital. The purpose of the study was fully explained to each patient and only those who agreed to participate completed the study.

Eligibility criteria for the current study were (1) diagnosed primary breast cancer, (2) age under 65 years, and (3) no severe mental disorder. One member of the experimental group could not complete the study because she failed to fill out the questionnaire before the deadline. Thus, a total of 28 patients (experimental group [n=14], control group [n=14]) completed the study.

Procedure

The intervention was made by an investigator with 8 years experience in clinical practice, and who had been studying counseling. Following an informed consent, intervention was provided to the 14 remaining subjects in the experimental group. Each subject received three sessions: at 3-4 days after surgery, and at 1 month and 3 months after discharge. The assessment periods were 3-4 days after surgery (pre-intervention), 3 months after discharge (post-intervention), and 6 months after discharge (follow-up).

Following this procedure, 14 patients were assigned to the control group and filled in the questionnaire during the same assessment periods as the experimental group did. Each session and baseline assessment was conducted in a private meeting room in the hospital. Assessment at post-intervention and follow-up was conducted by mailing.

Intervention

The intervention consisted of three components i.e., providing medical information, providing psychological information, and counseling using the Structured Association Technique (SAT counseling) [31]. Providing psychological information was aimed at helping the subjects to understand the influence of various stresses on physical and mental conditions, and to motivate them to change behavior to reduce stress. SAT counseling was provided to help the patients find feasible ways of solving their problems. Fukui et al [23] reported that more than half of the Japanese patients in their intervention study did not wish to be given statistical medical information, such as survival time and the rate of recurrence. Thus, providing medical information depended on the individual patients' wishes.

The SAT counseling method was developed by Munakata [31] to help individuals become aware of his/her real feelings/emotions, healing, and behavior modification. It involves providing structured counseling and imagery therapy by means of the guided association technique. In this counseling method, it is very important for the intervenient to help the patients themselves establish specific goals for problem-solving, not just provide suggestions for a general coping strategy. SAT counseling has been reported to reduce psychological distress in patients with cancer, [32] and improve the visual performance in patients with psychogenic visual impairment. [33]

At the first intervention, the investigator provided information that primarily focused on the patients' psychological state, physical response and QOL. The information included "stress and both physical and psychological reaction", "stress and its related factors (personality, self-esteem, social support, etc)", and "better attitude for living (e.g. having a positive attitude, expressing negative emotions, getting social support, the effectiveness of laughter, etc)". At that point, the investigator asked the patients individually about how they lived before cancer diagnosis and made them be aware of how they were being stressed by it.

At the 2nd and 3rd interventions, the investigator asked patients whether they felt stress or had particular concerns in their lives after discharge from the hospital. After that, SAT counseling was used to help them find ways of managing their stressful situations. The length of each intervention was approximately 60-90 minutes.

Study variables and scales

Five scales with established reliability and validity were used: the **Self-repression** scale, the Japanese version of the **Self-esteem** scale, the **Emotional support** scale, the Japanese version of the **Mental Adjustment to Cancer Scale (MACS)**, and the Japanese version of the **Hospital Anxiety and Depression Scale (HADS)**.

Self-repression. Munakata's self-repression scale[27] measures both emotional suppression and repressive behavior patterns. The scale is a 10-item Likert-type scale that assesses the tendency to repress one's true feelings in order to be liked by others (e.g., "I endeavor to please others"; "at the expense of my convenience, I want people around me to be happy"). The responses that approximated to self-repression were scored 2 (I always do so), 1 (I sometimes do so), and 0 (I never do so). Thus, a high score indicates a high tendency for self-repression. The scale has adequate validity and reliability.[27] Cronbach's alpha indicating internal consistency of the scale was 0.73 in a previous study[27].

Self-esteem. Rosenberg's 10-item self-esteem scale[34] in Japanese [(35)] that measures perceived feelings of self-worth was used to measure subject's self-esteem. The scale has both positive (e.g., "On the whole, I am satisfied with myself"; "I feel that I have a number of good qualities") and negative (e.g., "At times, I think I am no good at all"; "I feel I do not have much to be proud of") domains. Responses ranged from "1"(strongly agree) to "3" (disagree) Agreement with positive items and disagreement with negative items score 1 in the Japanese version. A high score indicates a high level of self-esteem. This original scale has adequate validity and reliability. Cronbach's alpha was reported as 0.77-0.88 [36] and tool has been widely used in recent studies of cancer patients[14, 37]. The alpha of the Japanese version scale, which was used for Japanese cancer patients, was reported to be 0.69 in a previous study[29].

Emotional support.   Munakata's 20-item scale[38] measures perceived emotional support from both family (10 items) and friends (10 items). Items include "Do you have *any friend* who supports your behavior?" "Do you have any friend who talks about your life prospects?" "Do you have a friend who makes you feel secure when you meet him/her?"   *Any family member* is substituted for *any friend* in the "emotional support from family members" subscale. Responses that approximated to sooth one's emotional feelings were scored 1 (Yes), and 0 (No). Scores in the 2 subscales were totaled and higher scores indicated higher emotional support. Cronbach's alpha of 0.90 was reported in the study[38].

MAC scale (Mental Adjustment to Cancer Scale). This 40-item questionnaire was developed by Watson et al [39] to assess five dimensions of patients' reactions to

having cancer: fighting sprit, helplessness/hopelessness, anxious preoccupation, fatalism, and avoidance. Fighting spirit is characterized by a determination to fight the illness and adopt an optimistic attitude (e.g., "I see my illness as a challenge"). Patients giving a response of helplessness/hopelessness may feel overwhelmed by the diagnosis and have a wholly pessimistic attitude (e.g., "I feel like giving up"). Each item is rated on a scale of 1 to 4, ranging from "definitely does not apply to me" to "definitely applies to me", with higher scores indicating a greater tendency to adopt that coping style. Cronbach's alpha for the subscales was "fighting spirit" 0.84, "helplessness/hopelessness" 0.79, "anxious preoccupation" 0.65, and "fatalism", 0.65 in original scale[39]. The Japanese version of the MAC scale, which was used in this study, was also validated[40]. Cronbach's alpha of the subscales was "fighting spirit" 0.78, "helplessness/hopelessness" 0.75, "anxious preoccupation" 0.60, and "fatalism" 0.66, respectively [40].

HADS (Hospital Anxiety and Depression Scale). This 14-item questionnaire was developed by Zigmond et al [41] to assess anxiety and depression as two dimensions and has been validated in cancer patients [42]. Sample items of the anxiety scale include **"I feel tense or 'wound up'"** and "Worrying thoughts go through my mind". Items of the depression scale include **"I still enjoy the things I used to enjoy"** and "I can laugh and see the funny side of things".   Each item is rated on a scale of 0 to 3, with higher scores indicating a greater tendency toward anxiety and depression. Cronbach's alpha of the original scale was confirmed with a large population (n=51930) [43], and alpha was "anxiety" 0.80 and "depression" 0.76. Kitamura translated it to Japanese[44] and adequate validity and reliability were confirmed[45]. Cronbach's alpha was "anxiety" 0.77 and "depression"0.79, respectively[45].

The following information such as age, type of surgery, disease stage, axillary lymph node metastasis, type of adjuvant therapy, menopausal status, marital status, whether or not having children, whether or not having daughter(s), job status was obtained from medical charts by the investigators.

Data analysis

Demographic and illness-related data and baseline scores of the study variables were tested by Student's *t* test and Mann-Whitney's *U* test to assess the comparability between the 2 groups. Two-factor repeated measures ANOVA and Dunnett's test for multiple comparisons were used to determine whether there were differences between groups and within groups. Data were analyzed using the Statistical Package for Social Sciences, version 11.0 (SPSS Inc, Japan).

Results

Characteristics of the Experimental and Control Groups

Characteristics of both the experimental and the control group were compared using Student's *t* test and Mann-Whitney's *U* test. The results showed no significant differences between the 2 groups in mean age *(t=-0.26, p=0.98)*, marital status *(z=0, p=1.00)*, having or not having children *(z =-0.43, p=0.77)* having or not having daughter(s) *(z=-0.43, p=0.77)*, job status *(z=-0.82, p=0.41)*, menopausal status *(z=-0.38, p=0.79)*, type of surgery *(z=-1.80, p=0.35)*, axillary lymph node metastasis *(z =-1.29, p=0.35)*, type of adjuvant therapy [chemotherapy *(z =-0.38, p=0.77)*, radiation therapy *(z =-1.44, p=0.54)*, hormonal therapy *(z =-0.40, p=0.77)*, and disease stage *(z=0, p=1.00)*.

The patient who dropped out was younger (32 years old) than the mean age of the other participants. However, Average values for all variables showed no significant differences from those of other patients.

Effect of Intervention on Personal and Environmental variables

Student's *t* test was conducted to compare the baseline psychological scores of both the experimental and control group. As a result, a significant difference was found in emotional support *(t=2.34, P=0.03)*.

Two-factor repeated measures ANOVA was administered to assess whether there were differences between the 2 groups in score change over time. The baseline score for emotional support was adjusted by setting it as covariance.

The results showed that significant group-by-time interaction was found in self-repression *(F=8.7, P=0.001)* and self-esteem *(F=9.0, P=0.001)* (Table2). For these variables, the respective patterns of score change of the 2 groups were different. That is, the score of the experimental group improved, whereas that of the control group did not change or even deteriorated.

Next, Dunnett's test of multiple comparisons, in which the baseline score is regarded as the control group, was conducted to examine the score change over time within each group. As a result, the experimental group showed significant improvement *(p<0.001)* in self-repression and self-esteem at 3 months and 6 months after discharge (Table3). No group-by-time interaction was found in emotional support, and significant differences *(p<0.05)* were found between groups (Table2).

Effect of Intervention on Coping to Cancer

Two-factor repeated measures ANOVA revealed that significant group-by-time interaction in fighting spirit *(F=6.0, P=0.004)*. Here, the score of the experimental

group improved, whereas that of the control group deteriorated (Table2). According to Dunnett's test of multiple comparisons, the experimental group showed significant improvement in fighting spirit at 3 months *(p<0.01)* and 6 months *(p<0.05)* after discharge (Table3). The group-by-time interaction, and significant differences between groups, were not found in other variables (Table2). However, the results of Dunnett's test showed that the experimental group exhibited significant improvement over time in helplessness/hopelessness, anxious preoccupation (only at 6 months), and fatalism, whereas the control group improved only in fatalism, and only at 6 months (Table 3).

Effect of Intervention on Psychological Status

As a result of two-factor repeated measures ANOVA, no significant group-by-time interaction was found in anxiety and depression. However, a significant tendency of differences between groups was found in anxiety *(p=0.06)* and depression *(p=0.08)* (Table 2). Dunnett's test of multiple comparisons indicated that the experimental group showed significant improvement in anxiety at 3 months *(p<0.05)* and in depression *(p<0.05)* over time.

Self-determination for behavioral change

By undergoing the intervention, patients established a plan of action for overcoming their stressful situation on their own. For example, they gave responses such as "Sometimes I will ask for support, instead of trying to do everything by myself", "Until now, I put priority on taking care of people. But I will pay attention to my condition and take care of myself, as well", "My workplace is stressful. I will ask for a reassignment", "I will try to do something I can enjoy my life", etc. These patients reconsidered their lifestyles and decided that they would adopt a more positive attitude.

Discussion

In this study, individual psychological intervention was applied to Japanese primary breast cancer patients in an attempt to demonstrate the effect on personality change (self-repression and self-esteem), environmental change (social support) change, coping toward cancer, and psychological status. The hypothesis was that alteration of these characteristics may be able to help improve the way that stress is appraised, which would eventually lead to better adaptive coping and psychological well-being.

The sample characteristics of both the experimental and the control group were not statistically different in demographics and illness-related data. Thus, comparability between the 2 groups was acceptable.

All patients had early-stage cancer, but almost 40% of them (experimental = 5 [35.7%] and control = 6 [43%]) had undergone chemotherapy. They were recruited

post-surgery and the investigation lasted for 6 months after that. During this period, the subjects also needed to readapt to social lives while they were undergoing adjuvant therapy. Thus, the subjects may have experienced both physical and emotional pain during this time.

As shown in the hypothetical model (Figure 1), the current study aimed personality (self-repression and self-esteem) change and environmental (social support) changes in the subjects. As expected, it was effective in enhancing these characteristics.

According to Munakata[27], self-repression is a type of self-sacrifice that is committed in order to be liked by others. A Japanese sociological survey showed that there was a relation between self-repression and a high incidence of psychosomatic disorder [30]. Watson et al [4] reported that breast cancer patients who tended to control their emotions were more fatalistic and helpless. Amelioration of self-repressive patterns may be important for avoiding such negative consequences.

Some reports have implied that self-esteem has an inverse correlation with self-repression[29, (30)]. Hence, improving self-esteem might be a reasonable outcome, especially because it may have helped some patients to express their feelings and be more assertive. They formulated plans for solving problems, such as how to avoid stressful situations, by themselves. The sense of control may have helped to improve their self-evaluation.

A significant difference between the 2 groups was found in emotional support. The experimental group maintained a high level of perceived emotional support, whereas in the control group it decreased. During the perioperative period, family members and friends may have paid more attention and offered support to the patients. However, once the patients got better and returned to a normal social life, their supporters may have become less supportive than before. Thus, maintaining the same level of perceived emotional support over time might have significant positive effects.

According to Lazarus and Falkman's model, an individual's psychological symptoms are the results of relationships between the individual and an environment that is appraised as taxing or exceeding his/her resources and endangering his/her well-being by the individual[26]. In this model, improvement in individual resources (self-repression and self-esteem) or in maintaining good environmental resources (emotional support) might be able to enhance the patient's sense of control. By ameliorating these characteristics, it might be possible to improve the way of appraising stress (problems caused by having cancer) which in turn might lead to better adaptive coping and psychological state. In fact, the experimental group showed significant improvements in fighting spirit, helplessness/hopelessness, fatalism, anxiety and depression after

intervention and in fighting spirit, helplessness/hopelessness, anxious preoccupation, fatalism and depression in the follow-up period.

With regard to fatalism, both groups showed significant improvement, thus it was assumed that the patients gained increasing confidence over time that they could live with disease. However, the experimental group might have acquired this sense a bit earlier than the control group.

Avoidance did not show any significant changes. One possible reason for this may have been that the avoidance scale had only one item, so the distribution of the data was small and was probably unable to see the change.

In the intervention, medical information was not readily provided. In fact, there were 2 types of participants: those who wanted to know as much about cancer as possible, and those who did not wish to know the details of the disease. Individual intervention may be beneficial for understanding patient's wishes and preventing unnecessary fear caused by providing unwanted information.

Observing patient's reaction, psychological information could be useful information for some patients to motivate behavioral change. However, there might be other patients who do not understand how this could be positive. The SAT counseling method helps patients establish their own goals for resolving their problems or concerns (self-determination), rather than just suggesting general coping strategies. Deci et al [46] noted that when people are self-determined (intrinsically motivated), they experience a greater sense of choice about their actions, and less conflict and pressure. This might help to patients to modify their behavior and develop a more positive attitude that will improve their psychological well-being.

On the other hand, not all patients showed desirable change. Possible reasons might be that 1) the intervention was not effective for some patients; 2) the treatment was physically painful to some patients and might have affected their psychological condition; and 3) changes in lifestyle and interpersonal relationships might have affected the results.

However, the experimental group showed statistically significant improvement in several variables. Thus, the intervention might be effective for enhancing the short-term personality change, coping ability, and psychological well-being of primary breast cancer patients in Japan. Further trials will be needed with larger samples to corroborate the findings.

Limitations
The current study has some limitations.

At first, it was a study design. Because the intervention and assessment periods were set at a particular time after surgery, the sampling was nonrandom but quasi-random. Furthermore, the sample size was small. Thus it is difficult to generalize the study findings to all Japanese cancer patients. In future studies, randomized trials with larger samples may be needed to more precisely evaluate the reliability of the intervention effect.

Next, the influence of psychological status of the samples at the baseline on the intervention effect should be considered. In the current study, the mental health of the subjects in both the intervention group and control group was relatively good at the baseline, and subjects who had an extremely bad mental state were not included. Although a significant improvement in the experimental group was observed and the intervention seemed effective, it is possible that this effect occurred only in patients with originally good mental state. Thus, it appears that distressed patients should be screened and provided with sufficient support. Likewise, the participants were limited to primary breast cancer patients. Thus, the same method might not be applicable to different populations such as patients with cancer in recurrence or at the terminal stage. In this regard, development of the different type of intervention may be needed for targeting such population.

Finally, the repeatability of the intervention effect was a considerable issue. In the current study, the intervention was conducted only by the author. Thus, it is not certain whether the effect of the intervention could be repeated by another intervenient. In future studies, it may be necessary to clarify the contents of the program and instruct nurses in the counseling method to corroborate the findings.

In this study, since the setting was research based, the number of interventions was limited to 3. However, there were some patients who wished to have more sessions. In a clinical setting, flexible response may be more desirable when patients confront a certain problem or concern and need support.

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Legend for Figure and Tables

Figure 1. Conceptual framework and hypothesized intervention model.

Table1. Sample characteristics

NS: not significant
a. Student *t* test

Table 1   The differences in score change over time between groups (Two-factor repeated measures ANOVA)

a Higher score indicates psychological distress.
b Higher score indicates psychological well-being.
c Significant difference was found at baseline score (student's t test).

Table 2 The Score change over time within each group (Dunnnett's test of multiple comparison)

*** p<0.001,   ** p<0.01,   * p<0.05

Table 1　Sample characteristics

	Experimental group (n=14[100%])	Control group (n=14[100%])	Mann-Whitney's U test p value
Age(yrs)			
Mean (SD)	48.6(6.3)	48.6 (8.1)	NS[a]
Range	41-61	34-59	-
Marital status			
Being married	13 (92.6%)	13 (92.9%)	NS
Having daughter(s)	9 (64.3%)	7 (50.0%)	NS
Having a child/children	11 (78.6%)	10(71.4%)	NS
Having a job	11 (78.6%)	9 (64.3%)	NS
Menopausal status (postmenopausal)	5 (35.7%)	6 (42.9%)	NS
Type of surgery			
Mastectomy	3 (21.4%)	0 (0%)	NS
Lumpectomy	11 (78.6%)	14 (100%)	NS
Axillary lymph node metastasis			NS
Positive	2 (14.3%)	5 (35.7%)	
Adjuvant therapy（Multiple answer)			
Chemotherapy	5 (35.7%)	6 (42.9%)	NS
Radiation therapy	12 (85.7%)	14 (100%)	NS
Hormonal therapy	10 (71.4%)	9 (64.3%)	NS
Disease stage			NS
0	3 (21.4%)	3 (21.4%)	
Ⅰ	7 (50.0%)	7 (50.0%)	
ⅡA	2 (14.3%)	2 (14.3%)	
ⅡB	2 (14.3%)	2 (14.3%)	

NS: Not Significant

a. Student t test

Table 2. A comparison of temporal changes in scores between the 2 groups (Two-factor repeated measures ANOVA)

Outcome (possible range)	Baseline Mean (SD)	3mos (post) Mean (SD)	6mos (follow up) Mean (SD)	Group F	Group P value	Group×time F	Group×time P value
Personal, environmental factors							
Self-repression (0-20 [a])				13.7	0.001	8.7	0.001
Experimental	10.6 (3.6)	7.3 (2.3)	7.1(2.1)				
Control	11.4 (4.0)	10.1 (3.6)	10.8 (2.8)				
Self-esteem (0-10 [b])				12.4	0.002	9.0	0.001
Experimental	6.6 (2.1)	8.7 (1.4)	8.6(1.4)				
Control	6.2 (2.0)	6.3 (2.6)	6.5 (2.6)				
Emotional support (0-20 [b]) [c]				6.0	0.02	2.4	0.10
Experimental	19.5 (1.2)	19.7 (0.9)	19.7(0.8)				
Control	17.3 (3.6)	15.6 (4.5)	16.9 (3.3)				
MAC							
Fighting Spirits (16-64[b])				12.3	0.002	6.0	0.004
Experimental	49.2 (4.6)	52.7(4.9)	51.9(3.7)				
Control	51.6 (4.9)	50.1 (7.9)	49.4 (5.8)				
Helplessness/hopelessness (6-24 [a])				1.6	0.22	2.0	0.15
Experimental	9.4 (2.3)	7.2 (1.2)	7.9 (1.5)				
Control	9.0 (2.9)	8.4 (3.9)	8.0 (2.1)				
Anxious preoccupation (9-36 [a])				2.8	0.11	2.3	0.12
Experimental	23.8 (4.8)	21.8 (3.3)	21.0(3.1)				
Control	22.6 (4.1)	23.1 (5.1)	23.1 (4.3)				
Fatalism (8-32 [a])				1.7	0.21	2.2	0.12
Experimental	19.3 (4.0)	16.7 (5.1)	16.1(3.1)				
Control	20.1 (1.1)	20.1 (4.6)	17.5 (4.0)				
Avoidance (1-4 [a])				0.4	0.55	0.7	0.51
Experimental	1.9 (1.1)	1.9 (1.0)	1.9(1.1)				
Control	2.1 (1.1)	2.4 (1.1)	2.1 (0.8)				
HADS							
Anxiety (0-21 [a])				3.9	0.06	2.8	0.07
Experimental	4.7 (2.4)	3.0 (2.3)	3.6(2.1)				
Control	2.9 (2.7)	4.1 (3.9)	3.4 (2.8)				
Depression (0-21 [a])				3.2	0.08	1.5	0.24
Experimental	4.1 (2.3)	3.0 (1.8)	2.9(2.2)				
Control	2.7 (2.2)	3.6 (3.9)	3.8 (4.3)				

a Higher score indicates psychological distress.

b Higher score indicates psychological well-being.

c Significant difference was found at baseline score (student's t test).

Table 3. Score change over time within each group (Dunnnett's test of multiple comparison)

Variables	Mean score difference (SE)	
	(Baseline) – (post)	(Baseline) – (follow up)
Personal, environmental factors		
Self-repression		
Experimental	-3.4 (0.8)***	-3.5 (0.8)***
Control	-1.2 (0.8)	-0.6 (0.8)
Self-esteem		
Experimental	2.1 (0.4)***	2.1 (0.4)***
Control	0.7 (0.4)	0.3 (0.4)
Emotional support		
Experimental	0.1 (0.2)	0.2 (0.2)
Control	-1.5 (0.9)	-0.2 (0.9)
MAC		
Fighting Spirit		
Experimental	3.5 (1.2)**	2.6 (1.0)*
Control	-1.5 (1.1)	-2.2 (1.1)
Helplessness/hopelessness		
Experimental	-2.2 (0.6)**	-1.5 (0.6)*
Control	-0.6 (0.7)	-1.0 (0.7)
Anxious preoccupation		
Experimental	-2.0 (1.0)	-2.8 (1.0)*
Control	0.5 (1.1)	0.6 (1.1)
Fatalism		
Experimental	-2.6 (1.0)*	-3.1 (1.0)*
Control	0.0 (0.8)	-2.6 (0.8)*
Avoidance		
Experimental	0.0 (0.2)	0.0 (0.2)
Control	0.2 (0.3)	-0.1 (0.3)
HADS		
Anxiety		
Experimental	-1.7 (0.4)**	-1.0 (0.4)
Control	1.2 (0.9)	0.4 (0.9)
Depression		
Experimental	-1.1 (0.5)*	-1.3 (0.5)*
Control	0.9 (1.0)	1.1 (1.0)

*** $p < 0.001$,   ** $p < 0.01$,   * $p < 0.05$