PSYCHOEDUCATIONAL PROGRAM FOR BREAST CANCER PATIENTS: A PILOT STUDY

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Abstract

Cancer treatments adversely affect cognition in general and memory in particular. The current study focused on developing and investigating the feasibility and effectiveness of a group program for breast cancer survivors suffering from cognitive problems post cancer treatment. This intervention was designed to provide participants with specific memory and stress-reducing strategies. Three breast cancer survivors participated in this program, which included five 2-hour weekly sessions and one 1-hour follow-up session 1 month later. Assessment included self-report and objective measures. No statistical analyses were performed: all presented results are descriptive. The data hint that the intervention is associated with enhanced quality of life, satisfaction with memory abilities, and some increases in both the quality and quantity of effective memory and stress-reducing strategies of participants. Although the intervention is feasible, there were challenges to recruitment. Further research regarding content and delivery methods for cognitive interventions for breast cancer survivors is warranted.

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General Introduction

Cancer is a life-changing diagnosis. Cancer patients may experience a number of adverse effects, including anxiety, depression, cognitive changes, fatigue, pain, financial worries, and sleep disturbance, among others. Although these symptoms may occur in isolation, they often co-occur. These symptoms affect not only the patient but also their family members, work colleagues, and social interactions with friends. Cancer treatments may be considered successful only if the treatment side effects and symptoms associated with a cancer diagnosis are addressed and managed, in addition to cure or control of the disease itself.

A support program for cancer patients should depend on the nature of the support required, the point along the disease continuum at which the support is provided, and the preference and learning style of the person receiving the support. Interventions range from peer support groups and other psychosocial interventions at one end of the spectrum to psychoeducational and cognitive interventions at the other end. The latter type of intervention targets some of the common cognitive complaints associated with cancer and/or its concomitant medical treatments. Each of these interventions will be discussed below, followed by a proposed intervention that includes psychoeducational and cognitive-behavioral components. It should be noted, however, that all of the interventions discussed below overlap to some extent, and the boundaries defining each category or type of intervention are rather loose. Thus, the below-presented intervention types are grouped according to the primary focus of each intervention.

Support Groups and Psychosocial Interventions

Cancer survivors may find it useful to participate in support groups. In a groundbreaking study by Spiegel et al. (1981), women with breast cancer who attended a weekly support group

benefited from sharing their experiences with patients who had similar experiences. Specifically, individuals in the support group showed reductions in mood disturbance scores and had fewer maladaptive coping responses than those who did not attend. Sharing experiences also reduces stigma associated with the diagnosis of cancer and helps to overcome social isolation (Weis, 2003).

Psychosocial intervention programs generally focus on specific clinical problems of cancer patients such as depression, anxiety, fatigue, pain, and health-related quality of life. These programs usually strive to deliver specific psychosocial interventions that are relatively brief, goal-oriented, and directed at specific clinical outcomes. A meta-analysis of controlled outcome studies revealed that psychosocial interventions can have beneficial effects on cancer patients (Rehse & Purkrop, 2003). Other studies have found that psychosocial programs that incorporate a cognitive-behavioral therapy (CBT) approach are effective in reducing depressive and anxiety symptoms and improving quality of life in cancer patients (Edmonds, Lockwood, & Cunningham, 1999; Kissane et al., 2003; Larson, Duberstein, Talbot, Caldwell, & Moynihan, 2000; Lev, Daley, Conner, Reith, & Fernandez, 2001). These programs were conducted either in group settings or individually, although the specific format of the interventions did not emerge as a relevant factor for the effectiveness of the programs (Rehse & Pukrop, 2003).

Psychoeducational Interventions

Patients with cancer may also benefit from psychoeducational programs that are designed to increase understanding and knowledge about cancer and associated issues as opposed to learning techniques to reduce anxiety and cope with stress or pain, which is the primary focus of most psychosocial interventions. In a study of the effects of psychoeducational interventions on cancer patients at different stages (initial learning about the diagnosis, early treatment,

posttreatment), Andersen (1992) suggested that these types of interventions are effective because they increase patients' knowledge, teach them how to confront stressors with positive cognitive states, and teach active behavioral strategies. An educational component combined with specific strategies to reduce distress of cancer patients by enhancing self-efficacy and feelings of control may be even more beneficial.

Health care professionals at the Princess Margaret Cancer Centre in Toronto developed a book entitled "*Getting Back on Track: Life After Treatment*" that focuses on educating cancer patients about cancer and its effects (Jones et al., 2013). According to the authors, patients equipped with appropriate information are better able to recover because they possess realistic goal expectations and resources required to achieve them. The team subsequently developed a 2-hour psychoeducational group program based on the book and found that breast cancer patients who attended the session demonstrated improved knowledge regarding cancer and its after-effects as well as enhanced preparedness for re-entry into their pretreatment lives. Moreover, the effects were sustained when tested 6-months later (Jones et al., 2013). The authors did not observe any improvements in mood/distress or self-efficacy, which they attributed to the relative brevity of the program.

Cancer-Related Cognitive Dysfunction (CRCD)

There is burgeoning evidence that cancer treatments may adversely affect cognition in some women treated for breast cancer. For example, women undergoing chemotherapy often report symptoms such as forgetfulness, inability to focus, problems with attention, and mental slowness (Hess & Insel, 2011). These symptoms usually subside after chemotherapy is complete, but a substantial minority of patients report persisting cognitive deficits and mental fatigue. According to Matsuda et al. (2005), 10-40% of women with breast cancer experience some

degree of persisting cognitive impairment. Patients have coined terms like *chemo fog* or *chemo brain* to refer to these cognitive changes, terms which imply that chemotherapy is the cause of these changes. However, cognitive changes following cancer treatments likely result from a complex interplay of physiological (chemotherapy agents, radiotherapy, surgery, treatment dose and duration, concomitant medications), psychological (stress, anxiety, depression, distress), and moderating (age, education, genetics, coexisting neurological disorders) factors. Given the multifactorial nature of the phenomenon, we refer to these changes as cancer-related cognitive dysfunction or CRCD. Additional complexity in the literature arises from differences in the measurement of CRCD across studies; some use only subjective reports (also referred to as patient-reported outcomes), some use objective neuropsychological tests, and some use a combination of the two.

Subjective Reports of CRCD

Although the mechanisms of CRCD in breast cancer patients are poorly understood, reports of changes in one's ability to think are among the most common symptom complaints of breast cancer survivors. Studies have consistently revealed that patients report cognitive decline, most notably in the areas of memory and concentration, following aggressive cancer treatments (Ahles et al., 2002; Donovan et al., 2005; Downie et al., 2006; Jenkins et al., 2006; Schagen et al., 1999; Shilling et al., 2005; Shilling & Jenkins, 2007). A qualitative analysis of subjective reports of four breast cancer survivors who had received chemotherapy revealed that memory complaints are among the most common complaints (Mitchell & Turton, 2011). A typical sentiment expressed by patients is that their memory is not the same as it used to be before the treatment, and they are generally confused about the effects of treatment on their cognition. These reports suggest that patients' perceived memory functioning following treatment differs

substantially from their self-perceptions pretreatment. Moreover, patients expressed a need for assistance with getting back on track after cancer treatment.

Objective Measurement of CRCD

One of the major limitations of the studies assessing subjective report of CRCD is that the results rely on patients' perceptions and consequently lack the sort of objective evidence usually associated with studies on cognitive functioning. A broad range of neuropsychological test batteries have been administered to cancer survivors in an effort to detect and validate complaints. Although findings are mixed, there is a general trend toward an adverse effect of cancer treatments on verbal and visual memory, verbal learning, visuospatial functioning, processing speed, attention, and executive functioning (Brezden et al., 2000; Mehlsen et al., 2009; Paraska & Bender, 2003; Tchen et al. 2003; Van Dam et al., 1998; Wieneke & Dienst, 1995). In some cases, results indicate that performance of cancer survivors is generally within the normal range. However, the measures used may not be cancer-specific or sufficiently sensitive to detect subtle changes in cognition in cancer survivors (e.g., Bernstein, Catton, & Tannock 2014). Also, given that the problem is multifaceted, it is hard to establish the connection between cancer treatments and cognition. Specifically, other illness-related factors, such as depression, pain, anemia, anxiety, etc., might interact with or moderate potential cognitive effects of cancer treatment(s). A recent published review by Edelstein and Bernstein (2014) indicates that despite complicating factors, approximately 20% of patients are adversely affected by cancer treatments.

Despite the above-mentioned complexities regarding the diagnosis of CRCD, it is important to acknowledge its impact: cognitive disturbance following cancer treatments can affect educational, career, and personal decisions as well as quality of life. Thus, interventions

that target cognitive symptoms have the potential to affect overall quality of life. The next section outlines studies that focus on introducing and implementing cognitive interventions for cancer survivors.

Cognitive Interventions

As reviewed above, a number of interventions target psychological outcomes that can occur with a cancer diagnosis, but very few focus specifically on cognitive complaints of patients. A search of the literature on interventions for cognitive impairments in cancer patients revealed only five studies to date (reported below). One of the presented studies did not use objective neuropsychological measures to determine the effectiveness of the intervention, but rather relied on subjective measures and reports from participants.

The Neurocognitive Clinic in the Cancer Survivorship Program at Princess Margaret Cancer Centre aims to increase patients' engagement in self-managing their cognitive symptoms. Adult cancer survivors who have a self-expressed decline in their cognitive abilities are referred to the Neurocognitive Clinic for a one-hour individual appointment with a neuropsychologist. The goals of the session are to increase understanding of cognitive abilities and the impact of cancer treatment on cognitive performance, reduce distress regarding cognitive difficulties, increase self-efficacy to manage cognitive changes post cancer treatment, and increase behaviors that promote cognitive successes and reduce mistakes. The end goal is to equip patients with techniques and strategies for improved self-management of their cognitive deficiencies. Preliminary results of the effects of this intervention suggest that patients benefit from the program. Specifically, participants reported increased knowledge about CRCD, decreased distress about cognitive deficits, and generally increased quality of life and satisfaction with their memory, as measured by a mixed-method study including self-reports questionnaires and

qualitative interviews (Bernstein, Dissanayake, Tirona, Nyhof-Young, & Catton, 2012; Bernstein, Mamedova, Tirona, Catton, & Rich 2014).

Butler and Copeland (2002) developed a pilot intervention for children with brain tumors, leukemia, or osteosarcoma. Their Cognitive Remediation Program trained specific attention skills and compensatory strategies, such as metacognitive and mnemonic techniques. Participants were 31 off-therapy cancer survivors with documented attention deficits. Twenty-one completed the cognitive remediation program, and 10 served as a comparison group. This intervention yielded significant improvements, especially in sustained attention. Specifically, participants improved on neuropsychological measures of simple attention, sustained attention (vigilance), and memory but not on arithmetic achievement. Elements of CBT were also provided as a way of coping with distractions.

The program comprised 50 hours of individual treatment over a 6-month time period (children and adolescents were seen once a week, for a 2-hour period). As the authors indicated, however, the test battery was brief and possibly confounded by language competency. The authors also pointed to the limitation that the comparison group performed slightly below the treatment group at baseline testing. Finally, given the financial pressure on health care providers to shorten interventions, this intervention was expensive and time-consuming.

A team of researchers in Germany developed two neuropsychological intervention programs for women with breast cancer after adjuvant chemotherapy (Poppelreuter, Weis, & Bartsch, 2009). The researchers aimed to compare the effects of two types of neuropsychological interventions against a control group with no such training in a total of 90 female breast cancer patients. The programs were offered during in-patient rehabilitation following oncological therapy, which all cancer patients are entitled to in Germany. The two interventions were

neuropsychological training in a group format (NPT) and individualized, computer-based training (PC). The NPT group was composed of a maximum of 8 participants. The focus of the NPT intervention was on improving memory deficits and functional attention by teaching participants strategies that are easily applied to everyday problems (i.e., listening to radio news recordings and asking participants to relate the information back). In addition, specific compensatory strategies were also taught to participants (i.e., using day planners or conversation notes). An opportunity was also provided for participants to share their personal experiences with the group.

A second intervention - individualized, computer-based training (PC) – was developed, and the memory and attention tasks were tailored according to the neuropsychological measures used. Both NPT and PC intervention groups took part in four 1-hour training sessions per week during their stay as in-patients in the rehabilitation unit. The control group completed only the basic rehabilitation course offered in the hospital. All participants were tested at three time points: before the intervention, immediately after the intervention, and 6 months after the intervention.

A broad range of neuropsychological measures of attention and memory were administered to test the effectiveness of the interventions. All three groups showed significant improvement on most of the neuropsychological measures during the in-patient rehabilitation. No intervention effects were noted. The authors attributed the general improvement in all groups to several factors, including a general recuperative process that starts soon at the end of adjuvant therapy, practice effects arising from repeated administration of the same measures, and poor sensitivity of the measures. Despite the fact that no intervention effects were observed, patients expressed satisfaction with the program. Specifically, they appreciated that their cognitive

struggles were treated seriously and that they received expert advice for dealing with them (Poppelreuter, Weis, & Bartsch, 2009). Importantly, the patients' self-appraisal of their everyday cognitive skills improved after both interventions. However, even if there were intervention effects, this study would seem to have limited generalizability outside of Germany, as it would be difficult to deliver such complex interventions (especially the computerized individual one) for patients who are not enrolled in the rehabilitation program.

A fourth cognitive intervention study was conducted by Ferguson and colleagues (2007) who offered a Memory and Attention Adaptation Program (MAAP) for breast cancer survivors. The study was replicated and extended in 2012 to include waitlisted-control participants (Ferguson et al., 2012). Participants were 40 women (at least 18 months post-treatment and disease free at the time of the study) treated for Stage I and II breast cancer. Women were randomized to either an intervention (n = 19) or a waitlisted-control (n = 21) condition. All had reported memory and attention complaints. The MAAP focused on teaching compensatory strategies for improving everyday skills as well as some relaxation techniques. The program was based on four individual monthly visits (30-50 min. in length), with phone contacts once between the visits for additional support in applying learned strategies and review, for a total of seven contacts. Workbooks with the information about chemotherapy and memory as well as step-by-step instructions on how to practice and apply compensatory strategies were also provided. During the individual visits participants reviewed their knowledge regarding chemotherapy and its effects on memory, learned and rehearsed compensatory strategies relevant to their unique struggles, as well as learned relaxation and stress-management strategies.

The study measures included self-reported cognitive function, breast cancer survivor quality of life, measure of depressive and anxiety symptoms, standardized neuropsychological

tests, and a treatment satisfaction scale developed by the authors. Participants were tested at three time points: baseline, immediately after intervention (8 weeks), and at 2-month follow-up. Participants who underwent MAAP improved on the spiritual well-being subscale of the quality of life measure and on verbal memory. Most importantly, participants provided positive feedback and indicated their satisfaction with the program (Ferguson et al., 2012). The researchers pointed to the lack of sensitivity of some of the measures as one of the limitations of the study. They also suggested that the Functional Assessment of Cancer Therapy would be a better measure of quality of life of cancer patients in future studies.

Finally, a recent feasibility study was conducted by Shuurs and Green (2013) to test the effectiveness of a group cognitive rehabilitation program that focused on reducing cognitive complaints and improving quality of life of cancer survivors. The study involved three groups of participants: an intervention group of 23 cancer survivors who completed the cognitive rehabilitation program, 9 waitlisted cancer survivors, and 23 community-dwelling participants who never experienced cancer. The 4-week cognitive rehabilitation program was based on self-regulatory cognitive rehabilitation and cognitive-behavioral principles. The program was delivered in a 2-hour lecture format and included between-session homework. The first hour of each session started with didactic presentation of the weekly topics followed by a break. The second half of sessions was focused on developing and applying skills. Session 1 focused on educating participants on cognition, and training in goal setting, problem solving and relaxation. Sessions 2 and 3 involved education and skills training regarding memory and attention, respectively. Finally, Session 4 involved a psychoeducational component and cognitive-behavioral training related to emotional adjustment, fatigue, sleep, and self-care. Four groups of 4-8 cancer survivors in each group completed the intervention.

To determine the effectiveness of the program, all participants were tested at three time points: at baseline, immediately after the completion of the intervention (6 weeks) and at follow-up (3 months after the last testing). The authors used both objective and subjective measures, and a participant satisfaction scale developed by the authors. Participants who underwent the cognitive rehabilitation demonstrated improved subjective and objective cognition, psychosocial distress, and improved knowledge regarding cognition in compared to the two control groups. Although this intervention was deemed to be feasible, there were unequal comparison groups, small sample size and nonrandomized allocation of participants to group. A randomized controlled trial would provide a stronger test of efficacy of the intervention, and a bigger sample size would have increased statistical power to detect changes between the groups.

Current Study

There are several programs available to cancer patients, ranging from individual psychotherapy to group cognitive-behavioral interventions. However, at the time that this project was initiated, there were no known structured psychoeducational programs that combine cognitive-behavioral strategies and target both memory complaints (the most frequent self-reported complaint among breast cancer survivors) and stress-related complaints with elements of psychosocial support for breast cancer survivors. The current study sought to fill this gap by developing a structured psychoeducational program that provides factual information about CRCD, teaches breast cancer survivors practical memory strategies, and introduces specific stress-reducing cognitive-behavioral strategies designed to help participants cope with anxiety-provoking maladaptive thoughts. Provision of such information and skill building was incorporated with the aim of increasing sense of control over one's cognitive abilities (memory in particular). Providing the program in a group format where participants can share their

concerns and coping strategies was intended to maximize benefits of the program by normalizing participants' struggles and creating a sense of shared social identification.

Initially, the proposed pilot program included four groups (two experimental and two wait-listed control groups) with 10 participants in each group. The group format was selected based on research suggesting that group interventions increase emotional support, allow patients to express themselves and cope with social isolation, as well as promote a sense of camaraderie among cancer patients (Campbell et al., 2004; Spiegel et al., 1981; Weis, 2003). The number of sessions and length of each session was selected based on the proposed content of the program as well as on the structure of an existing Memory and Aging Program (MAP; Troyer, 2001, discussed below). A waitlisted group was included in order to evaluate the effectiveness of the intervention while accounting for practice effects and other changes that might occur with the passage of time. The number of desired participants was based on what would be necessary to ensure statistical power to detect changes between the groups. The content of the program was derived in part from the MAP (Troyer, 2001), the MAAP (Ferguson et al., 2007), and the Neurocognitive Self-Management Clinic program at Princess Margaret Cancer Centre that focuses on supporting self-management of persisting side effects of cancer treatment.

Designed for healthy older adults, the MAP (Troyer, 2001) presents factual information about age-related changes in memory and trains participants to use specific memory strategies (i.e., external memory aids, spaced retrieval, and semantic association). Group discussions are encouraged and incorporated into every training session. The MAP is offered to healthy older adults over five weekly 2-hour sessions in a group format that typically includes 8-12 participants. Each session consists of a didactic component (short lecture), the introduction and demonstration of various strategies, and practice of the strategies by the group. Practical,

everyday memory performance is emphasized. Troyer (2001) evaluated the program with several objective and self-report measures, including a knowledge quiz, word-list recall, name recall, a telephone task, strategy repertoire, and the Multifactorial Memory Questionnaire (MMQ; Troyer & Rich, 2002). The results indicated that the intervention increased participants' knowledge about age-related memory changes, increased scores on an objective prospective memory test (i.e. telephone task) and on two MMQ scales (Contentment and Ability), but did not have an effect on name recall, and word-list recall tests. In terms of the strategy use, results showed that the knowledge of possible memory strategies significantly increased in those who participated in the program, however, the increase in the frequency with which the participants reportedly used those strategies was smaller, but still significant (as measured by MMQ Strategy scale). Overall, self-reported memory performance improved as well as the self-reported use of a subset of memory strategies. However, performance on objective memory tests was inconsistent.

Based on successes of cognitive-behavioral interventions for breast-cancer patients (MAAP in particular), the current program also included a cognitive-behavioral component, which was modeled after the self-talk component of Meichenbaum's (1974) Stress-Inoculation Training. Meichenbaum's original Stress-Inoculation Training model consists of three phases: (a) an educational phase – learning about the nature of stress and psychological response to stress (including the set of maladaptive, anxiety-provoking self-statements and thoughts), (b) a rehearsal phase that focuses on providing clients with stress-reducing techniques, such as progressive muscle relaxation, modifying self-talk, etc., and (c) an application phase in which clients are guided into situations where they can apply and master learned cognitive and behavioral techniques.

In our pilot program, participants followed a slightly different regimen of Stress-Inoculation Training. Specifically, participants were educated about stress and its effect on memory functioning, and behavioral interventions to reduce stress (i.e., deep breathing and visualization) were introduced early in the program. The cognitive component of Stress-Inoculation Training was introduced only in the fourth session of the program, and participants were then encouraged to combine behavioral relaxation strategies with the cognitive strategies. Thus, the rehearsal phase of Stress-Inoculation Training was broken down into two sessions (behavioral techniques were taught in the second session, and cognitive techniques were taught in the fourth session). Moreover, the application phase was encouraged throughout the program in the form of homework and in-class assignments. This was done because behavioral techniques relevant to Stress-Inoculation Training were also integral components of the memory strategy training; therefore, it seemed appropriate to introduce this part early in the program.

Stress-Inoculation Training focuses on educating participants on how to monitor, modify and organize their internal dialogues to reduce stress. The general logic behind modification of internal dialogues is that self-talk can inhibit, initiate and reinforce behaviors. Instead of focusing on shaping behaviors from external reinforcement, the focus of this training is to shape behaviors via one's own cognitions by modifying internal dialogues. This cognitive component of Stress-Inoculation Training was presented in a slightly different way in our program. Borrowing from Gilbert's (2010) compassion-focused therapy, the training focused not only on modifying the structure of self-statements but also on the tone of the internal voice that pronounces those adaptive statements. The basic idea is that one's internal voice should be calming and soothing. People often criticize and bully themselves when something goes in an unfavorable direction, forgetting to remind themselves that being aggressive is not the only form of motivation. Thus,

participants were encouraged to state new, organized, and adaptive self-statements in a compassionate and soothing voice and were reminded to reinforce themselves for trying their best. A compassionate internal voice can help reduce effects of stressful situations and help with coping with negative emotions.

Goals

The primary goal of the study was to determine the feasibility of running a group psychoeducational intervention with elements of CBT for breast cancer survivors with concerns about their cognitive functioning. The study also aimed to test several hypotheses. Specifically, the study aimed to determine whether a successful implementation of the program with breast cancer survivors would result in: (a) increased knowledge regarding cancer-related cognitive dysfunction and memory in general, (b) a set of memory strategies that participants can use in their everyday memory tasks, (c) increased satisfaction and sense of control over memory abilities, (d) improved self-reported everyday memory functioning, (e) improved objective memory performance, (f) increased health-related quality of life, and (g) a larger toolbox of stress-reducing cognitive and behavioral techniques.

Methods

Sampling Procedures

A variety of different methods were used to attract participants between October 2013 and March 2014. Flyers were posted around North York, including 12 doctors' offices (primarily offices of general practitioners and private plastic surgery clinics), bus stops, libraries, hair salons, local community centers, and buildings throughout York University's Keele campus. The study was also promoted on several breast-cancer support Facebook pages, including Canadian Breast Cancer Foundation Ontario Region, The Healthy Breast Program and Mind-Body

Approaches to Cancer and Health, and Rethink Breast Cancer, After Breast Cancer. Additionally, the study was advertised on the York University Psychology Clinic's website, and a link to the study was posted on the ELLICSR Cancer Survivorship's official web page. The study was also advertised to the York University Retiree's Association. A registered psychologist at a Toronto-area cancer center also promoted the study.

Along with the previously mentioned methods of recruitment, a number of secretaries at York University were contacted and asked to email their departmental listserves with information regarding this research. Recipients of this email were then encouraged to forward the information to anyone who might find the information useful.

Ethics

The Ethics Board at York University approved the research and the measures used. The details of the study including the study's purpose, procedure, risks, and benefits were explained to participants both during the telephone interview and during the first session. Participants were assured that the personal information they might share during discussions would remain private and confidential and participants were reminded of their right to withdraw from the study. The program was offered free of charge, although participants were responsible for any fees associated with attending, such as transportation or parking.

Participants

Five community-dwelling female breast cancer survivors between the ages of 38 and 66 (*M* age = 51.2 years) expressed interest in participating in the present study. One potential participant recruited through the York University Retiree's Association declined participation due to personal circumstances before the program started. Another potential participant who was referred to the study by a registered psychologist did not show up for the scheduled first meeting

and did not respond to repeated attempts to contact her. Therefore, of the 5 individuals who expressed interest in the study, only 3 enrolled. Two of the participating women were referred by a registered psychologist, and one found out about the study from a flyer posted in the North York Area.

The three women were ages 38, 53, and 56. To screen out adults with possible early dementia participants were given the Modified Telephone Interview for Cognitive Status (TICS-m; Welsh, Breitner, & Magruder- Habib, 1993); individuals with scores below 31 were excluded. All three participants scored above the cut-off and were deemed eligible for participation (*M* score = 37.7, range = 33-44). All participants were fluent in English. Of the three participants, only one attended all six sessions; the other two missed one session each (Participant 1 missed Session 3 and Participant 3 missed Session 4. Participant 1 also missed the group Session 6 due to scheduling difficulty and attended an individual meeting later that day instead). Thus, only Sessions 1, 2, and 5 were attended by all three participants.

Detailed description of participants

Participant 1

Participant 1 is a 56-year-old breast cancer survivor who underwent surgery, chemotherapy, and radiotherapy 2 years prior to the program. The participant was on tamoxifen (hormonal therapy) at the time of the study. She heard about the program from a flyer posted in the North York area. The participant holds a community college degree. Past medical history of this participant includes diabetes (for which she is taking medications) and high blood pressure. Her social support circle includes her children and close friends. The participant had recently lost her job and was looking for a new job while taking part in the program. She noted that the experience was stressful. The participant missed the third session and was provided with the

workbook from that session, but she declined an offer to attend an individual meeting to review the material she missed. She also could not make it to the scheduled time during the follow-up session but agreed to come an hour later and do the testing as well as review the program and her progress over the month following the program. This participant was born in Israel and has lived in Canada since 1984.

Participant 2

Participant 2 is a 53-year-old survivor of breast cancer. Her cancer treatment included surgery, chemotherapy, and radiotherapy 1 year prior to taking part in the study. This participant heard about the program from a psychologist familiar with the program. She lives with her husband and has a circle of close friends supporting her in difficult times. This participant holds a community college degree. She was extremely motivated to attend the program and did not miss any of the sessions. She was also eager to increase public awareness about CRCD.

Participant 3

Participant 3 is a 38-year-old breast cancer survivor who underwent surgery, chemotherapy, radiotherapy, and hormonal treatment as part of her cancer care. Her treatment ended 4 months prior to the program beginning. Her medical history includes dystonia, stroke (in 1990) and a skin condition. This participant was referred to the program by the same psychologist who referred Participant 2. The participant holds a Master's Degree in Industrial Relations. She lives with her husband and cites him as her greatest source of support. This participant missed the fourth session and was offered an individual meeting but chose instead to work on her own and educate herself via the workbook. The participant noted that she was depressed at the time of the follow-up testing and was taking antidepressants.

Materials

The program consisted of five weekly 2-hour sessions and a 1-hour follow-up session one month later. A brief description and timeline of the program is presented in Table 1.

General Format of the Sessions

The first 10-15 min. of each session (with the exception of the first session) started with a review of the material learned in the previous session and review of homework. Participants were encouraged to share their experiences with trying the techniques discussed during the sessions, and also had an opportunity to report and work on problems that arose from experimenting with the techniques during the week and as part of their homework. The remainder of the first hour of each session involved a didactic presentation of the weekly topic via a Power Point presentation. Throughout the presentation participants could ask questions and express their concerns. A 10-min break was provided to participants after the first hour of each session.

The second hour of each session was generally focused on providing the participants with an opportunity to practice newly learned techniques with various sample scenarios. They were also encouraged to discuss and share their personal strategies. At the end of the second hour of each session, a workbook containing a brief description of the weekly topic as well as a homework assignment specific to each session was provided to participants. Participants were reminded of the importance of completing homework. A detailed description is presented below.

Week 1(Hours 1-2): *Introduction. CRCD. Memory. Memory and CRCD.* The session started with the introduction of the program leader and participants to each other. The general format of the program and goals were then discussed and ground rules were established including the importance of protecting private material discussed in the sessions, attending

lectures, and completing homework. The introduction was followed by a brief review of the content of the program and the participants were then asked to share their own expectations and goals regarding the program.

The first hour of the session focused on educating the participants about breast cancer and the connection between the brain and cancer. In an effort to facilitate the understanding of the mechanisms through which breast cancer can affect cognition, a short overview of the brain and the brain structures was presented. The definition of Cancer-Related Cognitive Dysfunction (CRCD) was then discussed and research findings regarding the prevalence of CRCD were presented. Given that chemotherapy is the most researched factor contributing to CRCD, six specific mechanisms currently hypothesized (Argyriou et al., 2011) to be related to why or how chemotherapy can affect cognition were presented. The six mechanisms include (a) direct neurotoxic effect, (b) hormonal changes, (c) secondary immunologic response, (d) anemia, (e) microvascular injury, and (f) genetic predisposition.

The second hour of the session started with a discussion of memory and memory stages (i.e., encoding, storage, and retrieval). After discussing the stages of memory, six types of memory were introduced including semantic, immediate, recent, remote (or autobiographic), prospective, and procedural memory. The session concluded by discussing the research data regarding the relationship between different types of memory and CRCD.

For the homework, participants were asked to record in their workbooks the number of memory mistakes (for example, forgetting to take a medicine or returning a book to the library) and successes (for example, remembering to visit a doctor or buy milk on the way home) they make throughout the week and try to associate mistakes and successes with one of the six types of memory discussed in the second hour of the session. A particular emphasis was placed on

including the memory successes section to instil hope in participants and provide some sense of control and comfort in their memory abilities.

Week 2 (Hours 3-4): Factors Affecting Memory. The didactic component of the second session included an overview of the factors that can affect memory aside from aggressive cancer treatments. Specifically, the session focused on discussing how age, dementia (Alzheimer's disease as one of the most frequent causes of dementia in particular), medications, hormones (and menopause), mood (anxiety and depression), other medical disorders (diabetes, stroke, thyroid abnormalities) and lifestyle factors (diet, physical exercise, and cognitively stimulating and social activities) can affect memory functioning for better or worse. The first hour concluded with a discussion of the importance of positive attitude about one's memory on memory functioning. Participants were then assigned the first part of the homework. The homework involved monitoring and recording any changes participants make over the week in their diet and in the quality and quantity of physical and cognitive activities they engage in.

The second half of the session focused on discussing the stress-memory relationship. Specifically, participants were educated on the role of stress hormones on the brain. Particular emphasis was placed on discussing the damaging effect of chronic stress, and the stress hormone cortisol was described in detail. Relaxation techniques were then introduced as a way of breaking the adverse effect of stress on memory functioning. Two relaxation techniques were presented: deep breathing and visualization. Deep breathing was chosen as a technique because of its simplicity and brevity. The program leader demonstrated deep breathing and encouraged participants to try taking several deep breaths.

The second technique – visualization – was then introduced. Participants were asked to close their eyes and imagine being on a beach. The leader guided participants throughout the

exercise and verbally assisted them by asking participants to pay attention to the scents, sounds and feelings on the "beach." At the end of the second session participants were encouraged to complete the second homework assignment in their workbooks. Specifically, participants were asked to try out the relaxation techniques and record the day of the week, the number of times practiced, and the specific techniques tested. Participants were reminded that the homework would be reviewed at the beginning of the following session.

Week 3 (Hours 5-6): Memory Strategies. The bulk of the third session was focused on teaching memory strategies. The first hour of the session focused on educating participants on five memory strategies adopted from Troyer's (2001) Memory and Aging Program. The five strategies included *Seeing and Saying, Habits, Associations, Records,* and *Practice Retrieval* (SHARP). The *Seeing and Saying* strategy involves paying close attention to new material. For example, focusing attention can help one to remember things that have just been done (locked the door) or things that one is intending to do (buy milk on the way home). To achieve that, one can *see* it (visualize or watch oneself do it) and *say* it (state it out loud). Participants were asked to think about scenarios where this strategy can be used and then encouraged to try out the technique over the next week and record their observations in the workbook.

The concept of *Habits* – the second memory strategy – was then introduced. Habits can be an effective memory strategy. Habits can be used to organize the environment to make it easier to remember where things are (having a habit of placing keys in a particular place, keeping reading glasses on a shelf close to books, etc.). One of the main ideas behind this strategy is to have *a place for everything and everything in its place.* There are other ways to use habits as a memory strategy such as making a habit of taking medications at a specific time or pairing it with some activity (dinner, before going to bed, etc.), or making a habit of checking a calendar or

to-do list every morning before leaving for work. Participants were asked to think of things that can be easily lost and think of logical places where these things can be kept (as long as it makes sense to a person). Participants were also challenged with scenarios where placing objects in their logical places immediately is not possible (an umbrella, gloves, etc.). Finally, participants were asked to try to experiment with this technique by finding logical places for some items that are easily lost at home or work and record their experiences in the workbook.

The *Associations* strategy was then introduced. It is another powerful memory strategy that involves processing information at a deeper level by associating it with something a person already knows. There are a number of ways to use associations as a memory strategy including thinking of what something means, making a mental image of the information (for example, imagining the title of the book), connecting new information with something a person already knows (associating a new neighbour's last name with a friend with the same last name), and finding patterns (good for numbers: PIN codes, etc.). Participants were encouraged to try to experiment with the technique over the next week by remembering a new name and a new number by forming associations and recording the results in the workbook.

The fourth strategy – *Records* – was presented next. It is a widely known and practiced memory tool that involves recording the information to be remembered in a memory book or any modern electronic device. A particular emphasis was placed on disputing the myth that writing information down instead of remembering negatively affects memory functioning. Research findings were presented to demonstrate that recording information improves one's chances of successfully recollecting the information even if a person does not refer to the recorded material. Participants were also encouraged to pair *Habits* and *Records* by making a habit of checking recordings and referring to the recorded information on a regular basis (checking a wall calendar

to remember appointments or birthdates every morning, checking to-do list for the next day before going to sleep, etc.).

The last memory strategy is *Practice Retrieval.* This strategy is the most natural way of remembering new information that is based on repetition. This memory technique involves practicing retrieving information by repeating it to oneself. An especially effective way to use repetition as a memory strategy is to repeat information over increasing intervals. At first, participants were instructed to repeat information after just a few seconds and then gradually increase the length of time between repetitions eventually repeating information over longer intervals (a few minutes or even longer). Participants were presented with a new word (for example, 'Hi' in Russian) and then asked to repeat it over spaced interval of time throughout the discussion. Participants were encouraged to try applying this technique to remember new names.

The second hour of the third session was focused on applying the memory strategies (SHARP) to various scenarios. Specifically, *Associations* was practiced with new names (Rose Miller, Freda Harrison, Kim Nagai, etc.), numbers (PIN codes; for example, associating 0107 code with Canada Day), postal codes (for example, making G3T 4T3 postal code memorable by making up a story: "getting three tickets for three tennis matches", as long as the "story" makes sense to a person) and names of books and movies (for example, visualizing the title). The strategy of keeping *Records* was also discussed in the second hour, and participants were educated about efficient ways of using their memory organizers. In particular, participants were advised that memory organizers should have different sections, including (a) Calendar for recording birthdates or appointments, (b) To-Do section to record items that have to be completed during a particular day, (c) Permanent Files section to record hints to the PIN codes or passwords or one's address and work numbers, and (d) Scratch Pad section for recording

information to remember for a short while, such as where one parked a car, and then scratch the information out once it's no longer needed.

Participants were reminded of homework to be completed for the next week and encouraged to organize their memory organizers to be more efficient. Relaxation strategies were briefly reviewed and participants were reminded to continue experimenting with deep breathing and visualization.

Week 4. Stress-Inoculation Training: The fourth session offered stress-inoculation training (Meichenbaum, 1974), which is a method used to reduce stress by changing internal dialogues. The technique involves modifying "self-talk" when completing or preparing for a stressful task, such as following a complex recipe or preparing a presentation for work. The first hour of the session focused on reviewing how stress affects memory and performance in general. Participants were educated that stress reaction involves physiological reaction and set of maladaptive toxic thoughts that can hinder performance. Participants were then reminded that they already know how to address the physiological part of the stress reaction (relaxation techniques) and, thus, the focus was on educating participants on how to deal with maladaptive thoughts. The emphasis was placed on educating participants on monitoring and modifying internal dialogues. Specifically, participants were instructed that the things people say to themselves affect how they appraise the situation and their ability to cope with the situation. The more organized and reassuring statements people incorporate and use in their internal dialogues the better is their ability to ward off disturbing thoughts and cope with challenging tasks.

The four stages of modifying internal dialogues along with the sample statements were introduced as a way of coping with stressful situations. The four stages include (a) *Preparing for a stressor* – this stage is focused on organizing the plan of action in a stressful situation

(statements such as “What is it you have to do?” “You can develop a plan to deal with it!” “No negative statements, just think rationally,” “Don’t worry - it won’t help you” can be used at this stage), (b) *Confronting and Handling a stressor* – this stage helps a person to convince himself or herself that he or she can deal with a stressor, and if fear or panic arises it is a good time to use one of the relaxation techniques learned in the program (for example, “Psych yourself up to meet the challenge!” “One step at a time you can do it,” “Stay relevant! This anxiety tells you that it’s a time to use one of the relaxation strategies” etc.), (c) *Coping with the feeling of being overwhelmed* – at this stage a person focuses on the present, on what he or she has to do and getting anxiety under control (for example, “When strong emotions come – just pause,” “Focus on the present – what is it you have to do,” “Don’t try to eliminate negative emotions – rather acknowledge and keep them under control”), (d) *Reinforcement* - the final stage of the training is focused on congratulating oneself on doing a good job and trying one’s best to cope with stressful situation (for example, “It worked – you did it,” “It wasn’t that bad as you expected,” “Your thoughts are what’s the problem, once you control them you control fear”). Participants were instructed to state those statements in a calm and soothing tone.

The second hour of the fourth session focused on applying the Stress-Inoculation Training to two stressful scenarios: (a) anger management (for example, “You come to work and find a poor evaluation from your boss, or you have been fired and you feel angry and disappointed with your boss. How would you cope? How can you change your internal dialogue?”) and (b) pain tolerance (for example, “You feel pain and you are concerned that this might be the signs that the disease is coming back; what goes through your mind? How can you change that?”). The leader facilitated monitoring of automatic and maladaptive thoughts and then worked together with participants to construct more adaptive and effective thoughts using the

four stages of Stress-Inoculation Training. Participants were then given a homework assignment that required them to record their maladaptive thoughts that occur in stressful situations (actual or imagined) and replace them with more structured, organized, and adaptive thoughts using Stress-Inoculation Training. Participants were reminded to record both maladaptive and adaptive thoughts and record any concerns or problems.

Week 5. Practice and Final Review: Most of the fifth session focused on going over the strategies taught in the previous sessions (both memory and stress-reducing strategies) and applying them to different situations. Scenarios were offered, and the group was encouraged to apply the techniques. The session started by reviewing five memory strategies: *Seeing and Saying, Habits, Associations, Records,* and *Practice Retrieval* (SHARP). Participants were then presented with the first scenario, which was learning the names of some psychologists (Brenda Milner, Angela Troyer, and Norman Endler), and were asked to think and apply any of the SHARP memory strategies. Participants were also presented with photos of those people and asked whether having additional (visual) information facilitated the task (processing information at a deeper level). In the second scenario, participants were asked to apply SHARP techniques to remember numbers (including a telephone number and PIN codes). Next, participants were encouraged to apply SHARP techniques to remember a grocery shopping list. In this task, the leader explained the importance of clustering similar information to facilitate remembering. Additional scenarios for SHARP application included doctor appointments, remembering to take medications, and remembering past events (trips, books, etc.). Throughout the exercise participants were encouraged to share their own techniques that they thought might be helpful for other group members.

Stress-Inoculation Training was also reviewed, and participants were asked to name the four stages of training. Participants were then asked to experiment with two stressful scenarios and apply the Stress-Inoculation Training techniques (monitor internal, automatic and maladaptive statements and replace them with organized, self-assuring and reinforcing statements). The two stressful scenarios included (a) anxiety over medical results (for example, "Think about the period after you had a medical/blood test and you are waiting to hear the results. How would you cope with anxiety?") and (b) anxiety about running into a nosy neighbour/acquaintance who asks how you're doing (for example, how much information do they want and are comfortable to disclose about their health and current fears or concerns).

The second hour of the final session focused on reviewing the program material. Together with the leader, participants reviewed CRCD and its possible mechanisms of CRCD. The group then reviewed memory stages and memory types and how they are affected by CRCD. Other factors that affect memory were also reviewed including age, medical conditions, lifestyle factors, and stress. Participants were then encouraged to review relaxation strategies and asked to continue experimenting with them over the next month.

Follow-up. The sixth session took place 1 month after the fifth session. During this final1-hour follow-up session, memory and relaxation strategies were reviewed, and participants were given an opportunity to ask questions and discuss any difficulties they experienced over the previous month. As participants graduated from the program the leader strongly encouraged them to make a plan to maintain and build on the positive changes they had made thus far. The leader referred participants to the workbook and asked them to set a goal of using memory strategies and Stress-Inoculation Training and making changes in their lifestyles and recording them in the workbook over the next month. The leader discussed elements of an effective plan,

namely that it should be specific, realistic, and time-limited. Finally, participants were encouraged to set new goals if targets are achieved.

Instruments

Screening interview. The Modified Telephone Interview for Cognitive Status (TICS-m; see Appendix A) is a 50-point test that screens for dementia by assessing orientation to time and place, basic verbal memory and attention, mental calculation, and language function (Brandt, Spencer, & Folstein, 1988; Welsh et al., 1993). The interview is administered over the phone and takes 10-15 min to complete. Possible scores range from 30 to 46.

To determine whether the goals of the program were met, the following questionnaires and tasks were administered in a group format as pre-, post-, and follow-up tests.

CRCD Knowledge Quiz. A 12-item quiz was created to test participants' knowledge of various topics presented in the program (see Appendix B). The quiz includes fill-in-the-blank questions regarding processes involved in cognitive changes, cancer-related changes, age-related memory changes, factors that affect memory and cognition, memory strategies, and so on. Possible scores range from 0 to 12 (1 point maximum per item), with higher scores representing greater knowledge of the material. Questions consisting of complex answers (answers requiring listing of several factors, steps or stages) are granted a full point (1) if a participant answers the question fully (lists all stages, types, and strategies). Partial credit (0.5 points) is awarded if a participant provides at least 50% of the correct responses for a given item.

Memory Controllability Inventory. This self-report questionnaire (Lachman, Bandura, Weaver, & Elliott, 1995) assesses how much control people feel they have over their memory abilities (see Appendix C). The test consists of 20 statements each comprising 6 different scales of the test. Participants' perceived control over their memory abilities is assessed with four scales

(13 statements divided between the scales) using a 7-point Likert Scale: (a) *Present Ability* measures beliefs about current memory ability, (b) *Potential Improvement* is concerned with beliefs and confidence that strategies can be used to improve memory, (c) *Effort Utility* measures the degree to which people believe that with applied effort memory can be maintained and improved, and (d) *Inevitable Decrement* measures beliefs that memory deteriorates with age regardless of the applied effort.

The measure also includes two additional age concerns scales (7 statements rated on the same 7-point Likert scale): (a) *Independence* assesses the belief that a person will be able to live without external help, and (b) *Alzheimer's Likelihood* assesses the degree to which people believe that there is an increasing likelihood of Alzheimer's disease with increasing age. Higher scores on each scale represent greater endorsement of the construct being measured. Possible scores ranged from 1 to 7 for each scale.

Narrative Memory Test: This test was developed to assess participants' memory for organized verbal material under free recall, delayed free recall, delayed cued recall and delayed recognition conditions (see Appendix D). In the free recall condition a story is presented on the screen for participants to read along with the leader reading the story. Participants are allowed to read the story for an additional 20 seconds, and then the story is removed from view. Participants are then asked to record as much information as they can remember – free recall condition. After a 10-minute delay participants are again asked to record as many details from the story as they can remember – delayed free recall condition. Following this condition, participants are then presented with some cues about the story and asked to fill in the missing parts of the story – delayed cued recall. Finally, participants are asked to recognize and choose the correct details of the story from the possible answers presented in the delayed recognition condition.

Three different stories are presented during the pre-, post- and follow-up testing. Each story targets 12 pieces of information to remember about the fictional character: name, occupation, age, street, town, and province of residence, last seven digits of the character's phone number (1 point for the first three digits and 1 point for the last four digits), two favourite colors, favourite musical instrument, and character's pet. Possible scores for the test range from 0-12.

Multifactorial Memory Questionnaire (MMQ), Contentment, Ability, and Strategy subtests. The MMQ (Troyer and Rich, 2002) is a 57-item self-report questionnaire that examines three different aspects of metamemory: contentment, ability, and strategy use (see Appendix E). The *Contentment* scale includes 18 items to assess satisfaction with one's own memory ability. This subscale incorporates a broad range of emotions and perceptions of one's own memory. Participants rate the degree to which they agree with each statement using a 5-point Likert Scale. Possible scores range from 0 to 72. The *Ability* scale assesses everyday memory function. Participants are asked to indicate the frequency of occurrence of 20 different memory mistakes made over the previous 2 weeks, using a 5-point Likert Scale. Possible scores range from 0 to 80. The *Strategy* scale examines the frequency of use of 19 different memory aids and strategies over the previous 2 weeks using a 5-point scale. Possible scores range from 0 to 76. The Scale Scores are obtained by summing all the responses for each scale. Higher scores indicate greater endorsement of each scale (i.e. greater satisfaction with memory ability, better memory ability and more strategy use).

Functional Assessment of Cancer Therapy - Breast Cancer (FACT-B). The Fact-B (see Appendix F) is a widely used measure of recovery from cancer treatments and has been validated as a sensitive and reliable outcome measure in cancer patients (Brucker, Yost, Cashy, Webster,

& Cella, 2005). The FACT-B is a 37-item measure consisting of five subscales assessing Physical, Social/Family, Emotional Well-Being, Functional Well-Being, and quality of life in breast cancer. Participants are asked to rate their responses on a 5-point Likert Scale with respect to the previous 7 days. The measure yields two total scores. The first total score represents the general quality of life of patients with cancer (not specific to the type of cancer) and is calculated by summing responses to the Physical, Social/Family, Emotional, and Functional Well-Being subscales. The second total score represents the quality of life of individuals with breast cancer and is obtained by adding up the first total general quality of life score and the scores from the Breast Cancer subscale. The total quality of life breast cancer score was used in the present study, with higher scores representing better quality of life. Possible scores range from 0 to 144.

Memory Strategy Toolbox. This questionnaire was adopted from the Memory and Aging Program as a practical way to measure strategy knowledge in everyday life (see Appendix G). For this measure, six memory scenarios requiring the application of memory strategies are presented to participants. Participants are asked to list the strategies that might be useful in each scenario to remember different types of information. Six sample scenarios include remembering a scheduled meeting with a friend, a phone number of a friend or a family member, the name of a new acquaintance, remembering things to do, things done in the past (books, trips), and remembering the placement of keys, wallet, or other personal items.

Responses are scored from 0-2 according to the number and quality of the strategies listed, with higher scores representing more effective and specific strategies. Full two points are awarded for strategies that are effective, specific, and self-reliant; one point is awarded for strategies that are less effective, are vague, or require external help and no points are awarded for

ineffective or non-memory-related strategies (e.g., memorize the information, look up the number in a phone book, etc.). Possible scores range from 0 to 12.

Stressful Situations Scenario: Similar to the Memory Strategy Toolbox, this measure was developed to assess strategy knowledge in stressful situations (see Appendix H). Four sample stressful scenarios include (a) receiving a poor evaluation at work due to mental fatigue associated with CRCD, (b) worry about forgetting important tasks to complete during a busy day, (c) pain management, and (d) remembering a follow-up appointment with a physician regarding one's recovery progress (a stressful and anxiety-provoking appointment). Scoring is similar to the Memory Strategy Toolbox measure. Bonus points are awarded for mentioning Stress-Inoculation Training techniques or relaxation strategies in addition to effective and specific strategies, and no points are awarded for ineffective stress-reducing strategies. Possible scores range from 0 to 12.

Lifestyle Factors Questionnaire: This questionnaire was developed to assess to what degree participants made changes in their lifestyle that could improve their memory ability as well as changes that would improve their health (see Appendix I). During the pretesting participants were asked to record the number activities they have engaged in over the past month or prior to beginning of the program, including cognitively stimulating or social activities, healthy nutrition choices, physical activities, relaxation activities, mental wellness or any other activities. At the post- and follow-up testing participants were again asked to record the number of memory– and health–related changes they have made (if any) after the completion of the program and during the following month. The numbers of activities were added up to obtain a total score of lifestyle changes. Higher scores correspond to lifestyle improvements.

Telephone Task: This is a prospective memory test that assesses participants' ability to remember to do things in the future (see Appendix J). Participants are asked to telephone the leader at two specific times and dates (for example, Friday evening and Sunday morning) and to leave a message including their name and phone number. Participants are allowed to use any memory aid or strategy they wish. A total of 8 possible points are awarded for the two calls. Two possible points are awarded for the time of each call made (i.e., 2 points if the call is made within 10 minutes of assigned time, 1 point if between 10 and 60 minutes, 0.5 points if the call is made more than 60 minutes late, and 0 points if the call is never made), and 2 possible points are awarded for including the correct information on the message. Times and dates selected are counterbalanced across participants for the three test sessions.

Procedure

Women who expressed interest in participation were first screened by telephone using the TICS-m (Brandt, Spencer, & Folstein, 1988; Welsh, Breitner, & Magruder- Habib, 1993). The demographic questionnaire was also administered over the phone to obtain information about the person's cancer treatment history and medical conditions (see Appendix K). In addition, participants also responded to some basic demographic questions.

Initially, the goal of the study was to recruit 40 community-dwelling breast cancer survivors. Forty participants would then be randomized into either intervention or wait-listed control group. Participants randomized to the intervention condition would attend weekly 2-hour sessions for 5 weeks. Testing sessions would be conducted prior to beginning Week 1 (pretesting), after completing Week 5 (posttesting), and one month following the completion of the program. Control participants would be tested at the same time as the program participants, but would not receive any psychoeducational intervention, would not be enrolled in any support

groups, and would not be involved in any other cancer research projects. They would be given an opportunity to participate in the program following the completion of the one-month follow-up testing session.

There were far fewer responses to advertisements than would be needed to randomly assign 40 participants to four groups, in accordance with the study design. Disappointingly, all the recruitment efforts yielded only 5 expressions of interest, and only 4 committed to attending after the screening phone call. Despite the difficulties recruiting participants, the pilot program was initiated with four participants enrolled (unfortunately, only 3 of the 4 actually followed through with program participation). The program and the testing were conducted at York University. The testing was administered in a group format. Participants were asked to arrive an hour early for the first session in order to complete the pretest questionnaires. Participants were tested again in a group format following the completion of Week 5, referred to as the posttest in the Results. Finally, the participants were tested 1 month later for one hour prior to the follow-up session (referred to as follow-up testing in the Results). Participants were provided with an opportunity to meet with the leader individually if they missed any of the sessions.

At the end of the follow-up session participants were asked (anonymously) to provide feedback on the content and format of the program. For this purpose a special "report card" was developed and included four sections: (a) Start – the participants were given an opportunity to express their opinion on what they would like to introduce to the program in addition to the strategies and information of the program, (b) Stop – in this section the participants were asked to provide feedback on what they think should be removed from the program, (c) Continue – this section allowed participants to express their opinion about the most memorable parts of the program – the parts they would like to keep in the program, and (d) Specific

Suggestions/Recommendations – in this section the participants left comments about the location, duration of the study and/or any other general comments about the program. Individual responses were transcribed and are presented in Appendix L. Program slides are also presented in Appendix M.

Statistical Analysis

Given that the data were restricted to three participants, only descriptive analyses were performed. No statistical software was used. Participants' performances on the nine outcome measures were compared (CRCD Knowledge Quiz, FACT-B, Memory Strategy Toolbox, Stressful Situations toolbox, MMQ, Memory Controllability Inventory, Narrative Memory test, Changes in Lifestyle Factors, and Telephone Task) at three testing time-points. [Originally, the planned analysis involved comparison of baseline performance between program and control participants using *t*-tests on the nine outcome measures. Because we expected baseline performances to be equivalent between groups, we were planning to use change scores as the dependent measures in subsequent analyses. To test group differences for both the pre-post and pre-follow-up as well as any interactions mixed-model ANOVA was planned to be used].

Results

Cancer-Related Cognitive Dysfunction Knowledge Quiz

Scores for each participant on the CRCD Knowledge Quiz are displayed in Figure 1. Overall, participants appeared to demonstrate an increase in knowledge regarding CRCD from the pre- ($M = 2.67$, $SD = 1.75$) to the post- ($M = 7.67$, $SD = 4.07$) testing session. Moreover, the increased knowledge appears to have been maintained over the one-month follow-up period, as evidenced by sustained high scores at follow-up testing ($M = 7.16$, $SD = 2.75$). Visual inspection of the graph suggests that, although all participants improved their knowledge about CRCD as a

result of the program, Participant 1 seems to have started at a lower level of knowledge and also improved the least of the three participants.

Memory Controllability Inventory

Individual and group means for each of the six scales of the Memory Controllability Inventory are presented in Table 2. There appeared to be no discernible change from pre- to posttesting on five of the six scales. The only exception was the Independence scale, which assesses beliefs about one's ability to live independently. There appeared to be a modest but consistent increase in scores on this measure for all three participants from pre- to posttesting and only minimal slippage of scores from the posttesting session to 1-month follow-up.

Although no conclusions can be drawn about real change between posttesting and the follow-up session in the absence of statistical analysis, it appears that scores remained relatively stable for most of the subscales over that month. However, there appeared to be modest but consistent delayed increases in scores on the Ability and the Effort Utility scales. These scales measure belief about one's current memory ability and the belief that with applied effort (e.g., memory strategies) memory ability can be improved, respectively.

Narrative Memory Test

The data from this measure are depicted in Figure 2. The three participants displayed distinctive patterns across the four measures, displayed in panels A-D. Participant 1 performed at the lowest level at pretesting but she consistently improved on all subtests of the measure at posttesting and continued improving even when tested a month later at follow-up testing. Participant 2 improved from pre- to posttest and reached ceiling at that point, so no further gains could be observed. However, she did maintain her gains over the one-month follow-up period.

Participant 3 scored at or near ceiling from the very beginning, so no appreciable gains could be measured as a result of the intervention or the follow-up period.

Multifactorial Memory Questionnaire (MMQ)

The scores for each of the MMQ subscales are presented in Figure 3 for each participant. Visual inspection of the graphs suggests that overall, Participants 1 and 2 showed relatively little change in their memory satisfaction or in their appraisal of their own memory abilities across the three time points. Only Participant 3 demonstrated a substantial increase in her memory satisfaction and her subjective memory abilities following the intervention, and these feelings were maintained at 1-month follow-up. In contrast, all three participants (especially Participant 2) reported an increase in the number of memory strategies used from pre- (M = 46.67, SD = 9.45) to posttesting (M = 61.00, SD = 3.00), and these gains were maintained over the follow-up period (M = 58.33, SD = 4.04).

Functional Assessment of Cancer Therapy- Breast Cancer (FACT-B)

Individual scores from this self-reported quality of life measure are shown in Table 3. All three women reported an improvement in their quality of life from the pre- to the posttesting session. Although the mean score remained roughly equivalent at follow-up, this was actually due to an increased score for Participant 2, a minimal decrease for Participant 1, and a more substantial decline in reported quality of life for Participant 3, who was suffering from depression and was taking antidepressants at follow-up.

Memory Strategy Toolbox

As shown in Table 3, scores on this measure were at or near ceiling across all three time points for two of the three participants. Only Participant 1 was below ceiling at pretest, and she reported an increase in the use of memory strategies for various everyday memory scenarios

from pre- to posttesting; moreover, her high level of reported strategy use was maintained over the one-month follow-up period.

Stressful Situations Scenario

Scores on this measure are presented in Figure 4. Overall, participants reported greater use of stress-reducing strategies at post- (M = 9.67, SD = 1.53) and follow-up testing (M = 8.67, SD = 1.15), compared to pretesting (M = 5.33, SD = 1.53). All three women demonstrated improvement in their use of stress-reducing strategies at posttesting. However, only two participants maintained gains at the follow-up testing; Participant 2, in contrast, reported a decline in her use of stress-reducing strategies over the one-month follow-up period.

Lifestyle Factors Questionnaire

Reported lifestyle changes (engagement in memory and health-stimulating activities) are shown in Table 3. Two participants (2 and 3) reported engaging in a higher number of activities at posttesting after the program, and maintained their activity level over the follow-up period. In contrast, Participant 1 did not change her memory and health-stimulating activities from pre- to posttesting, and she actually reported a decline in activity engagement over the follow-up period.

Telephone Task

Scores on the Telephone Task are presented in Figure 5. The findings from this measure are mixed. Generally the results suggest a decrease in performance on this measure from the pretesting (M = 4.83, SD = 1.44) to the posttesting (M = 3.17, SD = 3.25) sessions, due to a substantial decline in performance in Participants 1 and 2. In fact, Participant 1 failed to make a phone call as instructed at either post- or follow-up testing (scoring 0 at both time points). Participant 2 earned fewer points on this task at posttesting and at follow-up testing compared to her pretesting performance. Participant 3 was the only participant who displayed improvement

on the test from pretesting to posttesting and continued improving at follow-up testing, earning the highest possible score.

Feedback from participants

All three participants seemed to enjoy the program, were eager and motivated to learn, and reported that the intervention was beneficial. The participants had different views about the class size: one participant indicated that she enjoyed the small group, adding that it was less intimidating to share personal experiences, whereas another participant said she would have enjoyed a bigger group. Two participants noted that they would have liked the program to be longer (i.e., having more sessions) in order to have more time to practice newly acquired strategies. Throughout the program participants were encouraged to ask questions, and it was the leader's responsibility to find out the most recent research findings and provide answers. Participants seemed to appreciate this effort as they reported via anonymous feedback.

One participant expressed concerns about the content of the program. Specifically, she noted that at times it was too "medical," perhaps referring to the early sessions that focused on the description of the brain and medical disorders. She proposed spending more time on learning and discussing strategies instead. None of the participants expressed concerns over the location of the program (York University) or the fact that parking expenses were not reimbursed.

Discussion

Review of Primary Findings

The main goal of this study was to determine the feasibility of a 5-week psychoeducational program for breast cancer survivors who report CRCD. Initially, the goal of the program was to recruit 40 community-dwelling breast cancer survivors. Participants would then be randomly assigned to either the intervention or a waitlist-control condition.

Unfortunately, recruitment of participants proved to be difficult, and the goal of delivering the program to 40 participants was a failure. Upon completion of the first program with three participants, the study was advertised again in the spring. Four participants expressed an initial interest in participation in the spring sessions, but then two women declined participation due to personal circumstances when informed of the program structure. Therefore, the program was not initiated in the spring due to a lack of participants.

Despite the low recruitment, the few women who participated in the intervention seem to have gotten a lot out of the program. It is hard to determine if the feelings the participants expressed in a group with only three people would hold up in a larger group where they wouldn't be able to participate as much. Although it is hard to comment on the results of the program given that no statistical analyses were performed, gains were observed on several of the outcome measures, which suggests that the program may have a positive impact if it can reach its intended target population.

Specifically, it was the goal of the program to educate participants about cancer and its effect on cognition as well as to equip participants with specific memory and stress-reducing strategies. The measures of factual and strategy knowledge, including Cancer-Related Cognitive Dysfunction Questionnaire, Stressful Situations Scenario and the Strategy subscale of the MMQ indicate that the participants gained knowledge about (a) the effects of cancer on cognition, (b) a basic understanding about cognition, memory, stress, and relaxation, and (c) specific strategies that can be applied in memory-demanding and stressful situations. With regards to stress-reducing strategies, the quality of listed strategies under different stressful scenarios improved upon completion of the program: participants were more elaborative in their descriptions and

some incorporated self-talk changes in their responses. Moreover, the gains on the above-mentioned measures were apparently maintained at 1-month follow-up.

It was also the goal of the program to increase participants' perceived feeling of control over their memory and satisfaction with their memory functioning. The program seemed to have a positive influence on these constructs as assessed by Memory Controllability Inventory subscales and the Contentment subscale of the MMQ. Upon completion of the program, the results seem to show that participants' belief in their memory abilities and their satisfaction with memory functioning somewhat improved and the gains were maintained at 1-month follow-up. Participants' belief and confidence about usefulness of memory strategies and the belief that with applied effort memory functioning can be maintained and improved was already high prior to beginning of the program but some participants still reported some improvement after the completion of the program. Participants' beliefs in inevitable decrement regardless of applied effort seemed to decrease immediately upon the completion of the program for at least two participants, but all participants started low prior to the beginning of the program and, thus, it is hard to comment on the effects of the intervention. Interestingly, when tested right after completing the final session of the program one participant reported concerns about Alzheimer's likelihood. We speculate that it might be due to increased awareness about the disease (participants were educated about Alzheimer's disease in one of the sessions, and research was presented supporting the connection between age and increased likelihood of developing the condition).

Another goal of the program was to improve performance on objective measures of memory, and this goal was only partially met. Specifically, participants did seem to improve on the Narrative Memory Test, and the improvements were maintained at the follow-up testing.

However, they actually declined on the prospective memory task, which required participants to make a phone call at a specified time and leave specific information. This finding is both puzzling and troubling, as it was the aim of the program to provide participants with memory strategies that would facilitate everyday memory. It was a direct opportunity (and perhaps the most analogous to a real-life memory task) for them to use the kind of memory strategies taught in the program, and only one participant seemed to benefit. It should be noted, however, that participants did not have an opportunity to actually practice prospective memory tasks in the program, aside from two short in-class activities. Perhaps including prospective memory tasks in the homework would be beneficial.

Finally, it was the goal of the intervention to improve general quality of life of participating breast cancer survivors. The direct measure of quality of life (i.e., FACT-B) seemed to indicate an improvement when tested immediately after the completion of the program, and the gains were somewhat maintained at one-month follow-up. It was also interesting to monitor the changes that participants made to their lifestyles to improve their memory and health in general. Of note, all three participants listed a wide variety of cognitively stimulating activities and relaxation activities, and all three attempted to improve their diet and physical exercise regimen when assessed immediately after completing the program. These changes were somewhat sustained at the follow-up testing but not for all three participants.

Overall, descriptive evidence was obtained for the general positive impact of our psychoeducational program for breast cancer patients suffering from CRCD. An examination of the overall pattern of change on a variety of outcome measures used in the study revealed that the participants improved on most of the measures when tested immediately after completing the program and some of the improvements were maintained over the one-month follow-up period.

Because of noted improvements on the measures of knowledge, this intervention might be of particular benefit to those individuals whose cognitive and emotional concerns stem from inadequate knowledge about cancer treatments and their effect on cognition (memory in particular).

Limitations and Recommendations for Future Research

Unfortunately, the results of our study are based on only three participants, which greatly limits the generalizability of our findings. Two of the participating women and the four women who expressed interest in the spring session (but later declined) were referred to the program by a health care professional working closely with cancer patients. Therefore, as a suggestion for future studies it might be useful to advertise the program among professionals working with cancer survivors, including psychologists, oncologists, and family doctors to improve recruitment efforts. To achieve this goal it would be imperative to obtain ethics approval from a hospital Research Ethics Board and advertise the intervention in hospital cancer care facilities rather than in the broader community. It is likely that cancer patients experiencing cognitive challenges would be more motivated to participate in such interventions while receiving or nearing completion of active treatment in hospital.

Another limitation of our study related to the small sample size was our inability to use statistics to establish the significance of our findings. In the future, it would be interesting to run the program as it was planned originally with four groups given the promising, albeit descriptive, findings of the current study. Specifically, it would be interesting to examine effectiveness of the program using waitlisted-control participants and even healthy adults as comparison groups (as was performed in the promising pilot project conducted by Shuurs and Green, 2013). Future research can also examine the demographic data of participants to determine factors that might

affect the effectiveness of the program (for example, age of participants at the time of diagnosis, type of cancer treatment, educational history, socio-economic status, etc.).

Based on the comments from the participants it might also be useful to extend the program beyond 5 weeks. Perhaps breaking down the complicated and confusing medical information into two sessions rather than condensing it into one 2-hour session would be helpful. Given one comment from one participant about the timing of our sessions (the sessions were offered during the day) and given that the majority of cancer survivors are middle-aged working women it might be beneficial to offer the future programs in the evening or on weekends in addition to weekday offerings.

Given that the goals of the study were to equip participants with stress-reducing techniques and teach them how to cope with stressful situations it might be helpful to include some direct measures of stress in future studies. Specifically, some of the stress measures used in the previous studies with breast cancer patients might be of particular value. The Mastery of Stress Instrument (MSI) developed by Younger (1992) can be used to determine how women with breast cancer master their stress. The measure is a 89-item five-point Likert scale survey. The measure is designed to yield two scores – the mastery and overall perceived stress scores. Given the stress-related goals of the study (providing the "stress-mastering" techniques and decreasing stress through relaxation techniques), this measure can be of benefit in future studies that will build on or expand our study.

Another measure of stress that has been used in some studies with breast cancer patients is Perceived Stress Scale (PSS) developed by Cohen (1983). PSS measures the degree to which one appraises a situation as stressful. The measure was designed to determine how unpredictable, uncontrollable and overloaded respondents find their lives (Cohen, 1983). PSS is a 10-item five-

point Likert scale survey that asks respondents about their feelings and thoughts during the last month. It is a brief and easily administered measure that can be added to the instruments package in future studies. Finally, the measure of stress that assesses physiological, psychological and behavioural aspects of stress can also be used in the futures studies. One such measure is the Stress Symptom Checklist (SSCL) developed by Schlebusch (2004). This measure assesses physical, psychological and behavioural reactions to stress. Given that our program provides tools on coping with all three of these aspects of stress this might be a good measure for future studies.

Finally, the focus of this study was on the provision of a psychoeducational intervention for breast cancer patients with concerns about their cognition. Given the success of the pilot study conducted in 2013 that was open to all cancer survivors (not just breast cancer ones) perhaps relaxing our inclusion criterion and extending the program to other cancer survivors might increase interest in the intervention (as was noted in the pilot study by Shuurs and Green, 2013).

Conclusion

Despite limitations of participant recruitment, the promising findings from this pilot psychoeducational program fit with a growing body of evidence supporting the necessity and usefulness of group interventions for breast cancer survivors suffering from CRCD. Given participants' feedback about the group experience we were able to observe similar findings of support group studies for cancer survivors. Specifically, participants noted that having group discussions of emotionally painful and cognitive challenges with women with similar experiences was comforting. They noted that hearing each other's struggles had a "normalizing" effect on their emotional and cognitive difficulties. Moreover, the three women formed a warm

relationship over the course of the program and were eager to share their personal successes and specific suggestions with each other.

Also, the participants benefited from the psychoeducational component of our program, as was noted by subjective reports of increased knowledge and understanding about the nature of their cognitive difficulties and by improved performance on our measures of knowledge of information and behavioral strategies presented in the program. This finding echoed the findings from other psychoeducational and cognitive programs available for cancer survivors (e.g. Bernstein et al., 2012; Jones et al., 2013; Shuurs & Green, 2013). With regards to cognitive interventions, the stress-reducing cognitive-behavioral techniques (i.e. modification of internal dialogue combined with the elements of compassion-focused therapy) introduced and practiced in our program were the ones that the participants appreciated the most (as was noted by the participants themselves during group discussions). We consider this a significant contribution to the growing research in the area of cognitive interventions for breast cancer survivors since other studies in this area haven't reported similar findings. Similar to those studies, however, we found a comparable trend in utilization of specific memory strategies presented in the program – the participants seemed to have acquired useful memory strategies that could assist them in their daily memory-demanding activities.

To conclude, our findings support the feasibility of this approach, although careful considerations should be employed with advertisement of the program in the future. Future programmes should investigate the positive impact of this pilot program with a bigger sample and/or build on the findings from this study to develop a new model of intervention.

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Table 1

Timeline of the Program

Week	Program Description
1	Pretesting Welcome and Introduction - Goals of the program - What is CRCD? Mechanisms of CRCD - What is memory? - Memory types and CRCD
2	Non-cancer related factors affecting memory. Relaxation techniques - Review of homework - Factors affecting memory - Stress and relaxation
3	Memory Strategies - SHARP - Review of homework and relaxation strategies - Overview of memory strategies - Application of memory strategies
4	Stress-Inoculation Training - Review of homework and memory strategies - Introduction to Stress-Inoculation Training - Application of Stress-Inoculation Training
5	Practice and Review of the Program - Review of homework and Stress-Inoculation Training technique - Application of memory and Stress-Inoculation Training techniques - Review of the program - Posttesting Session
9	One-Month Follow-Up Testing Session Review of the Program

Note. CRCD = Cancer-Related Cognitive Dysfunction, SHARP = Seeing and Saying, Habits, Associations, Records, Practice Retrieval.

Table 2

Individual and Group Subscale Scores on the Memory Controllability Inventory

	Time of testing		
Scale	Pretesting	Posttesting	Follow-up testing
Ability			
Participant 1	4.00	3.30	4.00
Participant 2	2.70	2.70	4.30
Participant 3	3.30	5.00	6.30
Mean	3.33	3.67	4.85
Potential Improvement			
Participant 1	5.30	4.70	5.00
Participant 2	6.00	6.30	6.00
Participant 3	5.60	7.00	7.00
Mean	5.63	6.00	6.00
Effort Utility			
Participant 1	6.00	6.00	6.00
Participant 2	4.30	5.30	6.00
Participant 3	6.70	5.00	6.70
Mean	5.67	5.43	6.23
Inevitable Decrement			
Participant 1	4.70	3.00	4.00
Participant 2	2.00	3.30	3.00
Participant 3	1.70	1.00	1.30
Mean	2.80	2.43	2.77
Independence			
Participant 1	5.30	6.00	5.70
Participant 2	5.00	6.30	6.00
Participant 3	6.30	7.00	6.30
Mean	5.53	6.43	6.00
Alzheimer's Likelihood			
Participant 1	3.70	3.00	3.70
Participant 2	2.70	3.00	2.70
Participant 3	2.70	2.70	3.00
Mean	3.03	2.90	3.13

Note. Highest possible score for each scale is 7.

Table 3

Individual and Group Scores on the FACT-B, Memory Strategy Toolbox and Lifestyle Changes Questionnaires

	Time of testing		
Measure	Pretesting	Posttesting	Follow-up testing
FACT-B			
Participant 1	60.00	87.00	79.00
Participant 2	63.00	83.00	98.00
Participant 3	102.00	126.00	98.00
Mean	75.00	98.67	91.67
Memory Strategy Toolbox			
Participant 1	8.00	12.00	11.00
Participant 2	12.00	12.00	12.00
Participant 3	11.00	11.00	12.00
Mean	10.33	11.67	11.67
Lifestyle Factors Questionnaire			
Participant 1	13.00	12.00	6.00
Participant 2	3.00	10.00	11.00
Participant 3	6.00	15.00	17.00
Mean	7.00	12.67	11.33

Note. FACT-B = Functional Assessment of Cancer Therapy - Breast Cancer (highest possible score is 144). Memory Strategy Toolbox – highest possible score is 12.

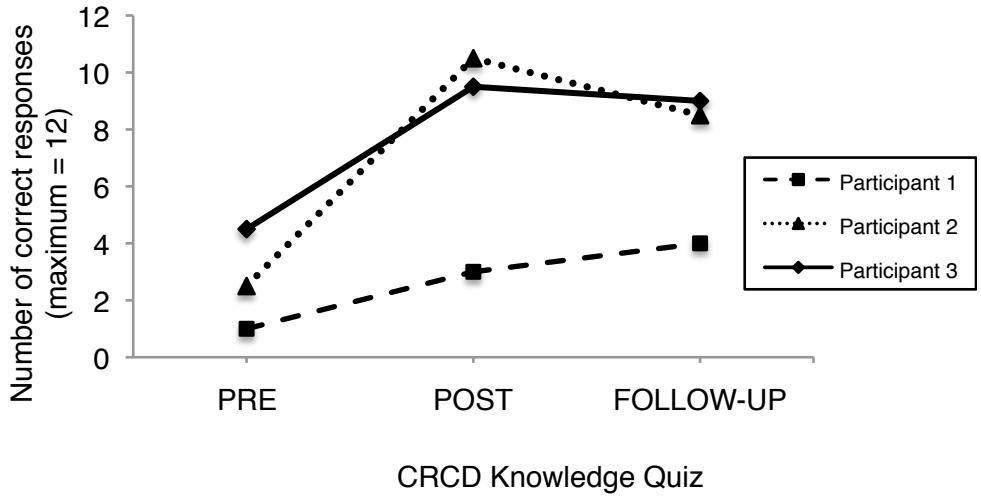
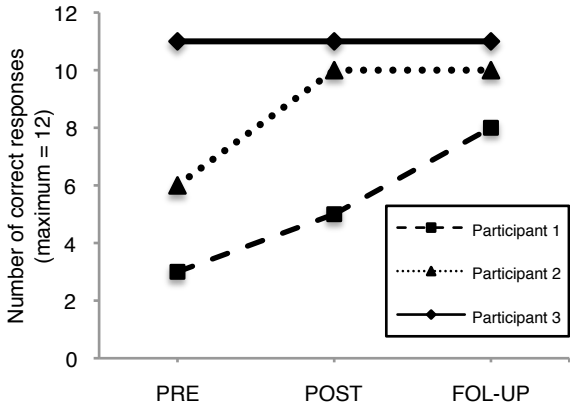
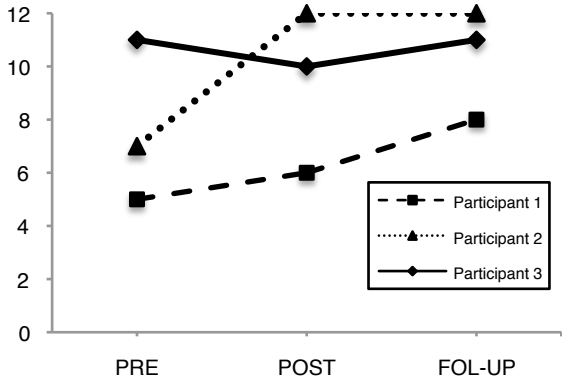


Figure 1: Performance of participants on Cancer-Related Cognitive Dysfunction Knowledge Quiz tested before starting the program (pretesting), immediately after completing the program (posttesting), and at 1-month follow-up.

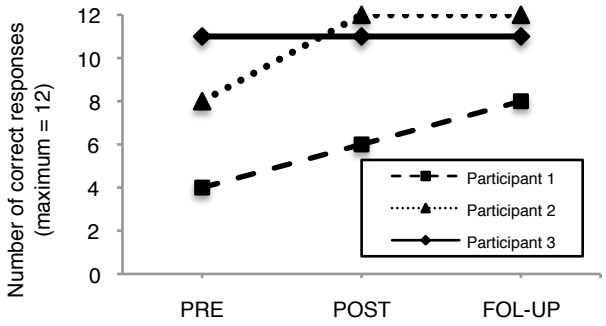
A. Free Recall Immediate



B. Free Recall Delayed



C. Cued Recall



D. Recognition

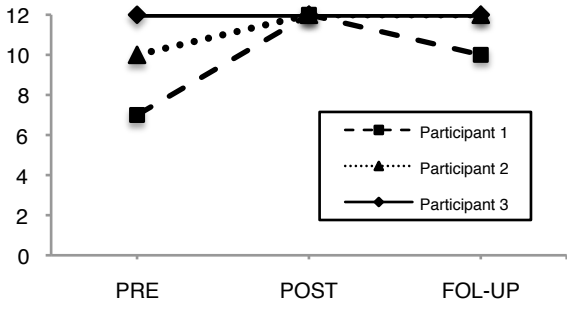
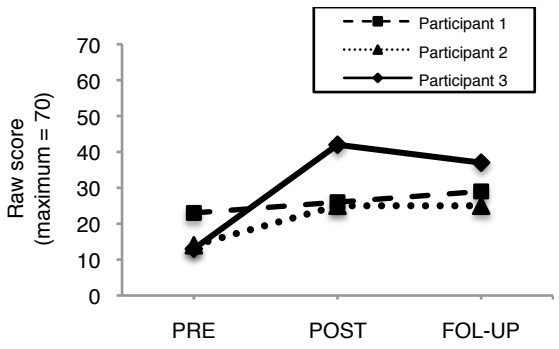
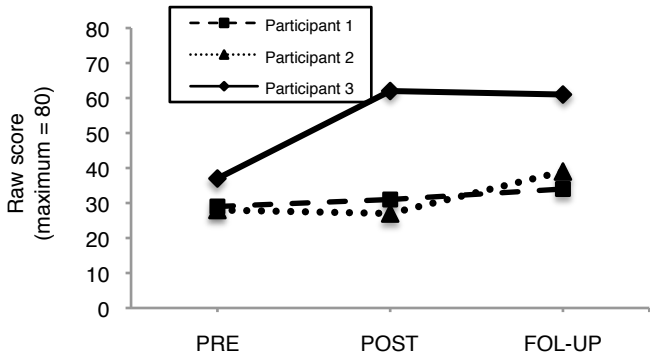


Figure 2: Performance of participants on Narrative Memory Tests – Free Recall Immediate (A), Free Recall Delayed (B), Cued Recall Delayed (C), Recognition (D) tested before starting the program (pretesting), immediately after completing the program (posttesting), and at 1-month follow-up.

A. Contentment



B. Ability



C. Strategy

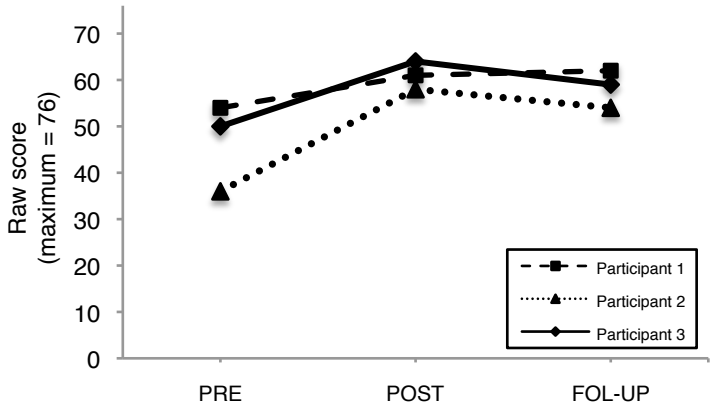


Figure 3: Performance of participants on Multifactorial Memory Questionnaire (MMQ) – Contentment scale (A), Ability scale (B), Strategy scale (C) tested before starting the program (pretesting), immediately after completing the program (posttesting), and at 1-month follow-up.

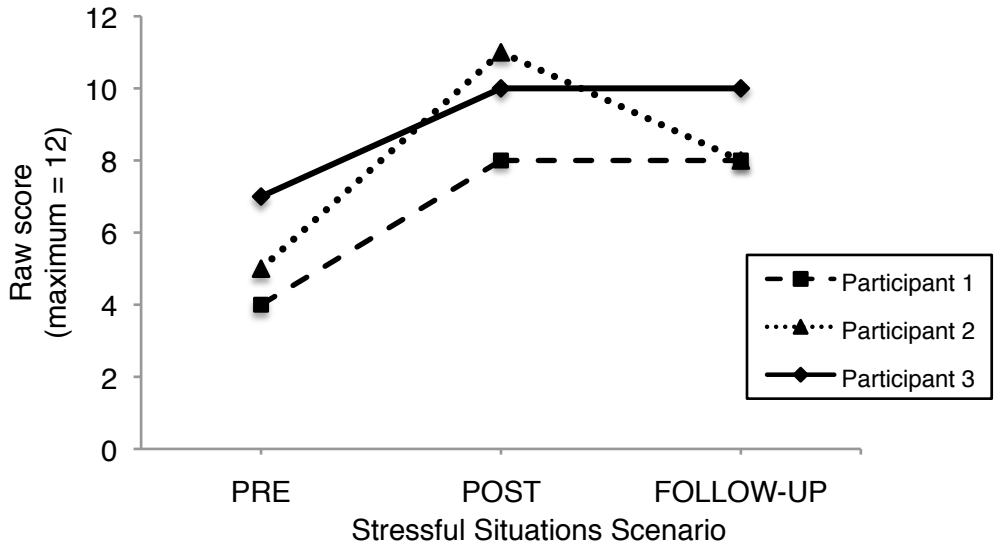


Figure 4: Performance of participants on Stressful Situations Scenario tested before starting the program (pretesting), immediately after completing the program (posttesting), and at 1-month follow-up.

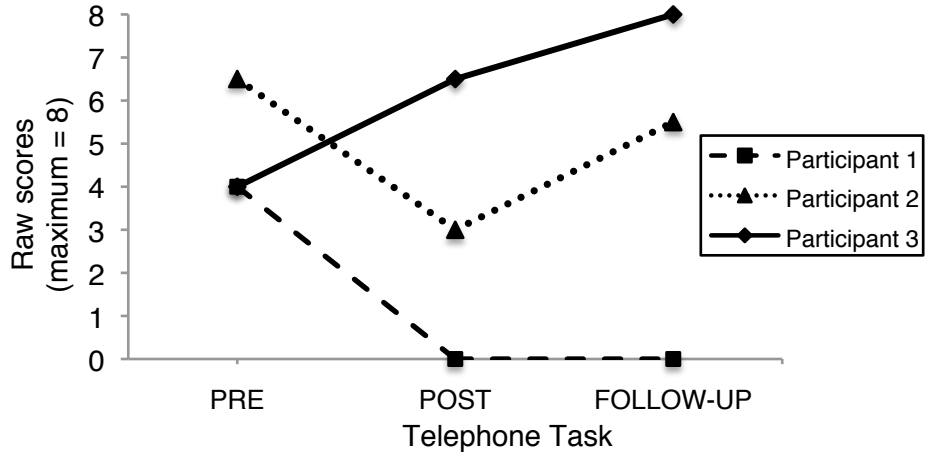


Figure 5: Performance of participants on the Telephone Task tested before starting the program (pretesting), immediately after completing the program (posttesting), and at 1-month follow-up.

Appendix A: Screening Interview

ID number: _____ Date: _____ Examiner: _____

Directions for examiner: Be sure distractions are minimal (no television or radio, no pens or pencils in reach). Ask full question, and query if incomplete on items 1 to 3. Single repetitions are permitted, except for items 5 and 8. For items with instructions DO NOT RECORD, use a check mark to indicate a correct response and an X to indicate an incorrect response, but do not record the participant's response.

Instruction	**Scoring criteria**	**Score**
1. Please tell me your full name. DO NOT RECORD	1 point each for first and last name	/2
2. Without looking at a calendar or anything else, tell me today's date. Date: Month: Year: Day of week: Season:	1 point for each part	/5
3. Where are you right now? House number: DO NOT RECORD Street: DO NOT RECORD City: Province: Postal code: DO NOT RECORD 4. *What is your age?* *What is your phone number?* DO NOT RECORD	1 point for each part *1 point for each italicized item*	*/2*
5. Count backwards from 20 to 1.	2 points if completely correct on 1st trial; 1 point if correct on second trial	/2
6. I'm going to read you a list of 10 words. Listen carefully and when I'm done, tell me as many words as you can, in any order. Ready? Cabin Theatre Pipe Watch Elephant Whip Chest Pillow Silk Giant	1 point for each correct response; no penalty for repetitions or intrusions	/10

7. 100 minus 7 equals what? And 7 from that? etc. 93, 86, 79, 72, 65	1 point for each correct subtraction; stop after 5	/5
8. What do people usually use to cut paper? How many things are in a dozen? What do you call the prickly green plant that grows in the dessert? What animal does wool come from?	1 point for "scissors" or "shears" 1 point for "12" 1 point for "cactus" 1 point for "sheep" or "lamb"	/4
9. Say this: No ifs, ands, or buts. Say this: Methodist Episcopal.	1 point for complete repetition on first trial; repeat item only if poorly presented	/2
10. Who is the prime minister of Canada right now? Who is the premier of Ontario?	1 point for each item (need both first and last name); *1 point each for first and last*	/4
11. With your finger, tap 5 times on the part of the phone you speak into.	2 points if 5 taps are heard; 1 point if subject taps more or less than 5 times	/2
12. I'm going to give you a word, and I want you to give me its opposite. For example, the opposite of hot is cold. What is the opposite of "west"? What is the opposite of "generous"?	1 point for "east" 1 point for "selfish," "greedy," "stingy," "tight," "cheap," "mean," or other good antonym	/2
13. *I read a list of words to you earlier. Tell me as many of those words as you can remember* *Cabin* *Theatre* *Pipe* *Watch* *Elephant* *Whip* *Chest* *Pillow* *Silk* *Giant*	*1 point for each word correctly recalled.*	*/10*
	Total score - original TICS	/41
	Total score - modified TICS	*/50*

Appendix B: Cancer-Related Cognitive Dysfunction Knowledge Quiz

1. What are the most common complaints or symptoms of CRCD?

_____

_____

2. Identify the three primary stages of memory.

_____ _____ _____

3. Which memory stage is most affected by cancer?

_____

4. Identify six different types of memory.

_____ _____ _____

_____ _____ _____

5. Which type of memory is most affected by cancer treatments?

_____

6. What brain structure is most associated with memory and learning?

_____

7. List some factors that can affect memory (could be lifestyle factors, biological factors, or medical conditions).

_____

_____

8. List 5 memory strategies that can help your memory (Hint: SHARP)

_____ _____ _____

_____ _____

9. What is the primary hormone that is released in response to stress?

_____

10. List two formal relaxation techniques.

_____ _____

11. What is stress-inoculation training used for?

_____

12. List the four steps involved in stress-inoculation training.

_____ _____ _____ _____

Appendix C: Memory Controllability Inventory (MCI)

This is a questionnaire about your memory. Please indicate the extent to which you agree or disagree with each statement. Provide the answer that is right for you by placing a checkmark in the box that best describes your beliefs. For example, if you **strongly disagree** with the statement, you would mark the box in the strongly disagree column. If you **strongly agree** with the statement, you would mark the strongly agree column. If you are **neutral**, you would mark the neutral column.		Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
1	There's not much I can do to keep my memory from going downhill.							
2	I can remember the things I need to.							
3*	I can't seem to figure out what to do to help me remember things.							
4	No matter how much I use my memory, it is bound to get worse as I get older.							
5	Alzheimer's disease is a common problem among the elderly.							
6*	As I get older I'll need to rely on others to remember things for me.							
7	If I work at it, I can improve my memory.							
8*	I'm not good at remembering things.							
9	If I use my memory a lot, it will stay in shape, just like my muscles do if I exercise.							
10	I can find ways to improve my memory.							
11	When I forget something I am apt to think I have Alzheimer's disease.							
12*	I can't remember things, even if I want to.							
13	I think there's a good chance I will get Alzheimer's disease.							
14	If I use my memory often I won't lose it.							
15	As I get older I won't have to rely on others to remember things for me.							
16	I can think of strategies to help me keep up my memory.							

17*	If I want to have a good memory I need to have others to help me remember.							
18	I sometimes think that I have Alzheimer's disease.							
19	When it comes to memory, there is no way I can make up for the losses that come with age.							

Note. * indicates the items that should be reverse scored.

Appendix D: Narrative Memory Test

The story is either presented on a projector screen, or if not available written out on the easel board (underline the key words).

The story is read out loud to the participants and then they are allowed an additional 20 sec to review the story. At this time the screen is turned over and the participants are given Immediate Free Recall form (I).

** Delayed recall is administered approximately 5-10 min after the Immediate Free Recall trial.

Delayed Free Recall is recorded on the form D-1

The Cued Recall is recorded on the form D-2

The Recognition is recorded on the form D-3.

Pretesting Story

Nancy is a **cook**. She is **57** years old. She is from **Kamloops**, **BC**. She lives on **Swordbill** Street. Her telephone number is 416-**267-4916**. Her favourite colours are **green** and **yellow**. She likes to play the **violin**. She has a pet **rabbit**.

Posttesting Story

Arthur is a **carpenter**. He is **73** years old. He is from **Nanaimo**, **BC**. He lives on **Valecrest** Street. His telephone number is 416-**752-8043**. His favourite colours are **red** and **orange**. He likes to play the **clarinet**. He has a pet **goat**.

Follow-up Testing Story

Martha is a **custodian**. She is **56** years old. She is from **Lethbridge**, AB. She lives on **Merryfield** Street. Her telephone number is 416-**638-1586**. Her favourite colours are **blue** and **purple**. She likes to play the **saxophone**. She has a pet **pig**.

Form: I

Please write down everything you can remember about the person that was presented to you.

Form: D-1

Please write down everything you can remember about the person that was presented to you earlier.

Form: D-2 (Pretesting)

Please fill in the blanks with the information about the person who was presented to you earlier.

_____ is a _____

She is _____ years old

She is from _____, _____

She lives on _____ Street

Her telephone number is 416-_____-_____

Her favourite colours are _____ and _____

She likes to play the _____

She has a pet _____

Form: D-2 (Posttesting)

Please fill in the blanks with the information about the person who was presented to you earlier.

_____ is a _____

He is _____ years old

He is from _____, _____

He lives on _____ Street

His telephone number is 416-_____-_____

His favourite colours are _____ and _____

He likes to play the _____

He has a pet _____

Form: D-2 (Follow-up testing)

Please fill in the blanks with the information about the person who was presented to you earlier.

_____ is a _____

She is _____ years old

She is from _____, _____

She lives on _____ Street

Her telephone number is 416-_____-_____

Her favourite colours are _____ and _____

She likes to play the _____

She has a pet _____

Form: D-3 (Pretesting)

Please circle the appropriate option for each blank regarding the information about the person who was presented to you earlier.

_____ is a _____
(Sally / Nancy / Stacey) **(secretary / teacher / cook)**

She is _____ years old
(59 / 47 / 57)

She is from _____, _____
(Kamloops / Calgary / Moncton) (NB / BC / AB)

She lives on _____ Street
(**Swordbill / Songbird / Billings)**

Her telephone number is 416-_____-_____
(584 / 696 / 267) (4916 / 4825 / 2681)

Her favourite colours are _____ and _____
Circle two: (blue / green / red / yellow / purple / orange)

She likes to play the _____
(cello / violin / guitar)

She has a pet _____
(dog / hamster / rabbit)

Form: D-3 (Posttesting)

Please circle the appropriate option for each blank regarding the information about the person who was presented to you earlier.

_____ is a _____
(Matt / Arthur / Peter) **(secretary / doctor / carpenter)**

He is _____ years old
(59 / 47 / 73)

He is from _____, _____
(Nanaimo / Alberta / Moncton) (NB / BC / AB)

He lives on _____ Street
(**Swordbill / Valecrest / Billings)**

His telephone number is 416-_____-_____
(584 / 696 / 752) (4916 / 8043 / 2681)

His favourite colours are _____ and _____
Circle two: (blue / green / red / yellow / purple / orange)

He likes to play the _____
(clarinet / violin / guitar)

He has a pet _____
(dog / hamster / goat)

Form: D-3 (Follow-up testing)

Please circle the appropriate option for each blank regarding the information about the person who was presented to you earlier.

_____ is a _____
(Marta / Aliona / Pamela) **(secretary / doctor / custodian)**

She is _____ years old
(56 / 47 / 73)

She is from _____, _____
(Lethbridge / Alberta / Moncton) (NB / BC / AB)

She lives on _____ Street
(**Swordbill / Merryfield / Billings)**

Her telephone number is 416-_____-_____
(584 / 638 / 752) (1586 / 8043 / 2681)

Her favourite colours are _____ and _____
Circle two: (blue / green / red / yellow / purple / orange)

She likes to play the _____
(saxophone / violin / guitar)

She has a pet _____
(pig / hamster / goat)

Appendix E: Multifactorial Memory Questionnaire (MMQ)

Memory Contentment

Below are statements about feelings that people may have about their memory. Read each statement and decide whether you agree. Think about how you have been feeling over the past *two weeks*. Then, place a check in the appropriate column.		Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1*	I am generally pleased with my memory ability.					
2	There is something seriously wrong with my memory.					
3*	If something is important, I will probably remember it.					
4	When I forget something, I fear that I may have a serious memory problem, like Alzheimer's disease.					
5	My memory is worse than most other people my age.					
6*	I have confidence in my ability to remember things.					
7	I feel unhappy when I think about my memory ability.					
8	I worry that others will notice that my memory is not very good.					
9*	When I have trouble remembering something, I'm not too hard on myself.					
10	I am concerned about my memory.					
11	My memory is really going downhill lately.					
12*	I am generally satisfied with my memory ability.					
13*	I don't get upset when I have trouble remembering something.					
14	I worry that I will forget something important.					
15	I am embarrassed about my memory ability.					
16	I get annoyed or irritated with myself when I am forgetful.					

17*	My memory is good for my age.					
18	I worry about my memory ability.					

Memory Ability

Below is a list of common memory mistakes that people make. Decide how often you have done each one in the *last two weeks,* then place a check mark in the appropriate column.		All the time	Often	Sometimes	Rarely	Never
1	Forget to pay a bill on time.					
2	Misplace something you use daily, like your keys or glasses.					
3	Have trouble remembering a telephone number you just looked up.					
4	Not recall the name of someone you just met.					
5	Leave something behind when you meant to bring it with you.					
6	Forget an appointment.					
7	Forget what you were just about to do; for example, walk into a room and forget what you went there to do.					
8	Forget to run an errand.					
9	In conversation, have difficulty coming up with a specific word that you want.					
10	Have trouble remembering details from a newspaper or magazine article you read earlier that day.					
11	Forget to take medication.					
12	Not recall the name of someone you have known for some time.					
13	Forget to pass on a message.					
14	Forget what you were going to say in conversation.					
15	Forget a birthday or anniversary that you used to know well.					
16	Forget a telephone number you use frequently.					

17	Retell a story or joke to the same person because you forgot that you had already told him or her.					
18	Misplace something that you put away a few days ago.					
19	Forget to buy something you intended to buy.					
20	Forget details about a recent conversation.					

Memory Strategies

People often use different tricks or strategies to help them remember things. Several strategies are listed below. Decide how often you used each one in the *last two weeks*. Then, place a check mark in the appropriate column.		All the time	Often	Sometimes	Rarely	Never
1*	Use a timer or alarm to remind you when to do something.					
2*	Ask someone to help you remember something or to remind you to do something.					
3*	Create a rhyme out of what you want to remember.					
4*	In your mind, create a visual image of something you want to remember, like a name and a face.					
5*	Write things on a calendar, such as appointments or things you need to do.					
6*	Go through the alphabet one letter at a time to see if it sparks a memory for a name or word.					
7*	Organize information you want to remember; for example, organize your grocery list according to food groups.					
8*	Say something out loud in order to remember it, such as a telephone number you just looked up.					
9*	Use a routine to remember important things, like checking that you have your wallet and keys when you leave home.					
10*	Make a list, such as a grocery list or a list of things to do.					
11*	Mentally elaborate on something you want to remember; for example, focus on a lot of the details.					

12*	Put something in a prominent place to remind you to do something, like putting your umbrella by the front door so that you will remember to take it with you.					
13*	Repeat something to yourself at increasingly longer and longer intervals so that you will remember it.					
14*	Create a story to link together information you want to remember.					
15*	Write down in a notebook things that you want to remember.					
16*	Create an acronym out of the first letters in a list of things to remember, such as carrots, apples, and bread (cab).					
17*	Intentionally concentrate hard on something so that you will remember it.					
18*	Write a note or reminder for yourself (other than on a calendar or in a notebook).					
19*	Mentally retrace your steps in order to remember something, such as the location of a misplaced item.					

Note. * indicates the items that should be reverse scored. Adapted from " Psychometric properties of a new metamemory questionnaire for older adults," by Troyer, A. K., & Rich, J. B., 2002, *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 57B,* 19-27.

APPENDIX F: Functional Assessment of Cancer Therapy- Breast Cancer (FACT-B)

Below is a list of statements that other people with your illness have said are important**. Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>**

<u>PHYSICAL WELL-BEING</u>

	Not at all	A little bit	Some-what	Quite a bit	Very much
1*. I have a lack of energy	0	1	2	3	4
2*. I have nausea	0	1	2	3	4
3*. Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
4*. I have pain	0	1	2	3	4
5*. I am bothered by side effects of treatment	0	1	2	3	4
6*. I feel ill	0	1	2	3	4
7*. I am forced to spend time in bed	0	1	2	3	4

<u>SOCIAL/FAMILY WELL-BEING</u>

	Not at all	A little bit	Some-what	Quite a bit	Very much
1. I feel close to my friends	0	1	2	3	4
2. I get emotional support from my family	0	1	2	3	4
3. I get support from my friends	0	1	2	3	4
4. My family has accepted my illness	0	1	2	3	4
5. I am satisfied with family communication about my illness	0	1	2	3	4
6. I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box ☐and go to the next section.					
7. I am satisfied with my sex life	0	1	2	3	4

EMOTIONAL WELL-BEING

	Not at all	A little bit	Some-what	Quite a bit	Very much
1*. I feel sad	0	1	2	3	4
2. I am satisfied with how I am coping with my illness	0	1	2	3	4
3*. I am losing hope in the fight against my illness	0	1	2	3	4
4*. I feel nervous	0	1	2	3	4
5*. I worry about dying	0	1	2	3	4
6*. I worry that my condition will get worse	0	1	2	3	4

FUNCTIONAL WELL-BEING

	Not at all	A little bit	Some-what	Quite a bit	Very much
1. I am able to work (include work at home)	0	1	2	3	4
2. My work (include work at home) is fulfilling	0	1	2	3	4
3. I am able to enjoy life	0	1	2	3	4
4. I have accepted my illness	0	1	2	3	4
5. I am sleeping well	0	1	2	3	4
6. I am enjoying the things I usually do for fun	0	1	2	3	4
7. I am content with the quality of my life right now	0	1	2	3	4

ADDITIONAL CONCERNS (BREAST CANCER)

	Not at all	A little bit	Some-what	Quite a bit	Very much
1*. I have been short of breath	0	1	2	3	4

2*. I am self-conscious about the way I dress.....	0	1	2	3	4
3*. One or both of my arms are swollen or tender.....	0	1	2	3	4
4. I feel sexually attractive	0	1	2	3	4
5*. I am bothered by hair loss	0	1	2	3	4
6*. I worry that other members of my family might someday get the same illness I have	0	1	2	3	4
7*. I worry about the effect of stress on my illness	0	1	2	3	4
8*. I am bothered by a change in weight	0	1	2	3	4
9. I am able to feel like a woman	0	1	2	3	4
10**I have certain parts of my body where I experience pain	0	1	2	3	4

Note. * indicates the items that should be reverse scored by subtracting item response from "4".
** the item is not included in the calculation of the total score.

APPENDIX G: Memory Strategy Toolbox

Below are several different situations that involve memory. After each situation, briefly list the things you should do to improve your ability to remember.

1. You made arrangements to meet a friend. You want to be sure you remember to meet him or her

_____

_____

2. A family member or friend has moved. You want to remember his or her new phone number

_____

_____

3. There are a number of things that you need to remember to do today

_____

_____

4. You have met someone new, and you want to remember his or her name

_____

_____

5. You frequently lose your keys or your wallet because you can't remember where you put them

_____

_____

6. You want to remember details about things that you have done, such as trips you have taken or books you have read

_____

_____

APPENDIX H: Stressful Situations Scenario

Below are several different situations that are considered stressful to many individuals. After each situation, briefly list some things you could do to lower your level of stress.

1. You just received a poor review at work, because you are struggling to maintain your previous pace due to mental fatigue.

2. You have a very busy day tomorrow, and you are worried that you will not be able to complete all your tasks or that you will forget something.

3. You have been struggling with increased levels of pain and your usual strategies for pain management are not effective.

4. You have an appointment coming up with your Doctor to follow up on your health.

APPENDIX I: Lifestyle Factors Questionnaire

1. Have you made any lifestyle changes over the past month that could improve your memory ability?
   Yes _____ No _____

   If yes, please list them below:

   _____

   _____

   _____

   _____

2. We are also interested in the healthy lifestyle activities you were already engaged in before beginning this program.

   Prior to beginning this program/After completion of the program/During the past month, were you engaged in:

   - Cognitively stimulating and/or social activities? Yes _____ No _____
     - If yes, please list them:

       _____

       _____

   - Healthy nutrition choices? Yes _____ No _____
     - If yes, please list them:

       _____

       _____

   - Physical activity? Yes _____ No _____
     - If yes, please list them:

       _____

       _____

   - Relaxation exercises? Yes _____ No _____
     - If yes, please list them:

       _____

       _____

   - Mental wellness activities? Yes _____ No _____

- If yes, please list them:
  _____
  _____

- Other? Yes _____ No _____
  - If yes, please list them:
    _____
    _____

APPENDIX J: Telephone Task

Pretesting

Please call this number: 647-868-6465 on Friday, January 17, at 10:15am. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Friday, January 17, at 7:15 pm. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Sunday, January 19, at 10:15 am. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Sunday, January 19, at 7:15pm. Please leave a message including your name and telephone number.

Posttesting

Please call this number: 647-868-6465 on Friday February 21, at 10:15 am. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Friday February 21, at 7:15 pm. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Sunday February 23, at 10:15 am. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Sunday February 23, at 7:15 am. Please leave a message including your name and telephone number.

Follow-up Testing

Please call this number: 647-868-6465 on Friday March 21, at 10:15 am. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Friday March 21, at 7:15 pm. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Sunday March 23, at 10:15 am. Please leave a message including your name and telephone number.

Please call this number: 647-868-6465 on Sunday March 23, at 7:15 pm. Please leave a message including your name and telephone number.

APPENDIX K: Demographic Questionnaire

1. How old are you? _____ years DOB:_____
2. Where were you born? ☐ Canada ☐ Other (please specify):

   _____
3. What is your first language? _____
4. If not English, when did you learn English? _____
5. What is the highest level of education you have completed?

   ☐ Grade 8 or less ☐ Grade 9 to 11

   ☐ Completed High School/GED ☐ Some College (attended but not completed)

   ☐ Completed 2-year College/Technical School after High School. Degree earned,

   Please specify: : _____

   ☐ Completed 4-year University. Degree earned,

   Please specify: _____

   ☐ Post-Graduate Degree (e.g. MA, MBA, MD, PhD).

   Please specify: : _____
6. What is your current employment status (check all that apply):

   ☐ Full time ☐ Part time ☐ Full time Homemaker

   ☐ Unemployed ☐ On Leave ☐ On Disability

   ☐ Retired ☐ Other (please specify):

   _____
7. What is or was (if no longer working) your occupation?

   _____

   _____

8. What is your current marital status?

   ☐ Married/Life Partner ☐ Widowed

   ☐ Divorced/Separated ☐ Other (please specify): _____

   ☐ Single/Never Married

9. Are you still having regular periods? ☐ No ☐ Yes
   a. If NO, did you have ☐ medical or ☐ natural menopause, please specify_____
   b. When was your last period? _____ (mm/yyyy) Approximate if not sure.
10. Do you have any major medical or neurological conditions, such as heart disease, stroke, or Parkinson's disease, other cancers?

    _____

    _____

11. Current Medications (and for what condition):

    _____

    _____

Cancer Care Received

Date Diagnosed: _____ (month/year) Please approximate if exact date unknown.

1. What was the date of your last cancer treatment? _____ (month/year)
2. What type of treatment did you receive for your cancer (check all that apply)?

   ☐ Chemotherapy ☐ Hormonal Therapy (e.g. Tamoxifen, Letrozole)

   ☐ Radiation therapy ☐ Unknown

   ☐ Surgery ☐ Other: _____

3. Are you currently on hormone or anti-hormone treatment?

   ☐ No ☐ Yes. Please specify: _____

APPENDIX L: Report Cards

A.

START:

Focus more on helpful ways to deal with brain fog issues – i.e. spatial issues. Split up the program, longer time to be able to get more practice – 6-8 weeks. Conclusion of program- provide feedback on how you were when you entered and now where you are at completion (referring to the questionnaires – did we improve? It would be encouraging to know how we did).

STOP:

Little less focus on the medical input and the brain and more on how to cope – learning techniques, etc. Some techniques could have been expanded on.

CONTINUE:

The location better than the classroom – more intimate and less daunting. If we have questions they were answered. If the answer was not readily available, the following week the answer was ready. The small class #'s were good – you didn't feel intimidated revealing your issues. Your tone of voice was very soothing and you were always understanding and encouraging which was helpful.

SPECIFIC SUGGESTIONS/RECOMMENDATIONS:

While teaching, specifics need to be repeated more often. A lot to learn in orientation it takes a few repeats before you can take it in. Though it was a good study and helpful.

B.

START:

Provide more time for discussion – the discussion among participants were so helpful that I think more time should be provided.

STOP: N/A

CONTINUE:

I loved it all actually. I am so glad I was able to participate. You did a fantastic job and with your intelligence and compassion, I know you are going to help a lot of people. Thank you!

SPECIFIC SUGGESTIONS/RECOMMENDATIONS:

I think it would be beneficial if the program was longer so that homework would be repeated more often, thus cementing it more in on brains. If the program could be offered during the evening and on a weekend, that would really help those who have already returned to work (and give your program an advantage over the Wellspring program).

C.

START:

Bigger groups if possible.

STOP:

Nothing

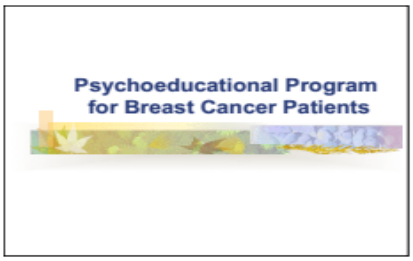
CONTINUE:

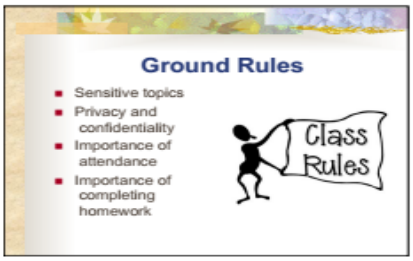
The good work it was helpful. It did give me some self-esteem. Very knowledgeable and understanding instructor.

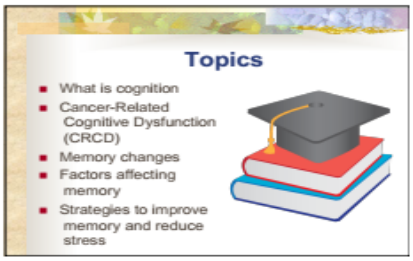
SPECIFIC SUGGESTIONS/RECOMMENDATIONS:

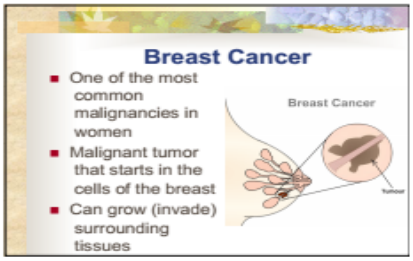
None.

Appendix M: Program Slides





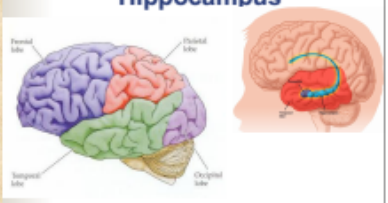




Breast – Brain?

- What is the connection?
- Cancer treatments
  - Surgery
  - Chemotherapy
  - Radiotherapy
  - Hormonal treatment
- Treatments – cognitive changes

Brain. Cognition. Hippocampus



"Chemofog", "Chemobrain", Cancer -related cognitive dysfunction (CRCD)

- Symptoms
  - Fatigue
  - Sleep disturbance
  - Cognitive impairments: memory, learning, attention problems
- 17 to 75% of patients experience cognitive challenges.
- One of the most common cognitive complaints: memory

Mechanisms of CRCD

1. Direct neurotoxic effect
2. Hormonal changes
3. Secondary immunologic response
4. Anemia
5. Microvascular injury
6. Genetic Predisposition

Direct Neurotoxic effect

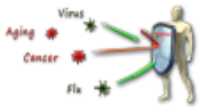
- Some chemotherapy chemicals can pass the Blood-Brain Barrier
- Toxic effect on the brain cells
- Reduce the volume of hippocampus

Hormonal Changes

- Chemotherapy -induced menopause
- Decreased number of protective hormones

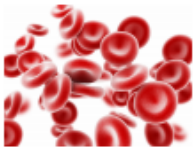
Secondary Immunologic Response

- Increase in cytokine level
- Can pass through the Blood-Brain Barrier
- High levels are toxic to the brain cells



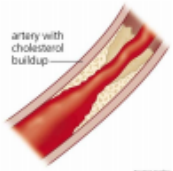
Anemia

- Decreased cerebral oxygenation
- Capable of inducing debilitating effects
- Anemia-related fatigue



Microvascular Injury

- Chemotherapy medications can increase the risk of blood clotting
- Damage vessels
- Ischemia
- Organ damage



Genetic Predisposition

- Long-term cognitive decline can be genetically predisposed
- Research is needed to identify genetic markers

TAKE A BREAK

What is Memory?

- Three-stage model of memory:

Encoding (input) → Storage → Retrieval (output)

Memory Types

- Semantic
- Immediate
- Recent
- Remote
- Prospective
- Procedural

Semantic Memory

- Accumulated information learned over the lifetime
- Unlimited capacity
- Typically semantic memory is stable or improves over time

Immediate Memory

- Remembering small information for several seconds
- Fades very quickly
- Definite capacity: *Magic number 7 +/- 2*

Recent Memory

- Remembering information from hours, days ago
- You probably remember more than you think you do
- Recall vs Recognition

Remote Memory

- Remembering things that happened years ago
- Sometimes referred to as autobiographical memory

Prospective Memory

- Remembering to do things in the future

Procedural Memory

- Remembering how to do things
- Habits
- Can be used as a memory strategy

Memory Types and CRCD

Don't change	*Change*
Semantic	Recent (recognition < free recall)
Immediate	Prospective
Remote	
Procedural	

Psychoeducational Program for Breast Cancer Patients

Session II

Factors Affecting Memory

- Age
- Medical conditions
- Hormones
- Prescription drugs
- Diet
- Physical exercise
- Cognitive engagement
- Attitude
- Stress

Aging

Stages of Memory

Encoding → Storage → Retrieval

Less efficient

Intact

Poor; Better with recognition

Types of memory: review

- Immediate 
- Semantic 
- Recent 
- Prospective 
- Remote 
- Procedural 

Memory Types and Aging

Change	Don't change
Recent	Semantic
Prospective	Immediate
	Remote
	Procedural
	Prospective (Hm?)

Dementia

- Dementia – syndrome
- Changes in cognition – memory
- Not the same as normal aging
- Aging is the biggest risk factor

Dementia: Alzheimer's

- Alzheimer's disease
- Abnormal structures and changes in hippocampus
- Connection between aging and the onset of Alzheimer's disease

Other Disorders that can Affect Memory

- Stroke
- Thyroid abnormalities
- Diabetes
- Depression and Anxiety

Medications

- Anxiolytics (lorazepam)
- Blood-pressure medications: mixed findings
- Sedating: (e.g., antihistamines)
- Medications that improve memory changes in dementia: Aricept, Exelon, Reminyl, Ebixa

Hormones

- Estrogen hormones are important for brain functioning
- Estrogen hormones: brain > bloodstream
- Menopause
- Chemotherapy-induced menopause

Diet

- Getting minerals and vitamins is important for memory
- Eating healthy diet can have a protective effect
- What is good for your heart is good for your brain
- Food Supplements?

Physical Exercise

- Relationship between exercise and memory
- People who exercise regularly show better memory overall and reduced risk of dementia
- Increases connectivity between cells

Cognitive Engagement

- What is it?
  - Reading
  - Solving puzzles
  - Playing chess
  - Taking classes
  - Social activities
- Regular cognitive exercise improves memory
- How much is enough? 12 activities per week

Attitudes

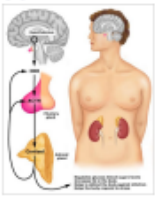
- Important relationship between memory abilities and your attitudes toward memory
- Positive attitude promotes better memory
- If you want to improve your memory, you have to believe you can do it

Stress

- What is stress?
- Lack of control
- Stress
  - Positive vs Negative
  - Major vs Minor
  - Chronic vs Acute
- We need stress: help keeping our immune system in shape

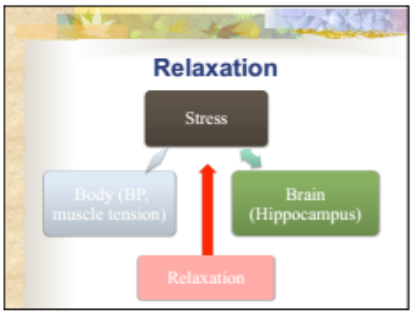
Cortisol

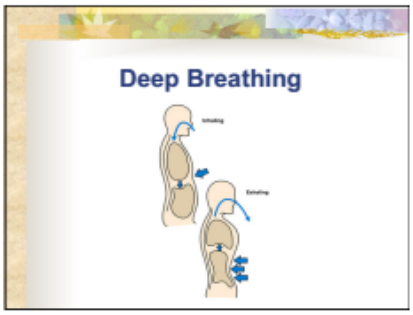
- Hormone
- Daily cycle: high in the morning, lower in the evening
- Chronic high levels are problematic



Cortisol and the Brain

- Cortisol has direct effects on the brain
- Cortisol negatively affects memory
- Good news: the negative effects can be reversed
- Antidote: relaxation!


Relaxation
Stress
Body (BP, muscle tension)
Brain (Hippocampus)
Relaxation


Deep Breathing


Visualization

Psychoeducational Program for Breast Cancer Patients

Session III

Memory Strategies

- **S**eeing and Saying
- **H**abits
- **A**ssociations
- **R**ecords
- **P**ractice Retrieval

SHARP

Seeing and Saying

- Attention

Encoding (input) → Storage → Retrieval (output)

Seeing and Saying

- Use when you want to remember that you have done something

Seeing and Saying

- Things you intend to do

Habits

- Organize your environment so you know where the things are
- Develop routines for doing important tasks
- Make a habit of checking your memory organizer

Associations

- Think of what something means
- Visualize a picture
- Connect the information with something else
- Find patterns
- Using semantic memory to help recent memory

Records

- Write down information to be remembered
- Memory organizer:
  - Scratch pad
  - To-do list
  - Permanent information

Practice Retrieval

- Repeating information over time
- At first, repeat information over short intervals
- Eventually, repeat information over long intervals

SHARP

S H A R P

Let's Practice

Associations

- Rose Miller
- Freda Harrison
- Bob Freedman
- Lily Boyd
- Kim Nagai
- Morris Gose

Associations: Numbers

- PIN: 2147
- 1248
- 7456
- 0107

Associations: Postal Codes

- G3T 4T3
- M2M 2S6
- P1J 1K0
- T6S 1C2

1 2 3 4 5
6 7 8 9 10
A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z

Associations: Books/Movies

- "The Cat in the Hat"
- "Who Moved My Cheese"
- "Aging with Grace"
- "Ribelle"

Memory Organizer

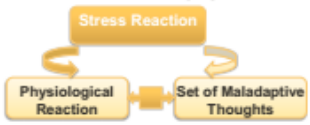
- Have different sections
  - Calendar
  - To do list
  - Permanent Files
  - Scratch Pad
- How to avoid losing?
- Habits

Psychoeducational Program for Breast Cancer Patients

Session IV

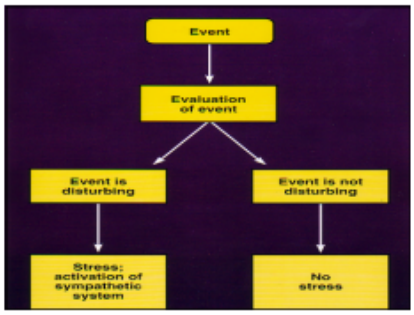
Stress Reaction

- Stress: lack of control over a situation/ event
- Chronic levels are damaging



Self-Talk, Self-Statements

- What we say to ourselves can have positive and negative effect
- How we react to stressor depends on our appraisal



Stress-Inoculation Training (SIT)

- Becoming aware of and monitoring statements
- What self-statements you have?
- Four stages of SIT
  - Preparing
  - Confronting
  - Coping
  - Reinforcing

Stage I: Prepare

Preparing for a stressor

Organize and plan your actions

- What is it you have to do?
- You can develop a plan to deal with it
- No negative statements
- Try to think rationally
- Anxiety may be eagerness to confront the stressor

Stage II: Confront

Confronting and handling the stressor

Convince yourself you can do it!

- Psych yourself up
- "One step at a time" you can handle this situation
- Don't think about fear
- Tension can be a cue to cope
- Relax, you are in control

Stage III: Coping

Coping with the feeling of being overwhelmed

Focus on the present; control fear

- When fear comes, just pause
- Keep the focus on the present, what is it you have to do?
- Don't try to eliminate your fear completely, just try to keep it manageable

Stage IV: Reinforce

Worked

- It worked, you did it
- You made more out of your fear than it was worth
- Your thoughts were the problem. When you control them you control the fear

Didn't work

- Good effort
- You did your best
- It will work the next time
- Look for positives: what did you gain?

Why use SIT?

- Appraise the situation
- Control negative thoughts and images
- Acknowledge, use and relabel the arousal you were experiencing
- Prepare yourself to confront the stressful situation
- Cope with intense fear (if such occurs)
- Reflect on your performance and reinforce yourself for having tried.

SIT: Application

- Anger management
- Pain Tolerance

Psychoeducational Program for Breast Cancer Patients

Session V

Memory Strategies

- Seeing and Saying
- Habits
- Associations
- Records
- Practice Retrieval

Names

Brenda Milner

Angela Troyer

Norman Endler

Numbers

- 647 – 448 – 1000
- 3214
- 4571

List

- Cauliflower
- Cucumber
- Butter
- Cheese
- Apples
- Banana
- Figs

Appointments

Medications

Past events

Stress-Inoculation Training

- Preparation
- Confrontation
- Coping with negative/strong emotions
- Reinforcement

Stress-Inoculation Training

Review

- CRCD - ?
- Memory: other factors?
- Diet, physical exercise, cognitive engagement, attitude
- Strategies
- Plan to change: realistic, time-limited, specific goals

Congratulations