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TRAINING AND MAINTENANCE OF BREAST
SELF-EXAMINATION SKILLS

by

Bernardine M. Pinto

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
December 1992

TRAINING AND MAINTENANCE OF BREAST SELF-EXAMINATION SKILLS

Bernardine M. Pinto, Ph.D.

Western Michigan University, 1992

Maintenance of breast self-examination (BSE) skills is crucial to the effectiveness of self-exams in early detection of breast tumors. While researchers have developed an effective technology for training these skills, the maintenance of BSE proficiency is questionable (Pennypacker et al., 1982). The objective of this study was to evaluate the effects of reassessment (and retraining) on the maintenance of BSE skills. Twenty-nine women (ages 25-64) were trained to criterion using the MammaCare training package. Experimental subjects were required to demonstrate their skills at a 2 month reassessment and received retraining if their skills had declined below criterion. Control subjects were not required to demonstrate their skills until a 4 month follow-up. Measures of proficiency were obtained by requiring all subjects to demonstrate their skills by examining breast models at pretraining, posttraining, and at two follow-ups (4 month and one year). Measures of BSE frequency and knowledge were also obtained at pretraining and at the 4 month follow-up.

There were no significant differences between groups on outcome measures. However, in the control group, there were significant decreases in lump detection rates between posttraining and each follow-up. In the experimental group, although detection rates declined between posttraining and the 4 month follow-up, such declines were not statistically significant. At the one year follow-up, experimental subjects' detection rates were similar to those at posttraining. We suggest that training to criterion on simulated breast models can produce acquisition of proficient BSE skills, and periodic reevaluation can prevent significant deterioration of these skills.

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ACKNOWLEDGMENTS

My thanks and appreciation to Dr. H. S. Pennypacker for his expert advice and suggestions in the development of this project. I would also like to thank the MammaTech Corporation for providing me with a variety of breast models.

My thanks to Chris Zimmer for her enthusiastic support for a BSE training program on campus, in providing me with training materials and assistance in subject recruitment.

My appreciation to Shelly Huizing and Cheryl Knight for assistance in data collection.

Finally, I would like to thank Dr. Wayne Fuqua for his feedback and suggestions through the lifetime of this study, and, in particular, for his editorial help.

Bernardine M. Pinto

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CHAPTER I

INTRODUCTION

Breast cancer is one of the leading causes of cancer-related mortality among American women (American Cancer Society, 1988): 45,000 women were expected to die of breast cancer in 1991 (American Cancer Society, 1991). It is estimated that one out of every nine American women will develop breast cancer at some time during her life (Boring, Squires & Tong, 1991). During the past forty years, mortality from breast cancer (over 32,000 a year) has remained stable (Gould-Martin, Paganini-Hill, Casagrande, Mack & Ross, 1982). However, breast cancer continues to be the leading site of cancer mortality among minority women (Bassett & Krieger, 1986; Farley & Flannery, 1989). Besides the mortality rates, patients with breast cancer also face the possibility of expensive and perhaps, disfiguring surgery. Although some of the risk factors in the development of breast cancer have been identified (Petrakis, Ernster & King, 1982), the only means presently available for attenuating the effects of breast cancer lie in early detection and treatment (Pennypacker, Goldstein & Stein, 1983). A number of investigators have shown that the smaller the

primary lesion at the time of detection and treatment, the greater the likelihood of survival without recurrence of the cancer (e.g., Gallager, 1980; Henderson & Canellos, 1980; Nemoto et al., 1980):

Techniques for detection of breast tumors include X-ray mammographs, physician examinations and breast self-examination procedures (BSE). While mammography is clearly a more sensitive screening device than BSE (Guinan, 1990; O'Malley & Fletcher, 1987; Wertheimer et al., 1986), several factors suggest that BSE will continue to have an important role in early detection and treatment of breast cancer. First, approximately one-sixth of the cancers discovered by patients in the Breast Cancer Detection Demonstration Project (BCDDP) were detected by women between annual clinical and mammographic exams (Baker, 1982). In fact, most tumors are detected by women themselves either accidentally or during self-examinations (Strax, 1984). Mammography screenings are seldom done more than once per year in an effort to limit cumulative radiation exposure (Eddy, Hasselblad, McGivney & Hendee, 1988). BSEs performed between annual mammography screening offer the potential to detect tumors that develop in the interim. Second, the cost-benefit ratio of mammographs may not be advantageous for women under fifty years of age, an age group with a lower

incidence of breast cancer than older women. Third, despite recent community outreach efforts, mammography screening may not be readily available for all women thus creating a compliance and logistical problem that could limit the utility of mammography as a public health screening tool. Because of the above considerations it appears that BSE will continue to be an important screening tool, especially for women for whom mammography screening is unavailable or unwarranted due to insufficient breast cancer risk (Strax & Greenwald, 1979). Accordingly, training skills that facilitate detection of breast tumors via BSE has become an important component of preventive health care for women.

BSE has several attractive features: The method(s) is convenient, non-invasive and safe; it can be done by women in the privacy of their homes; it actively involves women in their own health care; and it requires no equipment. Unfortunately, general agreement on the extent to which BSE reduces cancer mortality is lacking (Greenwald & Sondik, 1986). While some researchers found that cancer patients who reported regular BSE had earlier stage cancer than those who did not report BSE (e.g., Feldman, Carter, Nicastrì & Hosat, 1981; Foster et al., 1978; Greenwald et al., 1978; Huguley & Brown, 1981; Huguley, Brown, Greenberg & Clark, 1988; Philip, Harris,

Flaherty & Joslin, 1986), other researchers have not found such an association (e.g., O'Malley & Fletcher, 1987). While suggestive, the contradictory results preclude forming firm conclusions about the efficacy of BSE in the early detection and treatment of cancer.

One of the obstacles to experimental evaluation of the effects of BSE practice on cancer mortality is the focus on frequency of BSE practice as the relevant outcome of BSE training to the virtual exclusion of research on proficiency of BSE skills (Kegeles, 1985). The effectiveness of BSE as a cancer detection technique is determined both by the regularity or frequency of exams and by the proficiency with which the exam is performed. BSE frequency, a common measure in BSE research is not strongly associated with proficiency of self-examination (Assaf, Cummings, Graham, Mettlin & Marshall, 1985) and inferences about BSE proficiency can not be drawn from research on BSE frequency (Fletcher, Morgan, O'Malley, Earp & Degnan, 1989). About 40% of women perform BSE routinely (Mamon & Zapka, 1985; Worden, Costanza, Foster, Lang & Tidd, 1983). However, a relatively small percentage of women who practice BSE meet proficiency criteria (13% as determined by Jacob, Penn & Brown, 1989).

Breast self-exams conducted regularly with low proficiency could contribute to higher cancer morbidity

since the failure to detect existing tumors would necessitate more extreme medical interventions. Conversely, even if BSE skills are at high proficiency but BSE is not regularly practiced, then the probability of detecting cancer in its early stages could be greatly diminished, thus limiting the clinical impact of BSE (Huguley & Brown, 1981). Obviously, both the proficiency and the regularity with which BSE is practiced are important issues for health education research. To maximize the potential that BSE offers toward early detection of tumors, it is important to ensure that women can perform BSEs proficiently prior to expending effort in promoting their regular practice of the exams.

A review of BSE training studies reveals considerable variation in defining and assessing BSE proficiency (Pinto & Fuqua, 1991). In some studies, proficiency has been operationalized as subjects' knowledge of BSE techniques and assessed through questionnaires and/or interviews (e.g., Craun & Deffenbacher, 1987; Edwards, 1980; Marty, McDermott & Gold, 1983). In other studies (e.g., Assaf et al., 1985; Carter, Feldman, Tiefer, & Hausdorff, 1985; Coleman, 1989; Grady, Kegeles & Lund, 1982), the trainee's performance of a breast exam is assessed for the presence of previously validated BSE components (e.g., palpating tissue using finger-pads, a systematic

and thorough coverage of breast tissue and so on). Finally, trainees' ability to detect lumps of varying sizes in breast models or benign lumps in volunteer subjects has also been used to assess BSE proficiency (e.g., Dorsay, Cuneo, Somkin & Tekawa, 1988; Hall et al., 1980; Stephenson, Adams, Hall & Pennypacker, 1979; Murfin, White & Town, 1982; Pennypacker, Neelakantan, Bloom, Criswell & Goldstein, 1981; Saunders, Neelakantan, Criswell, Bloom & Pennypacker, 1982).

Such variations in defining BSE proficiency make it difficult to compare the effectiveness of training across studies. To reduce this ambiguity, mastery of BSE skills could be defined as: (a) the ability to detect lumps of some minimal size in simulated breast tissue, or (b) a response topography that has independently proven effective in maximizing lump detection. Defining mastery of BSE skills as a relevant outcome to BSE training, raises the challenge of developing training technology that facilitates such mastery.

Despite a variety of BSE teaching methods, there is consensus that trainees who practice on simulated breast models display greater BSE proficiency (defined as the number of BSE components performed and/or lump detection accuracy) than trainees who receive BSE instruction via pamphlets or films alone (Assaf et al., 1985;

Neelakantan, Criswell, Pennypacker, Goldstein & Stein, 1981; Pennypacker et al., 1982). The use of such models to train discrimination or detection skills has been extensively researched by Pennypacker and his colleagues (Adams et al., 1976; Bloom, Criswell, Pennypacker, Catania, & Adams, 1982; Hall et al., 1980; Pennypacker et al., 1982; Pennypacker et al., 1983; Saunders et al., 1982; Saunders, Pilgrim & Pennypacker, 1986). Their studies have validated the effectiveness of training procedures using breast models and have led to the development of the MammaCare approach to teaching BSE. While only 45% of tumors smaller than 1 cm were discovered by clinical breast exams (Fletcher & O'Malley, 1986), lumps as small as 3 mm can be detected following MammaCare training (Pennypacker et al., 1982). This training includes breast models to help train tactile discrimination between normal breast tissue and potentially harmful lumps, and techniques of palpation and search that provide a thorough exam of the breast tissue (Saunders et al., 1986).

While the development of an effective training technology for BSE skills is encouraging, the degree to which proficiency levels maintain after initial training has received little attention. Quite obviously, maintenance of proficiency and a regular exam schedule are

crucial to the effectiveness of BSE as a cancer detection technique. Pennypacker and his colleagues (1982) report that performance proficiency appears to deteriorate after only one training session even with recommended home practice, returning to near pretraining levels after 6 months (Criswell, 1981; Pennypacker et al., 1981).

Conversely, they found stability in detection skills following one hundred nearly consecutive daily practice sessions (Pennypacker et al., 1982). Unfortunately, the majority of BSE training programs consist of short one-session workshops ranging from one to two hours of training (e.g., Grady, 1984; Mayer et al., 1987). Mastery of BSE skills (lump detection accuracy and/or display of appropriate response topography) following such brief training is questionable and the maintenance of proficiency is debatable.

Recently, researchers have begun to promote maintenance of skills. For example, strategies such as newsletters and television spots were used to review correct BSE performance following short BSE training presentations (Worden et al., 1990). Although lump detection accuracy at one and two year follow-ups showed an improvement over baseline assessments, the percentage of correct detections was less than 50% at the follow-ups. In addition, the absence of posttraining proficiency

assessments makes it difficult to evaluate maintenance of skills.

The deterioration in BSE skills following brief training is not surprising. In many respects, BSE is analagous to a signal detection task in which individuals must remain vigilant over extended periods to detect "signals" (lumps or other symptoms) that are not normally present. Research on such tasks has typically shown that quality of vigilance and signal detection accuracy deteriorate rapidly unless feedback on performance is provided (Owens & Ashcroft, 1986). Maintenance of BSE proficiency poses special concern because the skills are typically performed at low frequency (ideally, once a month) with limited opportunity for corrective feedback and reinforcement. In general, women who receive BSE training during their physical check-ups are seldom required to demonstrate their skills. There have been suggestions (e.g., Owens & Ashcroft, 1986) that health workers could evaluate a woman's technique (correct faulty technique or confirm correct performance) at regular checkups. It is hoped that such feedback would not only maintain proficient performance but also provide reassurance about technique and improve confidence in one's skills. To date, the effects of this strategy alone (that is, requiring trainees to demonstrate their

skills) on maintenance of proficiency has not been determined.

In a recent study, demonstration and feedback on performance was one of several strategies used to improve BSE proficiency and maintenance of skills. Fletcher et al. (1990) compared the effectiveness of MammaCare training with traditional instruction and no training controls. Each woman in the MammaCare training group received: (a) 45 mins. individual training on breast models, (b) breast models for home practice, (c) a verbal review of BSE technique at one month, and, (d) another verbal review and feedback on her demonstration of BSE technique at her next clinic visit. Those in the traditional group received BSE instruction (per American Cancer Society guidelines) with practice on self for 30 mins. Each woman received a review and feedback on her demonstration of BSE at her physician visit. A one year follow-up assessment of BSE proficiency revealed that women who received MammaCare training detected 57% of the lumps versus 47% among women who received traditional instruction. The between group difference in lump detection was statistically significant. While there appears to be an improvement of detection skills over pretraining levels, the absence of a proficiency assessment immediately after the initial training makes it impossible to

determine if follow-up data represent stability, deterioration or enhancement in detection skills from training levels. Further, as with all multi-component training packages, it is difficult to determine the extent to which the package components (that is, individual instruction, home practice, review or required demonstration of skills) contributed to the results. An analysis of this BSE training package to identify the crucial components for skill maintenance could help to develop cost-efficient and effective maintenance programs.

In this study, I attempted to assess the effects of an intervention (reassessment and retraining of skills) on the maintenance of BSE proficiency. I hypothesized that initial training and periodic retraining of women to a clinically relevant criterion (e.g., detection of at least 80% of the lumps in simulated breast models) might promote maintenance of BSE proficiency over a four month and one year follow-up. This maintenance strategy (reassessment and if necessary, retraining) was selected for several reasons. First, reassessment has proven effective in the maintenance of other health care skills. For example, demonstration of cardiopulmonary resuscitation skills (CPR) by trainees followed by feedback on technique has been found to improve mastery and maintenance of skills (e.g., Seaman, Greene & Watson-Perczel,

1986). In many respects, CPR skills are analagous to BSE skills in that they are not frequently practiced and an individual typically receives little corrective feedback following completion of training. Furthermore, reassessment was one of the strategies in an effective multi-component training program (Fletcher et al., 1990), thus suggesting the potential benefits of reassessment alone. Second, and perhaps equally important, it may be practical to integrate reassessment of BSE skills into a variety of health care programs (e.g., annual exams, mammographs, community outreach programs). Providing women with an opportunity to demonstrate BSE skills can occasion the reinforcement of proficient performance and the correction of faulty technique, thus leading to long term maintenance of BSE proficiency.

In sum, this study extends prior research by:

(a) training BSE skills to a high level of proficiency in lump detection, and (b) evaluating the effects of periodic reassessment and retraining on the maintenance of BSE skills and frequency of practice. The usefulness of BSE in detection of tumors is influenced by the proficiency with which regular BSEs are conducted. Hence, results of this study could add to the technology of breast cancer screening and health education efforts directed towards early detection of disease.

CHAPTER II

METHOD

Subjects

Subjects were recruited by mailing a letter describing the study to a random sample of 200 female faculty and staff at Western Michigan University. Women age 20 and above, who were interested in learning how to do a breast self-exam were asked to contact the researchers. If a woman was pregnant (or anticipated pregnancy), or currently had breast cancer, or was unable to live in the area for the next 12 months, she was excluded from the study. One woman was excluded from participation based on these screening criteria. All interested participants were required to attend a session in which they performed a breast exam on two breast models, each containing embedded lumps. If a woman detected 50% or less of the lumps, she was asked to participate in the study. Five women were excluded from participation based on this criterion. Screening continued until 30 subjects (mean age = 40.8 years, range = 25-64 years) were recruited.

Setting

All sessions were conducted at the Behavioral Medicine Laboratory at Western Michigan University in a room equipped with a recliner chair and a table. A videotape machine and television monitor were placed in the room during training sessions.

Apparatus/Materials

Four breast models were used during the study. Two breast models (each containing six embedded lumps) were used for assessment of proficiency at pretraining, post-training, reassessment, and at follow-up. Each assessment model had flesh-colored silicone elastomer "skin" with a transparent back. The lumps varied in hardness, depth and size, ranging from 3 mm to 1.0 cm. For detailed descriptions of the psychophysical characteristics of these models, please refer to Pennypacker et al. (1982). Two models were used for training purposes and are described below.

BSE training was conducted using the MammaCare Professional Learning System (MLS 1), which consisted of a manual outlining BSE steps, a videotape demonstrating BSE, a teaching breast model, and a practice breast model. The videotape demonstrated the basic skills of BSE through a series of exercises, first with the

teaching model and then on the learner's own tissue. The teaching breast model contained four lumps and it was divided in half: one half had little background nodularity simulating postmenopausal breast tissue and the other half had significant background nodularity simulating premenopausal breast tissue. The practice breast model contained six embedded lumps that varied by size, hardness, depth and movability. These variations allowed the trainee to develop detection skills that would help locate breast lumps of varying dimensions.

Other materials included a Questionnaire that assessed knowledge of BSE components (those emphasized by MammaCare) and breast cancer screening practices (as per guidelines established by the American Cancer Society, see Appendix A), index cards to record practice of BSE (see Appendix B), and a Consumer Satisfaction Survey (see Appendix C).

Dependent Variables and Assessment Procedures

There were three dependent variables: BSE proficiency, knowledge of BSE components, and frequency of BSE.

BSE Proficiency

To assess proficiency, subjects were asked to perform a breast exam on the two previously described

assessment models. The following procedure was adopted: Each subject was brought into the room and seated in the recliner chair. The first assessment breast model was placed on the subject's chest and she was given the following instructions:

Please perform an exam on this model using the same techniques that you would use if you were doing a breast exam on yourself. Let me know if or when you find any lumps, and I will place a dot sticker on that spot on the model. As part of the assessment procedures, I can not tell you if you are correct when you find a lump. Similarly, if you are unsure if it is a lump, I can not help you to make a decision. Please do not push down on the model with your finger nails. There is no time limit so you do not have to hurry.

When a subject reported finding a lump, a black dot sticker was placed on the model corresponding to the location of the lump. The subject was then asked to provide a rating of her confidence in lump detection (1 to 5 rating scale with 1 = I am not at all sure it is a lump, 5 = I am sure it is a lump). This procedure was repeated at subsequent lump detections.

During the exam, the trainee's performance was evaluated for the presence/absence of six BSE response components (use of one hand, use of the second and third fingers, palpation with finger-pads, use of a vertical search pattern, circular palpations at each spot examined, and varying pressures during palpation), emphasized in the training video and validated by previous research

(e.g., Saunders et al., 1982). Scoring criteria are located in Appendix D. If the subject displayed the response component, she was given a score of one and hence, she could obtain a maximum BSE technique score of six. The total duration of each exam was recorded. The second model was placed on the subject's chest and she was provided the same instructions as described earlier. Again, her performance was evaluated for appropriate BSE technique (six response components allowing for maximum score of six). Hence, across the two exams, a subject could obtain a maximum BSE technique score of 12.

The percentage of correct detections, mean confidence ratings, number of false positives and mean confidence ratings were determined after the subject completed the exam of the second assessment model. Each "lump" the subject detected was scored as either a correct detection or a false positive by comparing the location of the suspended lump (visible through the transparent back of the breast model) with the location of the black sticker dot. A correct detection was scored when the sticker dot was placed on a lump, and a false positive detection was scored when a lump was not present under the sticker dot.

Definitions of Lump Detection Measures

The percentage of correct detections was determined

by dividing the number of correct detections by 12 (the total number of lumps in the two models) and multiplying the result by 100. The mean confidence in correct detections was determined by dividing the sum of confidence ratings associated with correct detections by the number of correct detections. Next, the number of false positive detections for the two models was noted, and the mean confidence for false positives was calculated by dividing the sum of the confidence ratings for these detections by the number of false positive detections. Finally, the mean BSE duration was determined by dividing the total duration of the exams by two (two models).

These procedures and definitions were also used to assess proficiency at posttraining, reassessment, and at the 4 month and one year follow-ups. At the 4 month follow-up, each subject also completed a BSE Questionnaire (see Appendix E), and a Consumer Satisfaction Survey form (Appendix C).

Interobserver Agreement

The primary researcher conducted the assessment of BSE proficiency and recorded data using the form in Appendix F. A research assistant was present for 20% of all proficiency assessments (31 sessions) to determine interobserver agreement. Prior to the study, the

assistant was trained to record responses until 90% interobserver agreement had been obtained. Each response (or sticker dot) on the model was examined to determine if the dot represented a correct detection or a false positive. For correct detections, an agreement was scored when both observers noted that the sticker was placed above a lump in the model. A disagreement was scored when one observer recorded that the sticker was placed above a lump, while the other observer noted that no lump was present under the sticker dot. Similarly, for false positives, agreement was scored when both observers noted that no lump was present beneath the sticker dot. A disagreement was scored when one observer noted that no lump was present under the sticker, while the other observer noted that a lump was present. The interobserver agreement percentage was calculated by dividing the number of agreements by the number of agreements plus disagreements. The same procedure was used to determine interobserver agreement for the presence/absence of 6 BSE components. Interobserver agreement ranged between 96% (number of false positives) and 100% (average confidence for correct detections, and average confidence for false positives).

Knowledge of BSE Techniques

A Questionnaire was administered to all subjects at pretraining to assess risk factors for breast cancer, knowledge of BSE components, and compliance to breast cancer screening guidelines (Appendix A). A similar questionnaire was re-administered at the 4 month follow-up (Appendix E).

BSE Frequency

At pretraining, subjects were asked to report how often they practiced BSE over the previous 4 months. At the 4 month follow-up, subjects were asked to report BSE frequency for the previous 4 months.

Following BSE training, each subject was given four index cards to record performance of a BSE. For the next 4 months, subjects were asked to note the date when they performed a BSE, the dates their menstrual period began and ended, and finally, report any unusual findings of the exam (Appendix B). Subjects were instructed to return the BSE index cards to the researchers via campus mail.

Procedure

BSE Training

Following subject selection, each participant completed the BSE questionnaire and attended a one-hour session during which she watched a 45 min. video-tape presentation of the MammaCare BSE method. The subject was seated in the recliner and provided with a teaching and a practice breast model, and dot stickers as required to complete the exercises on the videotape. Prior to viewing the videotape, the subject was given the following instructions:

I want you to watch the videotape and follow the training procedures as outlined in the tape. At times, you will be instructed to use the models: please use them and practice on yourself, according to the instructions on the tape. After watching the tape, you can practice on the practice model (point to the model) for another 10 mins. At the end of that time, I can answer any questions you may have about the steps in a breast self-exam. I will then ask you to do another exam of the two models (as you did in your first session) to determine your skills.

When she had viewed the videotape, the subject practiced BSE on the practice breast model for at least 10 mins. During practice the subject generally placed the model on her chest. The researcher then responded to the trainee's questions about the BSE technique.

Assessment

After training, the subject was asked to conduct a breast exam on the assessment breast models (the models were placed on the subject's chest) using the techniques she had just learned. If the percentage of correct detections was greater than 80% (that is, if the subject detected at least 10 of the 12 lumps in the two models), training was terminated. False positive detections were not included in the determination of the training termination criterion. If correct detections were less than 80%, the subject was scheduled for a Supplementary Training session.

Supplementary Training

At Supplementary Training sessions, the subject was asked to demonstrate her technique on the practice model (placed on her chest) while the researcher provided the trainee with feedback on the specific components of a BSE. For example, the subject was urged to use the finger-pads, press firmly, use the vertical strip search pattern and palpate all areas of the model. The researcher also modeled the technique for the subject. Subjects were not allowed to practice or receive feedback on the assessment models. Each Supplementary Training Session ended with an assessment of proficiency using the

assessment models. Training continued until percentage of correct detections on the assessment models was ≥ 80 . On the average, subjects required 3 Supplementary Training sessions to reach the termination criterion. Following training to criterion, subjects were given a National Cancer Institute booklet on breast exams and referral information to local mammographic services as required by the Institutional Review Board.

Independent Variable (Reassessment and Retraining)

After a subject achieved the training criterion, she was randomly assigned to either the control group or the experimental group. All subjects were given four index cards, with instructions to perform monthly BSEs over the next 4 months. Trainees were told to perform a BSE three to four days after their period ended, record information on each monthly BSE, and mail the card to the researchers. Postmenopausal and non-menstruating women were instructed to perform BSE on a fixed date each month. Subjects in the experimental group were instructed to return for a Reassessment session scheduled at 2 months posttraining. These subjects were informed that they would be required to demonstrate their skills at the Reassessment session. Assessment of proficiency followed the same procedures as at pretraining and posttraining.

If a subject's correct detections had decreased to below 80% (that is, if she found ≤ 9 lumps in the 2 assessment models) she was asked to return for a Interim Training session. Interim Training sessions followed the same protocol as Supplementary Training sessions (demonstration, feedback and modeling on the practice breast models). At no time did the subjects practice on the assessment models. Interim Training sessions continued until the proficiency criterion had been met (correct detections $\geq 80\%$). On the average, these subjects required one to two Interim Training sessions. Subjects in the control group were not required to attend a Reassessment session.

All trainees returned for a 4 month follow-up during which assessments of proficiency, frequency and knowledge of BSE were conducted. At the one year follow-up, subjects were required to demonstrate their self-exam skills by examining the two assessment models.

CHAPTER III

RESULTS

Demographic Characteristics

Of the 30 subjects who met inclusion criteria and agreed to participate in the study, one subject dropped out of the study during BSE training. This subject's data were excluded from statistical analyses. Table 1 shows that women in the two groups had similar demographic characteristics. Most women were college educated and pre-menopausal; and with one exception, all the trainees were Caucasian. Seventy-eight percent of the control group and all experimental subjects had received prior BSE instruction. Chi-square analyses indicated significant differences between groups on one demographic variable: Family history of cancer ($z = 2.11$, $p < .05$) with a greater incidence of cancer among the family members of control subjects than among experimental subjects. Seventy eight percent in the control group reported being "somewhat" to "moderately confident" of their BSE skills and all experimental subjects reported "somewhat" to "moderate confidence" in their skills. Subjects in both groups considered breast cancer as a serious disease,

and, a majority of women in both groups considered it more than possible that they could develop breast cancer.

Table 1
Demographic Characteristics of Subjects

Characteristics	Control <u>n</u> = 14	Experimental <u>n</u> = 15
Age	<u>M</u> = 40.8 (<u>SD</u> = 8.8)	<u>M</u> = 40.9 (<u>SD</u> = 9.1)
Marital Status: Single	<u>%</u> (<u>n</u>) 42.9 (6)	<u>%</u> (<u>n</u>) 20 (3)
Divorced	14.2 (2)	20 (3)
Married	42.9 (6)	60 (9)
Education: High School	7.1 (1)	-
College	92.9 (13)	100 (15)
Children: Yes	35.7 (5)	40 (6)
No	64.3 (9)	60 (9)
Menopause Completed: Yes	14.3 (2)	20 (3)
No	85.7 (12)	80 (12)
Family History of Cancer: Yes	71.4 (10)	33.5 (5) *
No	28.6 (4)	66.7 (10)
Family History of Breast Cancer: Yes	42.9 (6)	20 (3)
No	57.1 (8)	80 (12)
Clinical Breast Exam in Past Year: Yes	71.4 (10)	73.3 (11)
No	28.6 (4)	26.7 (4)
Mammogram in Past Year: Yes	35.7 (5)	26.7 (4)
No	64.3 (9)	73.3 (11)

* Significant between group differences (.05 level)

Assessment of Proficiency

Table 2 shows the measures of skill proficiency obtained for each group at pretraining, posttraining and follow-ups. Table 2 also displays the mean BSE technique score obtained at each assessment with the mean score on each of the six response components that comprised the technique score (maximum score on each component = 2). Finally, the frequency of self-exams and knowledge scores that were obtained at pretraining and at the 4 month follow-up are seen in the same table.

Table 2

BSE Proficiency at Pre-, Posttraining, and Follow-ups

Proficiency Characteristics	Gp	Mean values			
		Pre-	Post	Follow-ups 4 mth	1 yr
% correct detections	C	35.8	88.3	70.0	70.6*
	E	37.4	87.4	82.8	85.4
Confidence in detections (max. = 5)	C	4.5	4.7	4.7	4.7
	E	4.3	4.6	4.8	4.7
False positives	C	0	0.6	1.3	0.8
	E	0.7	0.6	1.0	1.1
Confidence in false positives (max.= 5)	C	0.3	1.9	2.2	2.0
	E	1.0	1.4	2.8	2.9

Table 2--Continued

Proficiency Characteristics	Gp	Mean values			
		Pre-	Post	Follow-ups 4 mth	1 yr
Duration (seconds)	C	109.3	359.9	285.5	229.3
	E	117.1	304.2	236.1	207.7
Technique (max. = 12)	C	3.6	11.8	10.9	10.9
	E	7.0	11.6	11.2	11.2
<u>Technique Components</u>					
Hands	C	1.5	2.0	2.0	1.6
	E	1.8	2.0	2.0	1.9
Fingers	C	0.7	2.0	2.0	2.0
	E	1.8	2.0	2.0	2.0
Finger-pads	C	0.9	1.9	1.2	1.8
	E	1.3	1.6	1.3	1.7
Vertical search	C	0.0	1.9	1.9	1.8
	E	0.2	1.9	1.8	1.7
Circular palpation	C	0.3	2.0	2.0	1.9
	E	1.0	2.0	2.0	1.9
Varying pressure	C	0.2	2.0	1.8	1.8
	E	0.8	2.0	1.8	2.0
Frequency	C	1.1	--	3.8	--
	E	1.9	--	3.1	--
Knowledge	C	12.3	--	16.7	--
	E	13.8	--	17.2	--

* Significant between group differences (.05 level)

Legend. C = Control Group
 E = Experimental Group
 Maximum Score on Each Technique Component is 2.0

Lump Detection Accuracy

Figure 1 displays the percentage of correct detections at pretraining, posttraining, reassessment and retraining (experimental group only), 4 month and one year follow-ups. Data were analyzed using the BMDP statistical package. Seven subjects were not available for the one year follow-up. Hence, repeated measures analysis of variance and covariate analyses are based on a total sample size of 22 (Control group = 10 subjects, Experimental group = 12 subjects). Analysis of covariance with pretraining values as the covariate, showed a significant difference in lump detection between the two groups, $F(1, 19) = 11.6, p < .05$. Significant differences were found across time, $F(2, 40) = 9.22, p < .01$. However, there was also a significant Group X Time interaction, $F(2, 40) = 4.39, p < .05$. Post-hoc analyses using Neuman-Keuls tests showed that there were no significant differences between groups at posttraining. However, lump detection accuracy was significantly greater among experimental subjects than control subjects at the 4 month ($p < .01$) and at the one year follow-up ($p < .01$). Further, in the control group, there was a significant decrease in lump detection accuracy from posttraining to each follow-up ($p < .01$). Although detection accuracy declined to a small extent in the experimental group

(posttraining to the follow-ups), such decreases were not significant.

Two subjects in the study (one in each group) found lumps in their own breast tissue. Pathologists' reports indicate that, in one instance, cysts measuring up to 0.5 cm were present in the right breast. In the other instance, the lump (8 x 6 x 7 mm) was diagnosed as a benign, cystosarcoma phylloide. Detection of lumps of these sizes compares favorably with detection rates during physical exams by physicians (Fletcher, O'Malley & Bunce, 1985).

Figure 1. Mean Percentage of Correct Detections.

Average Confidence in Lump Detection

Mean confidence levels associated with lump detections at pretraining, posttraining, reassessment, retraining and follow-ups are displayed in Figure 2. Covariate analysis (pretraining values as the covariate) revealed no significant differences between groups, $F(1, 19) = 0.00$, $p > .05$, and across assessments, $F(2, 40) = 0.44$, $p > .05$.

Figure 2. Mean Confidence in Correct Detections.

False Positive Detections

Figure 3 displays the mean number of false positive detections for each group at the six assessments.

Repeated measures analysis of variance yielded significant differences over time, $F(3, 60) = 3.49, p < .05$. Post-hoc analyses (Neuman-Keuls) indicated a significant increase in false positive detections from pretraining to the 4 month follow-up for the control group only ($p < .05$). Although false positive detections increased over time, analysis of covariance using pretraining levels as the covariates, revealed no significant differences between groups, $F(1, 19) = 2.4, p > .05$, and across time, $F(2, 40) = 2.4, p > .05$.

Figure 3. Mean False Positive Detections.

Average Confidence in False Positive Detections

Mean confidence levels associated with false positive detections at the six assessments are seen in Figure 4. Analysis of covariance showed no significant differences between groups, $F(1, 19) = 0.16, p > .05$, and across time, $F(2, 40) = 2.04, p > .05$.

Figure 4. Mean Confidence in False Positive Detections.

BSE Technique

Figure 5 shows the mean BSE technique score displayed by the two groups at each assessment. Repeated measures analysis of variance showed a significant

difference across time, $F(3, 60) = 73.68$, $p < .01$, and a significant Group $\times$ Time interaction, $F(3, 60) = 5.59$, $p < .01$. Post-hoc Neuman-Keuls tests showed a significant difference in BSE technique scores between groups at pretraining ($p < .01$). Further, there were significant improvements in technique from pretraining to post-training, and from pretraining to each follow-up for both groups ($p < .01$ for each comparison). To reduce variability between groups at pretraining, covariance analysis was conducted (pretraining levels as the covariate). There were no significant differences between groups, $F(1, 19) = 0.12$, $p > .05$, and across time, $F(2, 40) = 2.91$, $p > .05$.

Figure 5. Mean BSE Technique Score.

Duration of Exams

Figure 6 shows the mean duration of exams for each group at the six assessments. Analysis of covariance showed significant differences across time, $F(2, 40) = 13.29$, $p < .01$. Post-hoc tests indicated that exam duration decreased significantly from posttraining to the one year follow-up in the control group ($p < .01$) and experimental group ($p < .05$). Repeated measures of variance and post-hoc tests showed that duration had increased significantly from pretraining to posttraining, and from pretraining to each follow-up for both groups ($p < .01$ for each comparison).

Figure 6. Mean Duration of Exams.

Assessment of Knowledge of BSE Techniques

Subjects' knowledge about BSE techniques (maximum score = 18) was determined at pretraining and at the 4 month follow-up. Prior to training, subjects in the control group obtained a mean knowledge score of 12.28 (SD = 2.49) and the mean score for the experimental group was 13.8 (SD = 1.78). At follow-up, mean knowledge scores increased to 16.17 (SD = 1.54) and 17.2 (SD = 0.67) respectively. There were no significant differences between groups: $F(1, 27) = 3.46, p > .05$, analysis of variance showed significant improvements in knowledge at the follow-up for both groups from pretraining scores, $F(1, 27) = 118.1, p < .001$.

Relationship Between Dependent Variables

For the group as a whole, at pretraining, the percentage of correct detections was significantly correlated with the duration of the BSE exam, $r(27) = 0.52, p < .01$. There was a significant correlation between knowledge of BSE components (questionnaire data) and performance of these components during examination of the models, $r(27) = 0.46, p < .05$. At the 4 month follow-up, the average confidence associated with correct detection of lumps in the models was positively correlated with knowledge of correct BSE technique, $r(27) = 0.45, p < .05$.

Assessment of Frequency

At pretraining, the mean BSE frequency for the previous 4 months was 1.15 ($\underline{SD}$ = 1.67) for the control group, and 1.86 ($\underline{SD}$ = 3.09) for the experimental group. One subject in the control group reported a BSE frequency of 60 for the 4 month period and this datum was removed from further analysis. A minority of subjects reported at least monthly BSEs (21% of the control group and 26% of the experimental group). At follow-up, mean BSE frequency for the previous 4 months was 3.57 ($\underline{SD}$ = 0.85) for the control group and 3.13 ($\underline{SD}$ = 1.06) for the experimental group. There were no significant differences between groups: $F(1, 26) = 0.07, p > .05$. Analysis of variance showed a significant increase in BSE frequencies over time for both groups: $F(1, 26) = 16.76, p < .001$. Decreases in BSE frequency were reported by two subjects who indicated pretraining BSE frequencies of 60 and 12 respectively. Both subjects reported a decline to four BSEs each at the follow-up.

A comparison of self-reports of BSE frequency with the number of BSE cards returned to the researchers revealed that 14 subjects reported higher BSE frequencies than reflected in the number of cards returned. Self-reports of exam frequency were consistent with number of

BSE cards for 11 subjects, while, four subjects returned more cards than their reported BSE frequency. Control group subjects reported significantly higher BSE frequencies than BSE cards returned, $t(1, 13) = 2.83$, $p < .01$. The differences between reported BSE frequencies and BSE cards were not significant for the experimental group. In the follow-up questionnaire, subjects identified forgetting to mail cards, and losing or misplacing cards as reasons for failing to return BSE cards.

Consumer Satisfaction

Twelve subjects (41%) reported that the BSE skills were moderately easy to learn; 65% reported that the MammaCare videotape was very helpful in learning skills and 62% reported that Supplementary Training was very helpful. Twenty-two subjects (76%) held that BSE proficiency was important to them. All subjects reported that they would recommend similar training to others and twenty-one subjects (72%) had discussed the training with others (friends, co-workers, relatives and medical professionals). The entire sample reported they intended to continue BSE practice. The factors cited for possible discontinuance included forgetting, being too busy and laziness. Additional information on the Consumer Satisfaction Survey results can be found in Appendix G.

CHAPTER IV

DISCUSSION

The purposes of this study were to train subjects to a criterion level of proficiency in lump detection, and to evaluate the effects of reassessment and retraining on the maintenance of BSE skills. Although a majority of women reported previous BSE training, training to criterion on lump detection accuracy required an average of 5 hours of individualized training. The low detection rates at pretraining raises questions about the quality of BSE training presently available to women. In addition, the five-hour duration of training suggests that brief training as provided by physicians, nurses, and in many community outreach programs, may not be sufficient to promote proficient self-exams. Yet, the long-term effectiveness of BSE in tumor detection has been assessed without close attention to quality of training. A more valid estimate of the effectiveness of BSE would be obtained if women were trained to perform BSEs proficiently, and they then continued to conduct these exams regularly.

The training procedures adopted in this study suggest that it is possible to train women to acquire a high

level of BSE skills. However, despite the use of videotaped instruction, training to proficiency criterion required considerable time investment. It is likely that training similar to that provided in this study may not be cost-efficient for individual physicians and for large-scale training programs. I suggest several factors that may improve the speed of proficient skill acquisition and perhaps reduce training costs.

First, providing trainees with objective feedback on thoroughness of search on self and/or on breast models may help women to examine all parts of breast tissue including the areas beyond the conical part of the breast. Thoroughness of search was not assessed in this study, and did not receive separate focus in training. Such feedback can be provided in research studies by using techniques such as projecting a numbered grid on the subject's chest (Coleman, 1989; Pennypacker et al., 1983) or taping a light emitting diode to the trainee's middle finger and recording the trainee's examination of a model with an overhead camera (a Periphicon 511 image digitizer connected to a computer and video monitor).

Second, it may help to provide trainees with breast models for home practice (approximately \$30) following initial training. Such models containing lumps allow a trainee to be exposed to lumps or "signals" more

frequently than her practice on her own lump-free tissue. Health professionals could review technique and provide feedback on the trainee's skill at her next physician visit. Third, a trainee could be presented with a series of practice models containing lumps of various sizes, depths and hardness. Development of superior tactile skills may be facilitated if trainees examine models containing easy-to-detect lumps and then, proceed to examine models containing lumps that are more difficult to detect. Such gradual exposure or shaping could improve detection of lumps that require a high level of palpation skills (particularly lumps that are small, soft and deep within breast tissue). Finally, it may be interesting to determine the possibility of using a computerized feedback system while a trainee examines a model containing lumps. Computerized feedback on lump detection measures (such as the number of lumps detected, the number of false positive detections and so on) and topographic measures (such as thoroughness of search) could facilitate efficient learning while reducing the involvement of a trainer. If detection rates are low, then the trainee could be scheduled for individual instruction by a health professional.

The effects of reassessment and retraining on maintenance of proficiency were fairly promising as evidenced

by results. It is clear that detection rates at each follow-up were significantly higher than at pretraining for both groups. BSE proficiency (as reflected in the accuracy of lump detection in breast models) was moderately high at the 4 month follow-up: 70% and 82% for the control and experimental groups. At the one year follow-up, the detection accuracy remained stable for the control group (70%) and increased to 85% in the experimental group. The detection rates in the experimental group (attended reassessment and received retraining) were significantly higher than those of the control group (at each follow-up). The control group did show a significant decline in lump detection accuracy between post-training and each follow-up assessment. Results from the one year follow-up suggest that the control group's detection skills appeared to plateau following a decline at the 4 month follow-up. On the other hand, in the experimental group, the decline in detection accuracy at the 4 month follow-up was not as precipitous and did not attain statistical significance. At the one year follow-up, detection accuracy in this group improved over detection rates at the 4 month follow-up (improvement was not statistically significant). The observed decline in detection skills in the control group following training occurred despite training to criterion. These results

suggest that BSE skills may decline more rapidly from posttraining levels than has been suggested in previous studies.

The reasons for the declines in lump detection rates among control subjects are varied. BSE may be analogous to signal detection tasks in that subjects are required to monitor for long periods to detect "signals" or lumps with little opportunity for feedback and reinforcement. Given the reports of BSE practice among control subjects, it is likely that the absence of programmed rehearsal of BSE and feedback on correctness of technique and detection may have contributed to the decline in lump detection rates and BSE technique rather than the lack of practice per se. Experimental group subjects, on the other hand received exposure to "signals" or lumps in the breast models at reassessment with feedback and retraining. Given that a majority of experimental subjects required Interim Training (detection rates had decreased below criterion) following reassessment, it is possible that the scheduled reassessment at 2 months following training may not have been early enough to prevent a decline in detection skills. To identify an optimal reassessment interval, there is a need for descriptive studies in which detection skills are assessed (in the absence of retraining or feedback to trainees) at

intervals following initial training. When time intervals associated with decline in skills are identified, reassessments can be scheduled to offset such declines. For example, it is possible that BSE skills could be improved by frequent assessments (weekly or biweekly) immediately after training. Subsequently, the interval between reassessments could be increased to four or six months. Future research could help determine the optimal reassessment interval for proficiency maintenance and the costs of such assessments. Although reassessments are not time consuming, if it is determined that frequent reassessments are required to maintain proficiency, cost-efficiency issues may make BSE training a less viable screening technique than mammographs and clinical breast exams.

Results suggest that, in the experimental group, reassessment and retraining could have accounted for the less precipitous decline in proficiency at the 4 month follow-up and the return to detection rates similar to posttraining levels at the one year follow-up. However, these results should be interpreted cautiously because the experimental group received a combination of potentially active interventions (reinforcement for correct technique, and rules specifying appropriate technique). A component analysis would be necessary to identify the

crucial component(s) and process (es) operating in "reassessment" and retraining.

Despite the decline in lump detection rates in the control group, the overall detection rates were higher among this subject pool (control and experimental groups) than those reported by other researchers (Fletcher et al., 1990; Worden et al., 1990). It would be premature to conclude that the detection rates in this sample represents an adequate level of proficiency, in the absence of a consensus on "adequate" detection rates. Currently, researchers report overall detection rates and in some cases, detections rates of lumps of specific sizes, depths and hardness (e.g., Fletcher et al., 1985). It is clear that definite conclusions about proficiency awaits the determination of acceptable detection rates of lumps of various sizes, depths and hardness. Perhaps, adequate proficiency could be defined as the ability to detect correctly all lumps above 1 cm in size (of varying hardness and at various depths), and lower detection rates may be acceptable for smaller, softer lumps.

Although a consensus of "adequate" proficiency has not been reached, cross study comparisons reveal that subjects in this study had relatively high detection rates. Fletcher et al. (1990) found that women trained using the MammaCare approach found 57% of the lumps in

breast models at a one year follow-up. Worden et al. (1990) reported that their trainees found a mean of 5.57 lumps (maximum = 10) at a 2 year follow-up. It is possible that variations in the breast models used across these studies may account for the differences in detection levels. However, the higher detection accuracy rates obtained in this study may also be the result of factors such as the intensive nature of the training provided. In general, subjects required 5 hours of individual training before criterion was achieved: this contrasts with the briefer training (approximately one hour) provided by other investigators (Fletcher et al., 1990; Worden et al., 1990). Hence, it is possible that trainees had achieved a higher posttraining proficiency level than those in other studies. Another factor that may account for the higher detection rates in this sample is possible practice effects across six assessments. Care was taken to ensure that subjects were not informed about the number of lumps in each assessment model and further, they were not told that the same assessment models were used throughout the study. Previous research suggests that practising BSE during testing procedures does not alter detection rates (Hall et al., 1980). Nevertheless, in the absence of controls, the effects of practice on detection rates can not be ruled out.

Closer examination of the BSE techniques displayed by subjects at posttraining versus follow-up reveals that certain skills components (the use of finger-pads for palpation, vertical search pattern and the use of varying levels of pressure during palpation) are more likely to diminish than other components (such as the use of one hand during an exam, the use of the second and third fingers for palpation, and circular palpation motions). These findings suggest that BSE trainers may need to provide more intensive training on those components that are likely to deteriorate with time.

One of the concerns about the use of BSE is the possibility that women may over-use medical services by requesting examinations after locating something suspicious (Kegeles, 1985). Trainees did show an increase in their false positive detections and the confidence associated with these detections across the three assessments. Although the mean number of false positives at the one year follow-up (control group = 0.8, experimental group = 1.17) was lower than those reported by Hall et al. (1980), 63% of the current sample reported at least one false positive detection at follow-up. The confidence levels for false positive detections were lower than confidence rates for accurate lump detections suggesting that these subjects could discriminate between

correct detections and false alarms. Anecdotal reports indicate that trainees recognized that false positives could be checked by their physicians and, they preferred to report anything suspicious rather than ignore the "lump." While there were no aversive consequences for false positive detections in this research, it would be interesting to assess the effects of aversive consequences for false positive detections on correct detections. In the natural environment, it is possible that natural contingencies such as embarrassment, medical expenses to evaluate a false positive detection may reduce the frequency of false alarms. Additionally, though false positives could lead to overuse of physician services, these detections have less serious medical consequences than false negative detections.

Further analysis of false positives would be necessary to achieve twin objectives of improving detection of lumps without a corresponding increase in false positives. For example, we found that false positive detections were more frequently reported when trainees examined nodular areas in the models. Hence, the use of practice models with substantial nodularity could help trainees discriminate between lumps and "lumpiness" (nodularity). Similar strategies could be adopted if false positives are found to occur in certain locations

or depths within breast tissue.

Because skill proficiency was the main outcome variable, no particular emphasis was placed on promoting BSE frequency other than instructing subjects to perform monthly exams and to mail records (cards) of these exams to the researchers. Nonetheless, BSE practice increased among both groups (Control group mean = 3.57, Experimental group mean = 3.13) over the 4 months following training. This increase should be interpreted cautiously as BSE frequency for the four months prior to the study was based solely on recall whereas the frequency for the four months after training was based on a combination of recall and self-recording on cards. In addition, it is possible that the cards served as prompts for monthly BSEs.

The self-reports of BSE frequency were higher than the number of BSE cards returned (Cards: Control group mean = 2.42, Experimental group mean = 2.46) raising questions about the accuracy of self-reports. Such discrepancies between retrospective recall and behavioral measures are common (e.g., Smith & Hailey, 1988). Records and other behavioral measures of frequency could increase the response cost for a behavior that has few immediate reinforcers (Mayer, 1986). Further, while mail reporting requires two compliant acts (that is, doing a

self-exam and then mailing the card), retrospective recall of BSE frequency for the previous 4 months requires fewer behaviors. In the follow-up questionnaire, some subjects stated that they had performed their self-exams but failed to mail the cards for a variety of reasons (inconvenience, forgetting to mail cards and misplacing the cards). Despite these problems, current research suggests that the use of monthly cards to record performance of BSEs is the preferred method of self-report in BSE studies (Lavine & Hailey, 1991).

There are additional issues to consider when evaluating the results. The subject pool consisted of a fairly homogenous, self-selected sample of college-educated women. Almost all trainees considered breast cancer to be a serious disease and a majority considered themselves at risk. The time investment required to achieve proficiency in this study may make such training less attractive to those who are less motivated to learn BSE. Hence, reducing the duration of training while maintaining proficiency levels is a challenge both for reasons of cost-efficiency and marketability of training programs.

Besides considering generalization of results to other populations, it is also important to evaluate transfer of detection skills from breast models with

little nodularity to live tissue. Subjects in this study did not receive training on palpation skills on their own breast tissue. There is some support for transfer of skills in that two subjects detected lumps in their own breast tissue. In one instance, the subject's physician was unable to detect the lump by clinical breast exam and the subject was convinced that she would not have detected the lump, barring her participation in this study. However, previous research (e.g., Neelakantan et al., 1981; Pennypacker et al., 1981) suggests that training on breast models that more closely simulate a woman's own breast tissue and training on both models and the trainee's own tissue appear to improve proficiency and the confidence of women in their BSE skills.

In sum, results of this research suggest that reassessment and retraining could facilitate maintenance of BSE skills following training to criterion. Given the observation of declines in detection rates following training and the importance of early detection of breast tumors, health professionals would do well to schedule a trainee for a demonstration of skills. While the most effective schedule of such assessments remains undetermined, observations of decline in detection rates and/or deterioration of skill components at reassessments would be useful prompts for additional training and feedback.

Periodic reassessments are not time-consuming (approximately 5 to 8 min.) and can be conducted in conjunction with mammographs, clinical exams or other routine health care. While the effects of BSE on cancer mortality rates are not known, this study indicates that it is possible to train women to achieve high proficiency in BSE skills, and the use of periodic reassessments (and retraining) may be a promising strategy to prevent deterioration in acquired skills.

Appendix A
BSE Questionnaire

BSE QUESTIONNAIRE

This questionnaire assesses information and practices relevant to breast self-examination and breast cancer. Please read each question carefully and choose the appropriate response category either by circling yes or no or by placing an X against the appropriate response option. Your responses to this questionnaire will be kept strictly confidential. If you have any concerns or questions about this form, please speak to the researcher present.

1) Name: Code:

2) Ph.#:

3) Age:

4) Marital status: Married ____
 Never married ____
 Widowed ____
 Divorced ____

5) Education level:

6) Do you have any children? yes no

If yes, how old were you when you had your first child?

Less than 30 years ____

More than 30 years ____

7) Have you gone through menopause? yes no

If yes, how old were you when you finished menopause?

Less than 50 years ____

More than 50 years ____

8) Do you remember how old you were when you had your first menstrual period? yes no

If yes, were you

Less than 12 years? ____

More than 12 years? ____

9) Do you have a family history of cancer? yes no

10) Do you have a family history of breast cancer?

(specifically, have any of your female relatives: mother /sister /aunt been diagnosed with breast cancer?)

yes no don't know

11) Please indicate (by placing an X) if you have had any of the following cancers:

Breast cancer ____
Uterine cancer ____
Ovarian cancer ____
Colon cancer ____

12) Do you have fibrocystic disease? yes no don't know

If yes, have you ever had a breast biopsy? yes no

13) Have you had a breast exam done by your physician / nurse? yes no

If yes, how often?
Every year or less ____
Every 2 years ____
Other ____

14) Date of your last breast exam done by a physician / nurse:

15) Have you had a mammogram (X-ray of the breasts)?
yes no

If yes, how often?
Every year ____
Every two years ____
Every three years ____
Other ____

16) What was the date of your last mammogram?

17) Do you practice breast self examination? yes no

If yes, how often?
Daily ____
Weekly ____
Monthly ____
Every three months ____
Every six months ____
Once a year ____

18) In the past 4 months; how many times have you practiced a breast self-exam?

_____ times

In the past 4 months, how many menstrual periods have you had?

19) Have you ever been taught breast self-examination?
yes no

If yes, by whom?

nurse _____
physician _____
other _____

If yes, how were you taught?

Informal instruction:

Pamphlet _____
Newspaper/magazine _____
Television _____
Film/videotape _____

Formal instruction:

American Cancer Society group _____
Other group training _____
Individual training _____
Breast model used _____
Self-modeling over clothing _____
Self-modeling without clothing _____

20) Which of these words best describes how confident you feel that you can find an abnormality in your breasts if there was one?

Highly _____
Moderately _____
Slightly _____
Not at all _____

The next section of this questionnaire assesses information and practice of breast self-examination:

1) At what time of the month, is it generally recommended that a woman do her breast self-exam?

PLEASE RESPOND TO THE FOLLOWING STATEMENTS ABOUT YOUR PRACTICE OF BREAST SELF-EXAMS. IF YOU DO NOT EXAMINE YOUR BREASTS, PLEASE RESPOND TO THE FOLLOWING QUESTIONS

ACCORDING TO HOW YOU MAY DO A BREAST SELF-EXAM:

2) Please choose the appropriate response category if your breast exam involves the following steps:

a) I conduct the exam lying down/standing up/facing a mirror

b) While doing the exam, I palpate my breast using:
no particular pattern/ a circular search pattern/ a wheel or a spoke pattern (begin at the nipple and move in straight lines outwards like the spokes in a wheel) / a vertical search pattern

I examine the nipples	yes	no
I examine under the arm	yes	no
I examine under the collar bone	yes	no

c) I use my finger tips to do the exam	yes	no
I use the flat pads of my fingers to do the exam	yes	no
I use my thumb during an exam	yes	no
I use my entire hand	yes	no

I examine my left breast with my left hand and my right breast with my right hand	yes	no
I examine my left breast with my right hand and my right breast with my left hand	yes	no
I use both hands to examine a breast	yes	no

I use light, moderate and heavy pressure	yes	no
I examine each spot using a small rotatory circular motion	yes	no
I examine each spot more than once	yes	no

3) Although most women are aware of breast self-examination, most do not practice regularly. If you have heard about breast self-examination, and you do not perform an exam regularly, could you identify reasons why you do not perform an exam regularly?

4) Please complete the following sentence by choosing one of the following responses:

not a really serious, serious, quite serious, very serious:

I perceive breast cancer as (a) disease.

- 5) I rate my chances of developing breast cancer as:
- Not at all possible _____
 - Remotely possible _____
 - Possible _____
 - More than possible _____
 - Almost certain _____
- 6) Do you perceive any benefits to doing a breast exam regularly?
-

Appendix B
BSE Card

BSE CARD

When you conduct a BSE, please record the following information, and return this card (in the envelope provided) to the researcher via campus mail.

Date of BSE:

Period began on:

Period ended on:

Any findings:

Appendix C
Consumer Satisfaction Survey

CONSUMER SATISFACTION SURVEY

Please respond to the following questions about your participation in this study. You do not have to write your name on this form.

1. How easy was it for you to learn the BSE skills taught in this study?

1	2	3	4	5
very difficult		somewhat easy		very easy

2. How helpful was the BSE videotape in teaching you BSE skills?

1	2	3	4	5
not at all helpful		somewhat helpful		very helpful

3. If you received additional training after watching the videotape, how helpful was this additional training?

1	2	3	4	5
very helpful		somewhat helpful		not at all helpful

4. What components would you like to see added to the BSE training program?

5. Please complete this sentence by selecting the appropriate response options:

Participating in this study has helped me in the following ways:

☐ 1) I know more about my risk for developing breast cancer.

☐ 2) I perform regular (monthly) breast self-exams.

☐ 3) I attend to new information on breast cancer such as newspaper articles, personal experiences etc.

___ 4) I am more likely to attend breast cancer screenings according to the recommendations by the medical profession.

___ 5) Other (please describe) _____

___ 6) None of the above

6. Since receiving BSE training, how often have you used these skills?

_____ times

7. How important is it to you to know how to do a BSE proficiently?

1	2	3	4	5
very		somewhat		not at all
important		important		important

8. Have you discussed BSE training with others?

___ Yes ___ No. If yes, with whom? _____

9. Would you recommend this training to other women?

___ Yes ___ No

10. Will you continue to perform breast self-exams in the future?

___ Yes ___ No

11. What factors may influence you to discontinue regular breast self-exams in the future?

12. Please select one of the following options to complete this sentence:

Prior to participating in this study, if you have found a lump in your breasts, you would have:

____ 1) Gone to a physician for a physical exam or a mammogram right away

____ 2) Gone to a physician if the lump had not disappeared after a few weeks

____ 3) Ignored or forgotten about it

____ 4) Other. Please describe _____

Following your participation in this study, if you find a lump in your breasts, you are likely to:

____ 1) Go to a physician for a physical exam or a mammogram right away

____ 2) Go to a physician if the lump has not disappeared after a few weeks

____ 3) Ignore or forget about it

____ 4) Other. Please describe _____

Thank you for participating in this study.

Appendix D
Definitions of BSE Proficiency Components

DEFINITIONS OF BSE-PROFICIENCY COMPONENTS

Score the subject's performance according to these definitions:

1. Number of hands: Give the subject a score of 1 if she uses either her left or right hand to do the exam. Sometimes, subjects switch hands when they are tired; score 1 if subject uses one hand consistently. Score 0 if subject uses both hands simultaneously.
2. Number of fingers used: Score 1 if subject uses 2-3 fingers held together at least 90% of the time. Sometimes, a subject will check a spot which appears suspicious with 1 finger-the score remains 1. Give the subject a score of 0 if her technique consists of pushing down with one finger (somewhat similar to playing a piano) 90% of the time she does the exam.
3. Finger pads used: This component is fairly subjective. Give the subject a score of 1 if her fingers are horizontal because then she is more likely to be using the finger pads and not finger tips.
4. Search pattern: Score 1 if the subject uses a vertical search. If subject uses Circular (C) or Wheel spoke (W) search-write the appropriate letter on the data sheet.
5. Finger motion: Score 1 if the subject moves her fingers in a circular motion at each spot examined.
6. Pressure changes with palpation: Score 1 if the subject uses a consistent pattern (at least 90% of the time) of varying pressure with the circular palpations. If the subject pushes deeply with one finger consistently, score 0.

Appendix E
BSE Questionnaire at 4 Month Follow-up

BSE QUESTIONNAIRE

This questionnaire assesses information and practices relevant to breast self-examination and breast cancer. Please read each question carefully and choose the appropriate response category either by circling yes or no or by placing an X against the appropriate response option. Your responses to this questionnaire will be kept strictly confidential. If you have any concerns or questions about this form, please speak to the researcher present.

- 1) Name: Code:
- 2) Age:
- 3) Have you gone through menopause during your participation in this study? yes no
- 4) Do you have a family history of cancer? yes no
- 5) Do you have a family history of breast cancer?
(specifically, have any of your female relatives: mother / sister/ aunt been diagnosed with breast cancer?) yes no
- 6) Please indicate (by placing an X) if you have had any of the following cancers:

Breast cancer ____
Uterine cancer ____
Ovarian cancer ____
Colon cancer ____

- 7) Has your physician/nurse performed a breast exam for you since participating in this study? yes no

If yes, what was the date of this exam?

- 8) Have you obtained a mammogram since you began participating in this study? yes no

If yes, what was the date?

9) In the past 4 months, how many times have you practiced a breast self-exam?

_____ times

In the past 4 months, how many menstrual periods have you had?

After training was completed, you were given cards to record performance of a breast self-exam every month for the following 4 months. If you did not mail the cards back to the researcher, could you explain why?

10) Which of these words best describes how confident you feel that you can find an abnormality in your breasts if there was one?

Highly _____
Moderately _____
Slightly _____
Not at all _____

The next section of this questionnaire assesses information and practice of breast self-examination:

1) At what time of the month, is it generally recommended that a woman do her breast self-exam?

REGARDLESS OF WHETHER YOU PRACTICE BREAST SELF-EXAMS OR NOT, PLEASE RESPOND TO THE FOLLOWING QUESTIONS. IF YOU DO NOT EXAMINE YOUR BREASTS, PLEASE RESPOND TO THE QUESTIONS ACCORDING TO HOW YOU MAY DO A BREAST SELF-EXAM:

2) Please choose the appropriate response category if your breast exam involves the following steps:

a) I conduct the exam lying down/standing up/facing a mirror

b) While doing the exam, I palpate my breast using:
 no particular pattern/ a circular search pattern/ a wheel
 or a spoke pattern (begin at the nipple and move in
 straight lines outwards like the spokes in a wheel) / a
 vertical search pattern

I examine the nipples	yes	no
I examine under the arm	yes	no
I examine under the collar bone	yes	no

c) I use my finger tips to do the exam	yes	no
I use the flat pads of my fingers to do the exam	yes	no
I use my thumb during an exam	yes	no
I use my entire hand	yes	no

I examine my left breast with my left hand and my right breast with my right hand	yes	no
I examine my left breast with my right hand and my right breast with my left hand	yes	no
I use both hands while examining a breast	yes	no

I use light, moderate and heavy pressure	yes	no
I examine each spot using a small rotatory circular motion	yes	no
I examine each spot more than once	yes	no

3) If you do not perform an exam regularly, could you
 identify reasons why you do not perform an exam regularly?

4) Please complete the following sentence by choosing one
 of the following responses:

not a really serious, serious, quite serious, very serious:

I perceive breast cancer as (a) disease.

5) I rate my chances of developing breast cancer as:

Not at all possible	_____
Remotely possible	_____
Possible	_____
More than possible	_____
Almost certain	_____

6) Do you perceive any benefits to doing a breast exam regularly? If yes, please explain.

Appendix F
BSE Proficiency Record Form

BSE PROFICIENCY RECORD FORM

Subject #:

Date:

Pretraining / Posttraining / Reassessment / Follow-up
(4 mth/1 yr)

	Trial 1	Trial 2
No. of correct detections		
Av. confidence ratings for correct detections		
% of lumps correctly detected		
No. of false positives		
Av. confidence ratings for false positives		
Duration of exam		
<u>Techniques</u>		
No. of hands used		
No. of fingers used		
Finger pads used $\geq$ 90% (Y/N)		
Search pattern (V/C/W/Other)		
Finger motion: Circular/Other		
Pressure changes with palpation (Y/N)		

Appendix G
Responses to Consumer Satisfaction Survey

RESPONSES TO CONSUMER SATISFACTION SURVEY

NOTE: x = Mean response

1. How easy was it for you to learn the BSE skills taught in this study?

1	2	3	x 4	5
very difficult		somewhat easy		very easy

2. How helpful was the BSE videotape in teaching you BSE skills?

1	x 2	3	4	5
very helpful		somewhat helpful		not at all helpful

3. If you received additional training after watching the videotape, how helpful was this additional training?

1 x	2	3	4	5
very helpful		somewhat helpful		not at all helpful

4. What components would you like to see added to the BSE training program?

Printed summary of video information, more feedback on the difficult-to-detect lumps, view tape more than once, better models, more models so that errors could be pointed out, more scientific information on lumps, less video and more self-exam training, monitor self-exam to see if the skills have generalized, verbal review of essential steps in the video at follow-up, being able to buy the videotape, review tape again, additional models for practice, getting feedback on the kind and location of missed lumps, repetition of the opportunity to examine different kinds of lumps.

5. NOTE: Number in parenthesis following each statement indicates the number of subjects who selected this statement.

Please complete this sentence by selecting the appropriate response options:

Participating in this study has helped me in the following ways:

1) I know more about my risk for developing breast cancer (8)

2) I perform regular (monthly) breast self-exams (17)

3) I attend to new information on breast cancer such as newspaper articles, personal experiences etc. (16)

4) I am more likely to attend breast cancer screenings according to the recommendations by the medical profession (17)

5) Other (please describe): Reduced anxiety, better skills, more awareness of regular BSE, encourage others to learn method, self-exams are more effective, more skilled in detecting lumps, I do the exam more accurately now, regular exams but not every month, I feel my self-exam is adequate until my annual physical, more confidence in my ability to find lumps which makes self-exam more worth doing, I know how to do an exam, learn about different kinds of lumps, develop skills and BSE techniques, make it likely that I'll practice BSE every 2 months.

6) None of the above (0)

6. Since receiving BSE training, how often have you used these skills?

Mode = 4, Range = 2 to 8.

7. How important is it to you to know how to do a BSE proficiently?

1 x	2	3	4	5
very important		somewhat	important	not at all important

8. Have you discussed BSE training with others?

Yes (21) No (8). If yes, with whom?

Friends (8)

Female relatives (7)

Spouse (2)

Physician (3)
 Co-workers (10)
 Family (3)
 Health professionals (2)

9. Would you recommend this training to other women?

Yes (29) No (0)

10. Will you continue to perform breast self-exams in the future?

Yes (29) No (0)

11. What factors may influence you to discontinue regular breast self-exams in the future?

Forgetting (4), busy (7), laziness (6), discomfort of compression, thinking risk is low, irregular periods, not finding lumps may lose my motivation, complacency, anxiety about finding something.

12. Please select one of the following options to complete this sentence:

Prior to participating in this study, if you had found a lump in your breasts, you would have:

- 1) Gone to a physician for a physical exam or a mammogram right away (25)
- 2) Gone to a physician if the lump had not disappeared after a few weeks (4)
- 3) Ignored or forgotten about it (0)
- 4) Other (0)

Following your participation in this study, if you find a lump in your breasts, you are likely to:

- 1) Go to a physician for a physical exam or a mammogram right away (29)
- 2) Go to a physician if the lump has not disappeared after a few weeks (0)
- 3) Ignore or forget about it (0)

Appendix H
Human Subjects Institutional Review Board Approval

WESTERN MICHIGAN UNIVERSITY

Date: May 2, 1990

To: Bernardine M. Pinto

From: Mary Anne Bunda, Chair *Mary Anne Bunda*

This letter will serve as confirmation that your research protocol, "Training and Maintenance of Breast Self-Examination Skills", has been approved as expedited by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application.

You must seek reapproval for any change in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

xc: W. Fuqua, Psychology

HSIRB Project Number 90-03-23

Approval Termination May 2, 1991

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