TEACHING BREAST HEALTH TO ADOLESCENT FEMALES IN HIGH SCHOOL:
COMPARING INTERACTIVE TEACHING WITH TRADITIONAL DIDACTIC
METHODS

by

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TEACHING BREAST HEALTH TO ADOLESCENT FEMALES IN HIGH SCHOOL: COMPARING INTERACTIVE TEACHING WITH TRADITIONAL DIDACTIC METHODS

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HEALTH EDUCATION AND HEALTH PROMOTION

ABSTRACT

The purpose of this quasi-experimental study was to determine if teaching breast health with or without interactive learning using simulated breast models would affect the breast health knowledge and beliefs of adolescent females. The Health Belief Model (HBM) was the theoretical framework incorporated into the study. The constructs of the HBM that were utilized included perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

The sample consisted of 310 adolescent females’ ages 15-18 years. A breast health educational program was administered in two public high school settings in north Alabama to subjects enrolled in a health education, health science, or child development course. There were a total of 20 classes. The classes were randomly assigned to a treatment group with interactive learning or a comparison group with traditional didactic methods. One week before the program commenced, the participants were administered a Breast Health Knowledge pre-test and a Breast Health Beliefs pre-survey to assess prior breast health knowledge and breast health beliefs. An immediate breast health post-test and survey were administered. Also, a 4-week follow-up test and survey were administered to assess breast health knowledge retained and beliefs changed after the educational program. Data analysis included descriptive statistics, independent t-test, and analysis of variance (ANOVA) for each research hypothesis.
It was concluded that students who used interactive learning had higher knowledge retention of breast health/cancer. Students who used interactive learning had higher perceptions of benefits of breast self-awareness. Students who used interactive learning had lower perceived barriers to breast self-examination.

This research will add to the limited research in the area of breast health of adolescent females. It will provide health educators strategies to effectively teach breast health to this population and will also help facilitate the development of health education programs aimed at health promotion among adolescents.

Key words: adolescent breast health, breast self-awareness, interactive learning.
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<tr>
<td>AAFP</td>
<td>American Academy of Family Physicians</td>
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<td>AAP</td>
<td>American Academy of Pediatrics</td>
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<tr>
<td>ACS</td>
<td>American Cancer Society</td>
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<tr>
<td>BRCA</td>
<td>breast cancer gene</td>
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<tr>
<td>BSA</td>
<td>breast self awareness</td>
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<tr>
<td>BSE</td>
<td>breast self-examination</td>
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<tr>
<td>CBCSBS</td>
<td>Champion’s Breast Cancer Screening Beliefs Scale</td>
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<tr>
<td>CBE</td>
<td>clinical breast exam</td>
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<tr>
<td>CDC</td>
<td>Center for Disease Control</td>
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<td>CINAHL</td>
<td>Cumulative Index of Nursing and Allied Health</td>
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<td>HBM</td>
<td>Health Belief Model</td>
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<td>HRT</td>
<td>hormone replacement therapy</td>
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<td>IRB</td>
<td>Institutional Review Board</td>
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<tr>
<td>NCI</td>
<td>National Cancer Institute</td>
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<td>NHIS</td>
<td>National Health Interview Survey</td>
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<td>NIH</td>
<td>National Institute of Health</td>
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<tr>
<td>SCT</td>
<td>Social Cognitive Theory</td>
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<tr>
<td>SMOG</td>
<td>Simplified Measure of Gobbledygook</td>
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<tr>
<td>USDHHS</td>
<td>United States Department of Health and Human Services</td>
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<td>USPSTF</td>
<td>United States Preventive Services Task Force</td>
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CHAPTER I
INTRODUCTION TO THE STUDY

Introduction

*Incidence, Prevalence, and Survival of Breast Cancer*

The American Cancer Society (ACS) projected more than 192,000 new cases of invasive breast cancer will be diagnosed among women in the United States in 2010 (ACS, 2009). Over 40,000 women in the United States are expected to die from breast cancer in 2009 (ACS, 2009). After skin cancer, breast cancer is the most frequently diagnosed cancer in women in the United States. Every three minutes a woman in the United States is diagnosed with breast cancer. The rising incidence of breast cancer in women may be due to increased detection (ACS, 2010). Breast cancer has been increasing steadily from an incidence of 1:20 in 1960 to 1:8 women today, which is second only to lung cancer as the leading cause of cancer mortality among U.S. women aged 35 to 54 (ACS, 2010). The chance of dying from breast cancer is about 1 in 35. However, breast cancer death rates have been declining since about 1990, with larger decreases in women younger than 50 years (ACS, 2010). Breast cancer is three times more common than all gynecologic malignancies put together and is usually a much more aggressive disease in younger women (National Breast Cancer Foundation, 2009).

Overall, the incidence rate of breast cancer is higher for white women than for black women, yet the mortality rate for black women remains higher than white women (ACS, 2006; Bernstein, Mutschler, & Bernstein, 2000; Swanson, Haslam, & Azzouz,
Several factors have been suggested to contribute to the higher breast cancer mortality in black women than in white women, including poorer socioeconomic status with reduced access to health care, lower frequency of mammography with delayed diagnosis, obesity, and high-grade breast cancer tumors (Chlebowski, et al., 2005; Hahn, et al., 2007; Li, Malone, & Daling, 2003; O’Malley et al., 2003). The incidence rates are 20% to 40% higher in white women aged 55 years and older compared to black women, but are higher in young (under age 40) black women than in young white women with a less favorable prognosis. Research suggests that breast cancer risk factors are different for young black women than white women. Early age at first birth and having four or more children before age 40 appears to increase the risk of breast cancer in young black women, while in white women early childbearing reduces breast cancer risk. The cause is unclear but has been linked to genetics (Breast Cancer Fund, 2008; Chlebowski et al., 2005). Young black women have more aggressive tumors: typically estrogen-receptor negative, progesterone receptor tumors, HER2 negative and basal-type tumors, sometimes referred to as “negative” tumors. Triple-negative tumors do not respond to hormonal therapies such as tamoxifen (antiestrogen medication used to treat breast cancer) (Breast Cancer Fund, 2008; Chlebowski, et al., 2005). In addition, young black women present with more advanced breast cancer at diagnosis, including larger tumors and more lymph node involvement (Breast Cancer Fund, 2008; Britton, 2002; Chlebowski et al., 2005).

Incidence rates rose in the 1970s and the 1980s, increase slowed in the 1990s compared to the 1980’s and in general are declining for young women (ACS, 2007). After increasing for more than two decades, female breast cancer incidence rates
decreased by 2.2% per year from 1999 to 2005. This decrease may reflect the reduced use of hormone replacement therapy (HRT) after the results of the *Women’s Health Initiative* were published in 2002. The study linked HRT use to an increased risk of breast cancer and heart diseases (ACS, 2007).

The most critical factor in determining survival of breast cancer patients is the histological stage of the disease at the time of diagnosis. Fifteen years ago, the five-year survival rate from breast cancer (all stages) was 82% for white women compared with 66% for black women. Currently, the 5-year relative survival rate for breast cancer among black women is 77% compared with 90% among white women (ACS, 2008; Susan G. Komen Breast Cancer Foundation, 2007). A recent study showed that about 75% of the racial differences in survival between these two populations might be explained by stage at diagnosis, specific characteristics of the tumor, the presence of additional illness, and sociodemographic factors (ACS, 2007; Susan G. Komen Breast Cancer Foundation, 2007).

Although rare, breast cancer can and does occur in young women and adolescents. Less than 5% of all breast cancers occur in women under age 40. Women who are diagnosed with breast cancer under age 40 are more likely to have a BRCA1 or BRCA2 gene (ACS, 2007). These genes are important with breast cancer and women who carry defects of either of these genes are at greater risk of developing breast cancer. If a woman carries a defective BRCA1 or BRCA2 gene, she may have a 50 to 85% chance of developing breast cancer (Susan G. Komen Breast Cancer Foundation, 2008). During 2006 in the United States alone, over 11,000 young women under 40 years of age were
told that they have breast cancer. Only 1 in 2500 women will develop breast cancer by age 30 (Susan G. Komen Breast Cancer Foundation, 2007).

The ACS (2007) reported that the incidence of breast cancer among white and black women aged 15-19 years was 0 per 10,000. There was no other data found that reported the incidence, prevalence, and survival rate of breast cancer among adolescent females.

*The Controversy on Breast Cancer Screening Methods*

Currently, there are no known methods for the prevention of breast cancer. Morbidity and mortality rates can be reduced, however, through early detection and treatment. The ACS (2006) guidelines for the early detection of breast cancer in women at average risk are:

<table>
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<tr>
<th>Screening Method</th>
<th>Guidelines</th>
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<tr>
<td>Mammography</td>
<td>Annually starting at age 40</td>
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<td>Clinical Breast Exam (CBE)</td>
<td>CBE should be part of a woman’s periodic health examination, about every three years for women in their 20s and 30s and annually for women 40 and older.</td>
</tr>
<tr>
<td>Breast Self-Examination (BSE)</td>
<td>Women should report any breast change promptly to their health care provider. Beginning in their 20s, women should be told about the benefits and limitations of BSE. Women may choose to do BSE occasionally. Breast self-examination is optional.</td>
</tr>
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Women known to be at an increased risk may benefit from earlier initiation of early
detection testing and/or the addition of breast ultrasound or magnetic resonance imaging
[MRI] (ACS, 2006).

ACS (2006) has shifted from BSE and placed emphasis on breast self-awareness.
Breast self-awareness means that women become familiar with how their breasts look
and feel, and to be attuned to any change, and to bring any change to the attention of their
health care provider immediately. The shift to breast self-awareness was made for the
following reasons: (1) Some women weren’t sure if they were conducting BSE in the
right way and because of that, many did not practice BSE at all; (2) Research has not
shown a benefit for women in finding breast lumps by following a certain technique; and
(3) Physicians reported that most of their patients found a breast lump or other symptom
of breast cancer when they were going about every day activities, such as showering or
dressing (ACS, 2006).

In recent years, there has been an active discussion in the medical community
about whether the benefits of mammography really outweigh the risks. This debate was
sparked when two Danish scientists reviewed the existing evidence on mammography.
They felt that the majority of the randomized controlled trials were actually too flawed to
provide reliable information about mammography and did not include these trial results
in their analyses. Using the data only from the remaining studies, they concluded that
mammograms did not significantly change a woman’s chance of dying from breast
cancer (Olsen & Gotzsche, 2001; 2000). Most major health-related organizations disagree
with these conclusions, however, and feel that mammography does, in fact, save lives.
When researchers went back and looked at the trial results in response to the Danisreport,
they admitted that there were some problems with the trials, and concluded that mammography was a valuable screening tool (Susan G. Komen Breast Foundation, 2008).

Currently, mammography is the most effective method for detecting early malignancies and is considered the gold standard for early detection of breast cancer (ACS, 2008). The development and acceptance of mammography screening has had the most profound impact in the field of breast cancer in the last 15 years. Radiographic imaging of the breast detects about 85 to 90% of existing cancers and, along with regular professional check-ups and women becoming familiar with how their breast look and feel and promptly reporting breast changes to a health care provider (breast self-awareness), increases the rate of early breast cancer detection (ACS, 2006).

Clinical trials have demonstrated that mammography screening can reduce breast cancer deaths by 20 to 39% in women ages 50 to 74 and about 17% in women ages 40 to 49 (USDHHS, 2003). However, less than half of all women in the United States participate in screening. Reasons cited include fear of finding cancer, discomfort of mammogram, and lack of medical insurance (Eheman et al, 2006; Rauscher, Hawley, & Earp, 2005; Yarbrough & Braden, 2001).

The effectiveness of mammography screening in early detection of breast cancer among women younger than 50 years is also a matter of controversy (Lechner, Nooijer, & Vries, 2004; Vahabi, 2003). The sensitivity of mammography may be lower in premenopausal women, making mammography a less effective screening test because of their denser breast tissue (Secginli & Nahcivan, 2006). A greater proportion of breast cancers in younger women may not be detectable with screening mammography.
Therefore, breast self-awareness accompanied by CBE might be the strategy for early detection of breast cancer for women ages 20-39 (Susan G. Komen Breast Cancer Foundation, 2005).

Another breast cancer screening method, BSE, seemed promising when it was first introduced and it has been widely advocated, but the evidence that it actually provides a benefit is not conclusive. Results of studies on its effectiveness have been mixed, with some supporting its value and others not (Humphrey, Helfand, Chan, & Woolf, 2002; Institute of Medicine and National Research Council of the National Academies, 2003). Unfortunately, it is still unclear whether BSE is a useful way for most women to detect early stage tumors and improve their chances for survival if a tumor is detected. There was some controversy about whether BSE should even be included in the screening recommendations. BSE is the screening test that has the least scientific support (ACS, 2007; Susan G. Komen Breast Cancer Foundation, 2008). It was removed from the ACS guidelines in 2003 because research has shown that BSE plays a small role in detecting breast cancer compared with self awareness (ACS, 2006). Often women who do detect their own breast cancer find it outside the specific technique of BSE. They may detect a lump while showering or getting dressed, that is, just by being familiar with how their breasts look and feel. Therefore, the emphasis is on breast self-awareness. When it comes to self-detection, women should be aware of what their breasts normally feel like, and to be attuned to any change and to bring any change to the attention of their health care provider right away. Women just need to know their own bodies (ACS, 2008).

There are studies that support the monthly performance of BSE. These studies have illustrated that in the period between breast cancer screening rounds, a considerable
number of new cancers are detected, the so-called interval cancers (Epstein, Bertell, & Seaman, 2001; Jarvis, 2004; Lechner et al., 2004). The researchers of the studies advocate that BSE is really the only way that most women younger than age 40 can determine that they have cancer and after the age of 40, BSE detects the suspicious lumps that mammography did not pick up. Therefore, they have concluded that regular BSE might be an important tool, in order to self-detect cancers that have developed between the screening rounds.

Other researchers believe that BSE provides an alternative and relatively simple, low-cost method of early detection and, should be performed in conjunction with mammography or CBE (Anderson et al., 2003; Epstein, Bertell, & Seaman, 2001; Epstein, 2003; Manasciewicz, 2003). Data from randomized studies conducted on BSE in Russia and China have suggested no benefit from regular BSE or education on breast cancer mortality (Semiglazov et al., 1999; Thomas et al., 1996; Thomas, Gao, et al., 2002). However, Champion (2003) states that the design issues of these studies raise some questions about the results. Similarly, Vahabi (2003) has pointed out that there are several caveats with respect to these two randomized studies. There was low compliance both in terms of the number of women performing BSE and the frequency of BSE in the intervention groups.

One of the largest studies done to date in Shanghai, China did not find a difference in mortality after 10 years between women who practiced regular BSE and women who did not (Thomas, Gao, Ray, et al., 2002). There were 135 (10%) breast cancer deaths in the instruction group and 131 (10%) in the control group. The cumulative breast cancer mortality rates through 10 to 11 years of follow-up were similar
for women in the instruction group relative to that in the control group. Moreover, the study found that the self-exam group had nearly twice the number of benign breast masses diagnosed as the other group, which meant that BSE caused many women to endure unnecessary follow-up biopsies (Thomas, Gao, Ray, et al., 2002).

In the Chinese study, it is unclear whether women in the intervention group were proficient enough to detect any abnormalities in their breasts since no supervision was provided during the examination (Manasciewicz, 2003; Vahabi, 2003). Several studies have also suggested that BSE could result in earlier detection of breast cancer, especially when the quality of the procedure was considered and might contribute to more favorable mortality and morbidity outcomes (Anderson, et al., 2003; Champion, 2003; Lechner et al, 2004; Secginli & Nahcivan, 2006).

Thomas, Gao, et al. (2002) concluded that if mammography and CBEs are not available to confirm suspicious lumps found by BSE then public health officials should not spend their limited funds on teaching BSE but on other programs, such as immunizations. Contrary to Thomas, Gao, et al. (2002), there is evidence from the Canadian National Breast Screening Study that in developing countries where mammography services are almost non-existent, women over the age of 50 years could benefit from learning BSE (Miller, Baines, To, & Wall, 1992). Among motivated women who practice regular BSE and are very proficient at performing BSE, it might make a difference, but the study of Thomas, Gao, et al. (2002) did not test that assumption.

Differences in China’s culture and access to health care make it hard to completely generalize these results to screening in the Unites States. Also, the researchers did not rule out the possibility of a modest survival benefit if women practiced self exam
regularly and proficiently. They saw no reason to discourage women from practicing BSE as long as women were aware that the practice had no proven survival benefit and could increase their chances of having unnecessary follow-up tests. Despite the controversy about its overall benefit, BSE does provide an opportunity for women to become more aware of their own bodies and play active roles in their health (Dillon, 2007; Jarvis, 2008).

Although cancer prevention experts have recommended BSE for years, many organizations, including the U.S. Preventive Services Task Force (USPSTF) (2002), say there is insufficient evidence to recommend for or against teaching or performing routine BSE. The USPSTF found poor evidence to determine whether BSE reduces breast cancer mortality. The USPSTF found fair evidence that BSE is associated with an increased risk for false-positive results and biopsies. Due to design limitations of published and ongoing studies of BSE, the USPSTF could not determine the balance of benefits and potential harms of BSE. In 2001 The Canadian Task Force on Preventive Health Care analyzed medical literature on BSE and concluded that there is no benefit to routine teaching of BSE (Thomas, Gao, et al. 2002).

The question of whether young adolescent girls should be taught BSE is controversial because of the low risk of breast cancer in this age group and the potential for anxiety and the necessity for testing if a mass is found. The main reason to teach BSE is to help the adolescent girl feel more comfortable about her body and acclimate her to how her breasts feel normally, so that when she reaches the age at which she becomes at risk for breast cancer (over age 20), she will know what is normal for her (Alderman, 2000; Susan G. Komen Breast Cancer Foundation, 2008). The American Academy of
Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) recommends that breast health, with an emphasis on self-awareness and BSE, should be taught to adolescents in private offices, clinics, and high school health education classes during the preteen and teen years. A young woman may experience a number of changes in her breasts during puberty and adolescence as she becomes an adult. Some breast changes or conditions are related to her menstrual cycle, while others may occur at any time. While most breast conditions are benign, it is important for young women to be aware of the need for BSE and proper breast health, so that she may detect any problems (AAFP, 2007; AAP, 2004; 2007; Powe, Underwood, Canales, & Finnie, 2005; Sloand, 2003).

**Effective Teaching Methods for Breast Health at the Secondary Level**

Today, high school students are a diverse group with the instructional background of the computer age. Elementary and high school teachers have accepted the challenge of competing with the media in gaining and holding the attention of the learner. These students expect learning to be fun. Because most high school classes are composed of students who have different learning style preferences, teachers have to adopt a flexible approach to their instructional practice so that their ultimate approach is integrated (Beaman 2008; Nuckles 2000; Pithers, 2001). David Kolb, who is credited with initiating the learning style movement, notes that “it is more effective to design curriculum so that there is some way for learners of every learning style to engage with the topic, so that every type of learner has an initial way to connect with the material, and then begin to stretch his or her learning capability in other learning modes” (Delahoussaye, 2002).
Teaching to students’ learning styles gears instruction toward maximum use of students’ preferred ways of accessing their intellectual strengths (Soniat, 1998). According to O’Neil (1990) and Beaman (2008) the learning styles most widely known are those defined as visual, auditory, and tactile/kinesthetic.

1) Visual learners: learn best from visual displays including diagrams, illustrated textbooks, videos, CDs, DVDs, computer-based programs, flipcharts, and handouts (printed materials) (Beaman, 2008).

2) Auditory learners: learn best through verbal lectures, discussions, talking things through, listening to stories/experiences, and listening to what others have to say (Simmers, 2008).

3) Tactile and Kinesthetic learners: learn best through a “hands-on” approach known as interactive learning (Beaman, 2008).

Simmers (2008) and Kline (1995) believe instruction which favors student learning styles is particularly advantageous to underachievers, since regardless of intelligence all students learn best when using their preferred style. Utilizing more than one teaching modality improves instruction and extends students’ thinking (Simmers, 2008).

During the review of the literature for the proposed study, breast health studies that examined teaching methods and/or learning styles of adolescents were not found. The few research studies that were found, pertaining to breast health programs and adolescents, merely stated the teaching methods that were utilized and hypothesized improved breast health knowledge, attitudes, and BSE practice. The researchers of the studies found did not analyze or emphasis the teaching methods, that is, the teaching
methods that were more effective for teaching breast health to adolescents were not investigated by the researchers of the studies found.

Traditionally, lecture has prevailed as the instructional strategy of choice at the high school level, with teachers doing most of the talking and students responding to teacher questions or asking for clarification, a teacher-as-worker and students-as-product model (Beaman, 2008; Sizer, 1984). There are, however, more effective instructional strategies which encourage interactive involvement of secondary students in learning, and require that teacher-centered instruction give way to student-centered pedagogy (Beaman, 2008; Murphy, 1991).

The use of computer technology in education is widespread, both in the form of computer-based learning (CBL) or in the use of generic software tools in support of students’ learning activities. Computer-based learning has become an alternative to lecture. CBL is now used to replace traditional teaching in secondary and postsecondary schools, however, it is important to monitor its effectiveness in relation to the forms of teaching it replaces (Macleod, 2009).

Computers offer a way to customize instruction and allow students to learn in the way they are best wired to process information. The benefits of integrating computers into instruction are numerous. Computer technology can empower students with thinking and learning skills that help them interact with complex information. It can assist in improving students’ achievement. For example, students’ motivation is increased when technology is used to assist the teacher in facilitating a particular lesson, that is, the lesson is made fun and exciting. In addition, technology in the classroom helps to prepare students for the outside world and can offer resources and experiences that books
are not able to offer. Students are found to be challenged, engaged, and more independent when using technology (Canady & Rettig, 2008). Computer-assisted learning accommodates the individual needs, intelligence, and styles of learning of students. Technology in the classroom provides students with opportunities to work at a higher order of cognition and increases teachers’ expectations of students. Effective integration into the course material creates the potential for teachers and students to work as a team toward cooperative and authentic learning (Keengwe, Onchwari, & Wachira, 2008).

Accommodations for individual strengths, weaknesses, and disabilities are more manageable for teachers when they use computer technology that can direct learning or promote creative construction of knowledge. Students can benefit from problem solving and higher order reasoning skills. Computer technology provides opportunities for students to take an active role in their own learning. Utilizing computer technology shifts the locus of control in the classroom from teacher-centered to student-centered instruction. Teachers and students can discover new motivation to expand learning and create real-life applications (Canady & Rettig, 2000).

Audiovisuals can be effectively used with all styles of learning. They may be used with computer-based learning, to reinforce lecture material, and demonstrate a psychomotor skill, thereby promoting improved student learning. Because of its analogy to watching television and entertainment videos, it tends to be a comfort zone for adolescents (Beaman, 2008; Lorber & Pierce, 1990). Audiovisuals seem to be the teaching strategy most often used by the few researchers found that conducted studies on breast health programs for adolescents. The audiovisuals were used to demonstrate the skill of BSE and reinforce lecture information.
Interactive learning is a common method employed in schools today and often involves the use of computers and other tangible equipment. The proposed study will not utilize computers during interactive learning but will use simulated breast models as tangible equipment. Teachers often use interactive learning as a way to get their students involved. Interactive learning helps students grasp concepts successfully or review a concept that may be difficult to understand (Keengwe, Onchwari, & Wachira, 2008).

Most of the time in a typical classroom setting, students are involved only passively in learning; for example listening to the teacher, looking at the overhead or slide and reading from the textbook. Research shows that such passive involvement generally leads to a limited retention of knowledge by students. After two weeks of teaching and learning in the classroom students tend to remember 10% of what they have read, 20% of what they have heard, 30% of what they have seen and heard, 70% of what has been said during discussion, and 90% of what they say and do [simulation] (McKeachie, 1998). Research also indicates that by re-organizing or adapting ways information is presented to students, teachers can create an environment in which knowledge retention is significantly increased. Such situations require the cooperation of the students themselves. One of the best methods is to implement active learning (McKeachie, 2008).

The proposed study’s comparison groups will be taught with the teaching methods of lecture/discussion and video, but will not utilize interactive learning with simulated breast models. The interactive learning with the simulated breast models will be used with the treatment groups, in addition to lecture/discussion and the video. Interactive learning, the “hands-on” approach, will guide students toward constructing
their own realities and solving their own problems (Kline, 1995; Simmers, 2008).

Interactive learning will require more involvement of the student, thereby, guiding the student with the application of decision making in real life situations. The demonstration and “hands-on” approach as part of teaching breast health reinforce the information being taught (Ludwick & Gaczkowski, 2001).

Background of the Problem

Pathophysiology

There are many pathologic types of breast cancer, but the most common, causing 80% of cases, is infiltrating ductal carcinoma. As the name implies, the disease originates in the mammary ducts, specifically growing in the epithelial cells lining these ducts. The rate of cancer growth varies and partially depends on hormonal influences. It takes an estimated 5 to 9 years for a cancer cell to divide and result in a lesion large enough to be clinically palpable (Black & Hawks, 2005; Ignatavicius & Workman, 2002). Breast changes such as thickening, lumps, spontaneous nipple discharge or skin changes, such as dimpling or puckering may be noticeable (Susan G. Komen Breast Foundation, 2007).

As long as the cancer remains within the duct, it is considered noninvasive. The cancer is classified as invasive when it penetrates the tissue surrounding the duct. Most breast cancers arise from the intermediate ducts and are invasive. Once invasive, the cancer grows into the tissue around it in an irregular pattern. The lesion is felt as an irregular, poorly defined mass (Black & Hawks, 2005; Ignatavicius & Workman, 2002). It is estimated that in 2009 over 192,000 new cases of invasive breast cancer and over
67,000 new cases of noninvasive breast cancer will be diagnosed among women in the United States (ACS, 2009).

Metastases result from seeding of the cancer cells into the blood and lymph systems, which permits spread of these cells to distant sites. The most common sites of metastatic disease from breast cancer are bone, lungs, brain, and liver. The course of metastatic breast cancer is related to the affected site and the impaired function (Black & Hawks, 2005; Ignatavicius & Workman, 2002).

**Etiology**

There is no known etiological agent responsible for breast cancer. However, there are several known factors that increase a woman’s risk for developing breast cancer. Although being female is the greatest risk factor, some women are at higher risk than others (Black & Hawks, 2005; Ignatavicius & Workman, 2002).

Important risk factors for female breast cancer include a defect in the BRCA1 or BRCA2 gene, early age at onset of menarche, late age at onset of menopause, first full-term pregnancy after age 30, nulliparity, a history of pre-menopausal breast cancer for mother and a sister, and a personal history of benign proliferative breast changes. As mentioned earlier, white women are more likely to develop breast cancer than any other race, and as age increases, so do risks (ACS, 2006; National Cancer Institute, 2001).

**Breast Health Promotion**

Consumer education about breast cancer detection is an important component that increases utilization of screening services. Consumer education provides information
such as breast cancer facts and statistics, breast cancer risk factors, screening methods, and ways to reduce risk of developing breast cancer. It ultimately increases awareness. Breast cancer detection information is presented to the public through health campaigns. These health campaigns are advertised on television, radio, in newspapers, magazines, and brochures. Mass media can have powerful effects on setting “healthy” or “unhealthy” agendas for communities by emphasizing certain behaviors (National Consumers League, 2002).

Primary and secondary prevention of breast cancer have been a major part of health promotion and health education efforts for decades. It includes activities to prevent the occurrence of disease. Educating people about risk factors and lifestyle changes to reduce risk is a vital component of primary prevention. Breast cancer education programs are designed to heighten awareness and promote breast cancer screening. In secondary prevention, action is taken to enable early detection of breast cancer and to stop or modify the severity or extent of disease. The dominant activities in secondary prevention are screening, diagnosis, and cure. Until there are well-established primary prevention strategies that will benefit the general population of women at risk, secondary prevention in the form of breast self-awareness, CBE, and mammography screening represents an important strategy for reducing mortality from this disease.

Promotion of breast health is an attitude that if fostered early in life may pay lifelong dividends. The adolescent period is a time of rapid change, physical and emotional, that provides teaching opportunities for shaping health behaviors into adulthood. Breast health programs focus on adolescent females with the premise that teaching adolescents’ breast self-awareness will increase the likelihood they will continue
the practice into adulthood. For example, teaching breast health may influence positive behaviors such as seeking regular professional examinations if she notices changes in her breasts (ACS, 2006; Ludwick & Gaczkowski, 2001; Ogletree et al., 2004). A very small body of research has examined outcomes of BSE and self-awareness for adolescent females.

During adolescence, health promotion behaviors often are taught in school. Oral hygiene, safe sex, and safe driving are examples of health topics covered routinely in most school health education curriculums. Teaching breast health is less common, and little research has been performed to examine breast health awareness among adolescent girls (Ludwick & Gaczkowski, 2001).

Statement of the Problem

Breast cancer screening is a controversial public health concern regarding the benefits of screening methods and the optimal timing of those methods. The value of mammography is questioned based on recent evidence on incidence, mortality and age when breast cancer is likely to appear. Despite some controversy in recent years, the majority of experts agree on the evidence for effectiveness of breast screening by mammography for women aged 50 years and older, but for those under 50 years, the picture is less clear. However, the issue remains important both to policy makers and to individual women. According to reports from the Society for Women’s Health Research (2002), no health condition concerns women more than breast cancer. Over 40,000 women in the United States are expected to die from breast cancer in 2009 (ACS, 2009). Breast cancer is the most common type of cancer among American women. However,
breast cancer can be successfully treated. The key is breast cancer awareness with early detection (Susan G. Komen Foundation, 2006). Policymakers often focus on access to and quality of care. Although the incidence of breast cancer is lower at younger ages, the life years lost due to breast cancer diagnosed below 50 years of age amount to a third of all those lost due to the disease (Marshall, 2002; Miettinen et al., 2002; Moss, 2004).

In the absence of known, preventable causes of breast cancer, early detection of the disease is extremely important to ensure the best chance for treatment and survival (Powe et al. 2005; Susan G. Komen Foundation, 2006). Women find the overwhelming majority of their breast masses (70-95%) despite the two other modes of detection (CBC and mammography). These masses may be found by women while showering or getting dressed or through a structured BSE. The high percentage of breast masses found by women showering or getting dressed shows the importance of breast self-awareness. Females who practice breast self-awareness can become familiar with the way their breasts look and feel normally and will be able to recognize changes, such as thickening, lumps, spontaneous nipple discharge or skin changes, such as dimpling or puckering (AAP, 2004; Susan G. Komen Breast Cancer Foundation, 2006). Studies show that 85% of all lumps found in breast tissue are benign (Hislop, Worth, Kan, & Rousseau, 1997; Jarvis, 2004; Leight, et al., 2000). Although mammography remains the primary detection strategy, CBE is recommended as complementary screening methods and BSE is optional. Breast self-awareness is an important adjunct to mammography because 17% of cancers have been reported to appear during the interval between mammography screenings (Dillon, 2003). However, because annual screening mammography generally begins at age 40, this eliminates younger women. For this reason, it is recommended that
young females be taught breast health that includes the importance of breast self-awareness and how to perform BSE (AAP, 2004).

A young woman may experience a number of changes in her breasts during puberty and adolescence as she becomes an adult. Some breast changes or conditions are related to her menstrual cycle, while others may occur at any time. While most breast conditions are benign, it is important for young women to be informed about proper breast health, so that she may detect any problems (AAP, 2004; Powe et al., 2005; Sloand, 2003).

Even more prevalent than breast cancer is fibrocystic breast disease that affects 50% to 90% of the female population. The incidence is higher during the late teens and 20s. It is characterized by bilateral, multicentric nodules (Ignatavicius & Workman, 2002). Another common breast nodule that is more prevalent in young black females is fibroadenoma, affecting 60% (ACS, 2005). Fibroadenomas are the most common cause of breast masses during adolescence and they may occur into the 30s. Although the immediate fear is that of breast cancer, only 0.9% of these masses are malignant (Ignatavicius & Workman, 2002). Although BSE has not been shown to reduce breast cancer mortality, breast health education may promote stronger breast health awareness and more active self-care. Therefore, teaching breast self-awareness involves an important lifelong skill for all females. Encouraging positive health promotion skills during adolescence can enhance positive health promotion skills during adulthood (AAFP, 2007; AAP, 2007; Dillon, 2003).

The proposed study will use the Health Belief Model (HBM) as a framework to guide the research of adolescent females’ knowledge and beliefs associated with breast
health. Studies were found using the HBM as the theoretical framework to explain factors that encouraged or did not encourage the adoption of the breast self-awareness behavior. The HBM theory proposes that an individual’s attitudes and beliefs about health action and his or her environment influence whether the individual performs a health behavior (Strecher & Rosenstock, 1997).

The HBM is composed of constructs that are paramount in determining whether or not one will take a recommended course of preventive health action. The constructs of the HBM are as follows: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. For this proposed study, the constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers will be considered as they relate to breast health and breast self-awareness (see Table 1).

There are missed opportunities for teaching breast health to adolescents (Ludwick & Gaczkowski, 2001). One of the missed opportunities for teaching breast health awareness occurs in the 9th-12th grade health education curriculum. The Alabama Course of Study for Health Education (2009) incorporates the following 8 health content areas: community and consumer health, environmental health, family health, personal health and safety, mental and emotional health, nutrition, prevention and control of disease, and substance use and abuse. Each area has its own content standards. Content standards are statements that define what students should know and be able to do at the conclusion of a topic/course. Breast health is not addressed in any of the content areas. Potential standards for breast cancer awareness include: students will… “discuss breast cancer myths, describe early breast cancer detection methods, and state signs and
### Table 1

**Key Concepts and Definitions of the Health Belief Model of the Proposed Study**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived susceptibility</td>
<td>One’s opinion of chances of getting a condition.</td>
<td>Females who believe they are likely to get breast cancer, perhaps because a sister or mother had breast cancer, may be more likely to have a heightened awareness of breast health. Females should be taught breast health, even if they seem healthy.</td>
</tr>
<tr>
<td>Perceived severity</td>
<td>One’s opinion of how serious a condition and its sequelae are.</td>
<td>Females are more likely to respond to suggestions that they become aware of breast health if they view breast cancer as a serious health problem. Females should acquire knowledge about breast cancer that enables them to understand that it is very serious and sometimes fatal.</td>
</tr>
<tr>
<td>Perceived benefits</td>
<td>One’s opinion of the efficacy of the advised action to reduce risk or seriousness of impact.</td>
<td>Females must generally believe that breast self-awareness will actually do some good if they are to comply with screening guidelines. Begin implementing health promotion activities during adolescence to recognize the importance of breast cancer so as to carry over into adulthood.</td>
</tr>
<tr>
<td>Perceived barriers</td>
<td>One’s opinion of the tangible and psychological costs of the advised action.</td>
<td>Females who believe that measures to maintain good breast health may be time consuming, difficult, expensive, or painful may be unlikely to conduct or seek breast health care. Identify and reduce perceived barriers though correction of misinformation by educating adolescents.</td>
</tr>
</tbody>
</table>

*Note: Definitions of concepts from Glanz, K., Lewis, F., & Rimer, B. (1997), *Health Behavior and Health Education*. *
There are two content areas in which breast health could be incorporated. One area is family health. Content standard five of family health states, “identify common causes of disability and premature death.” Dying at a young age from breast cancer warrants premature loss of life. Examples in the course of study include sudden infant death syndrome, unintentional and intentional injuries, cardiovascular diseases, diabetes, and cancers. Breast health could also be discussed in the content area of personal health and safety. Content standard seven states, “recognize personal responsibility for lifelong health.” Examples in the course of study include participating regularly in physical activity, practicing water safety, operating motor vehicles safely, scheduling annual physical exams, cancer screenings, and immunizations. Breast self-awareness could be considered when scheduling annual physical exams and a component of cancer screening for breast cancer. The *Alabama Course of Study for Health Education (2009)* requires students not only to gain knowledge, but also to practice effective health skills/behaviors and to develop attitudes that promote healthy living. An important component of the course of study is its focus on the application and mastery of developing health-enhancing skills. Nevertheless, breast health is not a component of the course of study.

Another missed opportunity is with the health care provider. Adolescents are less likely than persons in other age groups to receive routine health care (Stephens, 2006). One in 10 adolescents does not have adequate health insurance, and one in 12 does not have a primary care physician (Centers for Disease Control and Prevention [CDC], 2005). Unfortunately, even when adolescents visit physicians, valuable opportunities for health promotion and prevention are missed in more than 50 percent of routine visits.
(Merenstein, Green, Fryer, & Dovey, 2001). Recommendations for screening and prevention are clear for adults and children but are less clear for adolescents (Agency for Healthcare Research and Quality, 2005; Moyer & Butler, 2004). Evidence regarding the effects of specific counseling on adolescent health outcomes is limited. However, some studies suggest that implementing professional guidelines or physician training improves the delivery of preventive health care in these patients (Klein et al, 2001; Ozer et al, 2005). The AAP (2007) and the AAFP (2007) recommend breast health education to adolescents during their office visits, thereby, endorsing health promotion during the preteen and teen years with a major emphasis on self-awareness. Also, physicians’ recommendations are more influential in changing behavior than hearing the same message from teachers, peers, parents, or others (Kreuter, Chheda, & Bull, 2002).

The quasi-experimental study design will assess the breast health knowledge and beliefs of adolescent females through the implementation of a breast health program with the treatment groups utilizing interactive learning with simulated breast models and the comparison groups will not incorporate interactive learning with the simulated breast models. The study’s research questions are closely tied with the Alabama Course of Study for Health Education (2009) requirements: attainment of knowledge, changing attitudes, and developing skills. The Alabama Course of Study for Health Education (2009) reflects awareness, prevention, health promotion, and effective instructional practices for secondary level health education.
Purpose of the Study

The purpose of this study is to determine if a breast health program with or without interactive learning with the simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females. The HBM constructs of perceived susceptibility, perceived seriousness, perceived benefits, and perceived barriers will be utilized to determine the breast health beliefs of adolescent females. Perceived susceptibility, perceived severity, and perceived benefits must be high and perceived barriers must be low in order for the behavior of breast health care to be adopted (Silk, et al. 2006).

The teaching methods that include cooperative learning, interactive learning audiovisuals, and computer-assisted instruction are considered the most effective modes of presentation for adolescent learning (Beaman, 2008; Daniels & Bizar, 2005; Duquette, 1997). Researchers who have conducted breast health learning programs have found that the traditional small groups, demonstration, practice, lecture-discussion, and audiovisuals were effective methods of teaching breast health to adolescent females (Clark et al., 2000; Cromer et al., 1992; Ludwick & Gaczkowski, 2001; Ogletree et al., 2004). A variety of learning and teaching methods are needed in the classroom to maintain student interest and to reflect more fairly those many different student learning styles. Lessons that are student-centered and which focus on the development of skills that can be used beyond the classroom walls are likely to be well received by students and more successful with them (Duquette, 1997). Breast health is one of those topics that promote awareness and self-care throughout the life span.
Little information is available regarding adolescents’ awareness of breast health and self-care. There was no information found pertaining to the most effective way to teach breast health to adolescents. The proposed study will help fill the void in breast health research of adolescent females by adding to the literature. It will serve as a guide for high school health educators in their quest to teach the difficult health promotion topic of breast health to adolescents.

Research Questions

This study will address the following research questions:

1. Do adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models have a significant increase in breast health knowledge than those who participate in a breast health program that does not include interactive learning with simulated breast models?

2. Is the adolescent female’s perceived susceptibility to breast cancer affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

3. Is the adolescent female’s perceived seriousness to breast cancer affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?
4. Are the adolescent female’s perceived benefits of breast self-awareness affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

5. Are the adolescent female’s perceived barriers of breast self-examination affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

Research Hypotheses

The major research hypotheses examined in this study are the following:

1. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to have significantly higher breast health knowledge scores than those who participate in a breast health program that does not include interactive learning with simulated breast models.

2. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe they are susceptible to breast cancer than those who participate in a breast health program that does not include interactive learning with simulated breast models.

3. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to
believe breast cancer is significantly more serious than those who participate in a breast health program that does not include interactive learning with simulated breast models.

4. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are benefits of breast self-awareness than those who participate in a breast health program that does not include interactive learning with simulated breast models.

5. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are fewer barriers of breast self-examination than those who participate in a breast health program that does not include interactive learning with simulated breast models?

Significance of the Study

As sophisticated as teenage girls are becoming, it turns out they don’t know much about a topic close to their hearts: breasts. Breastcancer.org, together with Lankenau Hospital in Philadelphia, surveyed more than 3,000 adolescent females, they discovered: more than 30% of them perceived a normal change in their breast to be a sign of breast cancer; more than 20% thought breast cancer was caused by infection, tanning, drug use, stress, or breast injury— all of which are breast cancer myths (Weiss & Friedman, 2008).

During adolescence, health promotion behaviors often are taught in school. Healthy eating, personal hygiene, first aid, safe sex, drug abuse, safe driving, and
physical fitness are examples of health topics covered routinely in most school health education curriculums. However, breast health is one topic that is not often taught. The most commonly stated reason by high school health education teachers for not including breast health in the health education classes is that the instructor is uncomfortable with the subject and do not know how to teach it properly (Darroch, Landry, & Singh, 2000). Teaching adolescents about breast health is less common and little research has been performed to examine the breast health awareness of adolescent females. Several research studies were found pertaining to breast health knowledge, attitudes, and practices of older women and minority women. Only five recent studies, Clark et al., (2000); Devi, Singh, Kumar, & Walia (1998); Freeman, Scott, Waxman, & Arcona, (2000); Ludwick & Gaczkowski (2001); and Ogletree et al., (2004) were found on breast health education for adolescent girls.

In an attempt to improve early detection, preventive health services, such as breast health awareness have been widely promoted among older women. However, the AAP and the AAFP recommend that breast health education including BSE and self-awareness should be taught to adolescents in private offices, clinics, and high school health education classes during the preteen and teen years (AAFP, 2007; AAP, 2007).

The AAP and the AAFP (2002) have partnered up with an organization called Bright Futures. The Bright Future initiative was launched in 1990 to improve the quality and health services for children through health promotion and prevention. The ACS also promotes breast health education in its Right Choices program, which is designed to increase secondary school students’ understanding of cancer and to increase their ability to reduce their personal risks for cancer (ACS, 2004).
Washington, DC, has the second highest breast cancer death rate for women in the United States, particularly African American women. Many of those deaths are due to late diagnosis, and could have possibly been avoided through early detection and an understanding of risk factors (Goode, Sockalingam, & Lopez-Snyder, 2003). In 2001, the Howard University Cancer Center, with funding from the Cancer Research and Prevention Foundation, entered into a partnership with five area high schools to create a long-term initiative to reduce the death rate. Howard University health officials realized that talking with women while they were still young would be a critical time to create an awareness and understanding about their bodies and for them to learn about breast cancer and breast cancer screening methods. Other regions in the country have also established effective adolescent outreach breast cancer education programs during the past 10-15 years:

- Teens Talk about Breast Cancer, Adelphi, NY Statewide Breast Cancer Hotline Support Program
- Check-It-Out Teen Health Awareness Program, Hadassah Women’s Zionist Organization
- The Adolescent Breast Cancer Prevention, Risk Reduction and Education Project—Zero Breast Cancer in Marin County, California
Through creatively employing teen friendly media to translate scientific principles and promote a focus on personal health, more teens are being educated annually about what is known about breast cancer and steps they can take to stay healthy and informed.

The proposed study is important because of its implications for health care providers and health educators. The study will emphasis an effective method to teach breast health during adolescence, a time when health care providers may not provide adequate information about breast health and when other health education topics often are addressed in school. The study will investigate a difficult or uncomfortable subject for high school health educators and how it can be integrated into the health education curriculum by utilizing a hands-on approach (interactive learning).

Definitions of Terms

The following are operational definitions of terms in this study:

**Attitude**: A relatively constant feeling, predisposition, or set of beliefs directed toward an object, person, or situation (Greene & Kreuter, 1991).

**Belief**: A statement or proposition, declared or implied, that is emotionally and/or intellectually accepted as true by a person or group (Green & Kreuter, 1991).

**Block Schedule**: Classes of 90 minutes or longer (Canady & Rettig, 1996).

**Breast Self-Awareness**: females being aware of what their breasts normally feel like and look like, and to be attuned to any change, and to bring any change to the attention of their health care provider. It does not require special training (ACS, 2005).
Breast Self-Examination (BSE): a specific technique that requires training of observation and palpation that enables a female to detect changes in her breasts (Taber’s Cyclopedic Medical Dictionary, 2001).

BSE practice: frequency of examining one’s own breasts (ACS, 2001).

Clinical Breast Examination (CBE): the examination of the breasts performed by a doctor or nurse (ACS, 2001).

Health Belief Model (HBM): A theory that postulates that if individuals are to take disease prevention measures, they must feel susceptible to the disease, believe that occurrence of the disease would have a serious impact on life, and judge that preventive measures are beneficial, outweighing any barriers involved in taking such measures. Furthermore, individuals must believe that disease may exist in the absence of symptoms (Strecher & Rosenstock, 1997).

Health Care Provider: A trained licensed professional that can diagnose and treat illnesses or diseases. Examples: Nurse Practitioners, Physician Assistants, and Medical Doctors. (Taber’s Cyclopedic Medical Dictionary, 2001).

Interactive Learning: A method of acquiring information by participating in a discussion, through hands-on simulation, and computer activities (Beaman, 2008).

Mammography: Radiographic imaging of the breast to screen for (and detect) breast cancer (Taber’s Cyclopedic Medical Dictionary, 2001).

Nulliparity: Condition of not having given birth to a child (Taber’s Cyclopedic Medical Dictionary, 2001).
Passive Learning: The opposite of interactive learning is passive learning, which is observing a learning process or just listening to information, taking notes, and reading the textbook (McKeachie, 1998).
CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

The review of related literature consisted of searching library databases such as PubMed, Medline Plus, Cumulative Index of Nursing and Allied Health (CINAHL), and Educational Resource Information Center (ERIC). The government resources utilized were National Library of Medicine, Center for Disease Control (CDC), and National Institute of Health (NIH). Also, selected studies cited in other references were utilized. The keyword combinations used to search databases included breast health, breast health learning programs, breast cancer and teenagers, breast cancer screening, health promotion for adolescents, breast self-awareness programs for adolescents, teaching breast health in high school, breast cancer awareness, breast self-awareness teaching programs, interactive learning, and engaged learning. The timeframe used to restrict the literature search was the past 15 years because of the limited research found on adolescent females pertaining to breast health knowledge, breast health attitudes, breast health beliefs, breast self-examination, and breast self-awareness.

Recent research regarding breast health education in adolescent females is almost nonexistent in the literature. Teaching adolescent females BSE and breast self-awareness is less common, and little research has been conducted to explore the breast health education of adolescents. The few research studies found examined BSE of adolescent females. There were no studies found that compared utilizing simulated breast models in
breast health education programs for adolescents versus not using simulated breast models. There were no studies found that examined breast self-awareness. Of the studies found on breast health education for adolescents, only five were conducted in 2000 and one in the late 1990s. The majority of the studies were conducted in the late 1980s and early 1990s. The most recent study (2008) was conducted with high school students in Turkey. There was one study conducted with special education students and BSE in the early 1990s. Also, there was one study found that discussed how to organize and conduct a BSE training program but made it specific to older women and minority women. The few research studies found in the professional literature suggest that educational interventions can improve breast cancer knowledge and attitudes of adolescent females.

Breast Health Teaching Programs for Women

Older women and minority women have been the target audience of choice in breast health education programs because of their high breast cancer incidence and mortality rate, respectively. Research pertaining to the pathophysiology, treatment, and prognosis of breast cancer seem to dominate the literature. However, there was research found in which programs assessed breast cancer knowledge, attitudes, and screening behaviors of women. There were a very limited number of programs that described or emphasized how to teach breast health information to women. In other words, these breast health research studies that were found focused on evaluating the knowledge, attitude, and behavior that women already possessed pertaining to breast health. The literature review that follows is an example of such a research study.
To guide the creation of a breast cancer education intervention and help focus other health educators’ and clinicians’ health promotion efforts, the study of Sadler, et al. (2007) explored whether a cohort of African American women living in San Diego would demonstrate the possession of adequate baseline knowledge about breast cancer screening and adherence to widely recommended screening guidelines. African American women (N = 1,055) from San Diego, California participated in a beauty salon-based survey about breast cancer knowledge, attitudes, and screening practices. Women’s ages ranged from 20 to 94 years, with the average age of 42 years. The women, who were clients of the 20 salons of *The Black Cosmetologists Promoting Health Programs*, provided written consent to participate in the programs’ randomized controlled education trial. The salons, which catered to a clientele of predominantly African American women, accepted the invitation to help evaluate the effectiveness of a breast cancer train-the-trainers intervention in which the cosmetologists would serve as the lay health educators.

Salon clients reported low rates of adherence to recommended breast cancer screening guidelines. Of the 1,055 participants, 31% reported performing BSE every month. Of those participants 40 and older, 57% reported having a CBE and 43% reported having a mammogram in the past year. Knowledge of breast cancer was associated with adherence to screening guidelines. While women recognized the serious health threat that breast cancer poses and that early detection of breast cancer is important, only 30% of women reported feeling well informed about the disease (Sadler et al., 2007).

The findings that evolved from the Sadler et al. (2007) study’s sample should be generalized with caution since they were developed based on a regional convenience sample. In addition, recruitment of these women from beauty salons may have led to a
biased sample of women who are able to afford such services. As anticipated, the women who could afford to purchase beauty services at a neighborhood salon and would consent to research participation were also more likely to be better educated than the region’s African American population at-large. This is a concern that plagues most research studies and must be taken into account when researchers consider the degree to which their findings may reasonably be generalized.

One study found, investigated health education programs in the workplace. *Healthy People 2000* encourage worksites to offer health promotion programs. Health education programs supported by women’s groups or workplaces have been successful in reaching large populations and changing intentions to perform breast health behavior. Thomas, Stamler, et al. (2002) examined the responses of women working in the automotive industry to two health education interventions, mailed pamphlets, and a combination of mailed material and classes at the worksite compared to a control group. A quasi-experimental design in which a pamphlet-only intervention and a pamphlet plus classroom education intervention were compared to a control group at pre-test and post-test.

The findings suggest that the mailed information produced some change in practices and intentions. The classes in combination with the mailed pamphlets produced the greatest change. In addition, confidence in BSE as a method of detecting an existing breasts lump increased from pre-test to post-test across all age groups (Thomas, Stamler, et al. 2002).

Both the strengths and limitations of the study were addressed. The very large workplace sample (2,535 women) was identified as strength. The research had
educational value and potential to affect many women’s lives. It was also of value to occupational health nurses who can use the information to increase teaching in the workplace (Thomas, Stamler, et al. 2002).

A limitation of the study was the very low number of women attending the class. Four hundred and thirty-seven (437) women participated in the study. They were divided into three groups. Of the 138 women in the pamphlet plus class group who returned the post-test questionnaires, only 8 women actually attended the class. Even though, the pamphlet and class group reported the greatest change in practices and intentions, this is questionable because of the number who actually attended the class. Consequently, the remaining women in this group were reassigned to the pamphlet group, and subsequent analyses were conducted comparing women in the control group to the pamphlet group. This precluded the opportunity to conduct any detailed analyses of the subgroups (e.g., age stratification) of women receiving breast health education class. This issue demonstrates the challenge of delivering breast health education to women, when few women voluntarily attend classes, even at the worksite (Thomas, Stamler, et al. 2002).

The researchers of Adderley-Kelly and Green (1997) examined teaching methods for breast health education. They studied the impact of a video intervention combined with individual or group instruction on breast cancer knowledge and BSE self-efficacy (i.e., level of performance confidence) with a sample of older African-American women in an experimental study. An educational session was implemented one week following recruitment. Subjects were randomly assigned to one of two groups. Group 1 was designated as the treatment group and consisted of 18 subjects. Group 2 was designated as the control group and consisted of 17 subjects. The treatment group received a lecture-
discussion, ACS video, and individualized, guided BSE practice using artificial models.

The control group received the lecture-discussion, ACS video and group practice. Immediately following practice both groups were administered a post-test on breast cancer facts and myths.

The objectives of the study were to determine the breast cancer knowledge of subjects, their level of confidence when performing BSE, and if group instruction, one-to-one (individualized) instruction/practice, and feedback on performance made a difference in screening practices. Adderley-Kelly & Green (1997) hypothesized that women who participated in a breast cancer educational program, which included one-to-one practice and feedback on performance, will have a higher level of confidence in performing BSE (self-efficacy) than women who received only one group practice. At the completion of the intervention, there was no difference in self-efficacy scores between the two groups; therefore, the hypothesis was not supported. Adderley-Kelly & Green (1997) also hypothesized that post-intervention follow-up of self-efficacy would be higher in those who received one-to-one practice and feedback on performance than in the control group. Even though the mean self-efficacy score was higher for the control group than for the treatment group at post-test, this increase was not maintained. Therefore, the hypothesis was supported. The study of Adderley-Kelly and Green (1997) reported mixed results of a breast health program with teaching methods of individualized instruction and group instruction. These two researchers were able to examine individualized instruction due to the small number of participants in each group.

Results of Adderley-Kelly and Green (1997) indicated that group teaching and one-to-one guided practice might enhance self-efficacy. Each of these positive findings
supports efforts that promote BSE self-efficacy and coping behaviors necessary for screening in the elderly. Since increases in self-efficacy were sustained in the experimental group, a larger and more comprehensive study is justified to test the impacts of alternatives teaching techniques. The proposed study will examine the affect of interactive learning with simulated breast models on the breast health knowledge and beliefs of adolescent females.

Cultural Considerations

The racial, ethnic, and cultural diversification of American society is accelerating at an unprecedented rate. Cultural factors reflect an individual’s beliefs and values and affect their learning needs and teaching approaches. Cultural beliefs consist of the explanatory ideas and knowledge that members of a given culture have about various aspects of their world and are based on cultural values and norms. Cultural beliefs influence the meaning individuals attach to health and illness, by whom and how they prefer to treat illness and the health behaviors in which they are willing to engage (Estes, 2006). The following studies are examples.

A study by Facione et al. (2000) examined the perceived risk and help-seeking behavior for breast cancer of 45 Chinese-American women. They were divided into eight focus groups. The researchers found that Chinese-American women believe that they were not likely to get breast cancer and that cancer was linked to tragic luck. If they had symptoms suggestive of breast cancer, they were likely to delay Western treatment in favor of Chinese medicine to conserve money and modesty.
There were very important limitations to the study based on the focus group sessions. The brevity of the responses, the absence of detailed breast symptoms accounts, and the fact that the women talked directly to the facilitator more often than to each other, caused the dynamics of these focus groups to falter. Possible reason for this could have been the comfort level of talking about cancer (Facione, et al. 2000).

The focus group sessions in the study generated no graphic accounts of advanced breast cancer symptoms or detailed descriptions of breast cancer deaths. This could have been a sampling effect, or it may be, as the women themselves suggested, an indication that disclosure of the details concerning cancer illness was relatively lacking in their community (Facione, et al. 2000). The implication of this finding is that the expectation of cancer risk or treatment information being communicated from woman to woman rather than directly from provider to woman may not be a successful strategy for early detection in the Chinese-American community.

Like Chinese-American women, some African-American women believe in chance and doubt the value of early diagnosis and treatment (Barroso et al, 2000). Culturally sensitive strategies may need to be used to increase breast cancer awareness among culturally diverse groups.

In ethno-cultural populations, attitudes toward breasts may influence breast cancer detection practices. Choundhry, Srivastava, and Fitch (1998) conducted a study with South Asian women, age 40 and older, to examine their knowledge, attitudes, and beliefs regarding breast cancer detection practices. Twelve percent (12%) of the participants practiced BSE monthly. Forty-nine percent (49%) had undergone at least one CBE during their lives and 53% had at least one mammogram. They reported that the women did not
want to expose their breast in front of others and did not want their breast touched by a male physician. In addition, South Asian women were reluctant to touch their own breast. Therefore, these women were not likely to engage in early BSE skills.

In another study, Han, Williams, and Harrison (2000) found that the percentages of Asian American women who ever had a CBE and mammography were 67% and 58%, respectively. Even though the percentage of Asian American women receiving a CBE had risen by 20% since the study of Choudhry et al. (1998), one cannot accurately infer that this population of women has overturned their cultural beliefs. The study did not report any information in reference to BSE and nor did it state whether the health care providers were male or female who examined the Asian women breasts.

Roubidoux (2005) developed a computer game to teach culturally appropriate breast cancer screening information to Native Americans. The interactive computer game had culturally relevant graphics, situations, and language for Native Americans, thereby, improving their breast cancer awareness and compliance with breast cancer screening.

Education is one of the most important tasks in reaching females about breast health. In order to reach different cultures, researchers must develop culturally sensitive breast health programs. In order to educate different age groups, researchers must develop breast health programs with appropriate teaching methods.

Breast Health Teaching Programs for Adolescents

The AAP and the AAFP recommend that breast health education including self-awareness and BSE should be taught to adolescents in private offices, clinics, and high
school health education classes during the preteen and teen years (AAFP, 2007; AAP, 2007).

The few studies found focused on BSE in reference to breast health teaching programs for adolescents. The first study is an older study that made suggestions for effective breast health education programs for adolescents and emphasized the continuous research need in this area of health promotion. Cromer et al. (1992) conducted a prospective study to measure compliance with BSE in high school students three months (n = 85) and eight months (n = 54) after group instruction. A clinical nurse specialist instructed the girls on the proper technique of BSE with the use of a silicone breast model. The girls were instructed when to perform BSE and given an illustrated pamphlet on BSE. Signs and symptoms of pathology were reviewed. At the end of the session, the students were given the opportunity to practice on the breast model.

Cromer et al. (1992) reported that less than half (40%) of tenth through twelfth grade girls performed BSE at the three-month follow-up to an educational intervention, and only 4% of the girls performed BSE at the eight month follow-up. The most frequently given reason for noncompliance was forgetting about performing BSE. Cromer et al. (1992) concluded that it is possible that individual instruction, compared with teaching in a group setting, enhances the likelihood that an adolescent will perform BSE skills. This is a particularly important consideration, as group teaching is the most common (and cost-effective) method of instruction employed by the ACS (2002) for adult education. It may be that individual instruction is most effective in adolescents; however, the researcher of the proposed study was unable to find a study comparing these two methods of instruction with adolescents.
Cromer et al. (1992) suggested BSE education programs for high school students provide one-on-one instruction and proper follow-up to evaluate their skills. Another recommendation for an effective BSE education program by Cromer et al. (1992) is that program planners address not only the students’ knowledge but also emotional barriers. Because self-report of BSE practice is a poor indicator of the quality of the examination performed, it is suggested that the performance of BSE skills not be used alone as an evaluation of program effectiveness but in conjunction with the knowledge gain and attitude change.

The more recent research studies that follow are in compliance with the suggestions made by Cromer et al. (1992), examining knowledge gain and attitude change with BSE practice. The researcher either investigated two of these three variables or all of them.

In 1999 governmental regulations in the state of Indiana mandated breast cancer education programs in all public high schools which remain in effect today (2008). As a result of the mandate, researchers Clark et al., (2000) analyzed the effectiveness of a one-hour educational intervention to increase knowledge and improve attitudes towards BSE and early detection among adolescent girls. The sample used in the quasi-experimental study consisted of 137 adolescent girls from participating schools. Subjects in the experimental group (n = 84) demonstrated increased knowledge of BSE at the completion of the class. The total score could range from 0 to 8 for BSE knowledge. The mean BSE knowledge score rose from 6.0 to 6.8 for the experimental group, while the control group’s (n = 53) score increased from 5.8 to 6.0. The total cancer-detection-attitude score range from 14 to 70. The mean attitude score for the experimental group increased from
46.9 to 48.9, while the control group’s score increased from 46.3 to 47. Both groups exhibited more improvement in their attitudes than knowledge.

In the study of Clark et al. (2000), the subjects were not evenly distributed among the experimental and control group. Sixty-one percent (61%) of the participants were in the experimental group and 39% were in the comparison group. This sampling could predispose to inaccurate findings in the study. The proposed study will have the participants as closely as possible distributed to 50% in the treatment and comparison groups. Despite the efforts to minimize error originating from sampling, there was another potential limitation in the study of Clark et al. (2000). The detection behaviors reported in the study relied on students’ self-reports, which could not be independently verified. The limitation that was more obvious was the lack of description of the educational intervention. The study stated that the one-hour educational intervention was implemented in the health education classes with pre and post-tests. Although the objectives were clearly stated, the researchers did not describe the teaching methods that were used in the breast health educational intervention for adolescent girls in high school.

In a descriptive study of 93 female students, drawn from three high schools in Ohio, Ludwick & Gaczkowski (2001) described the teaching methods of their BSE program for adolescent girls. They used a pre-test and post-test design to determine whether a teaching program would change beliefs, knowledge, and practices of BSE in high school girls. The students were given knowledge pre-test and asked about BSE practices before the start of the interventions. Participants were also given an immediate knowledge post-test and a one-month post-test on their knowledge and asked about BSE practices. Other teaching methods that were utilized by Ludwick & Gaczkowski (2001)
were: culturally sensitive age-appropriate video, lecture-discussion, demonstration, practice with anatomical models, and pamphlet/shower card discussion.

The results of the study of Ludwick & Gaczkowski (2001) proved that a one-time intervention with different teaching methods could be successful with increasing breast cancer knowledge and BSE practice in adolescents. When the knowledge and practice of BSE were examined, it was found that all the students increased their knowledge and practice of BSE but there was very little change in attitudes (Ludwick & Gaczkowski, 2001), whereas, the adolescent females in the study of Clark et al. (2000) had a major improvement in their attitudes after the educational interventions.

Quite different from the study of Clark et al. (2000), the research of Ludwick and Gaczkowski (2001) did not include an experimental group or control group. Ludwick and Gaczkowski (2001) utilized three groups of high school girls and conducted a descriptive study. The study was clearly nonexperimental in nature. The investigators did not manipulate any variables. However, the teaching methods were successful in improving the girls’ BSE knowledge and practice but not their attitudes. The researcher of the proposed study will utilize two groups of high school girls (treatment and comparison) and conduct an experimental study, thereby, manipulating a variable.

A more recent study conducted by Ogletree et al., (2004) supported the findings of Clark et al. (2000) and Ludwick and Gaczkowski (2001). Funded by the Susan G. Komen Breast Cancer Foundation, a BSE education program was developed and delivered by health educators at the Hult Education Center in Peoria, Illinois. The 50-minute program consisted of a PowerPoint slide presentation of breast cancer and BSE facts, and a video demonstration of proper BSE technique. Using a quasi-experimental
design, the program was evaluated for increase breast health knowledge and intention to perform BSE (Ogletree, et al. 2004).

Ninth-grade girls at four public high schools (n = 255) were given a pre-test to determine their knowledge about breast cancer and BSE. A delayed post-test was administered between five to six weeks later (n = 211). Results revealed that girls who participated in the BSE education program (treatment group) recorded a much higher overall mean knowledge score than girls who did not participate (comparison group). Those who participated in the program retained the knowledge over a five to six weeks period. Also, results revealed that more girls in the treatment group reported performing BSE in the past month as well as a higher intention to perform BSE in the future (Ogletree, et al. 2004).

A very important limitation to the study was noted. Due to class schedule considerations, immediate post-test results could not be obtained for the comparison group. Immediate post-test results were obtained from the treatment group. However, the evaluation compared the treatment and comparison groups at pre-test and at five to six weeks delayed post-test. Therefore, the treatment group may have benefited from a practice effect after completing the survey three times (Ogletree, et al. 2004). To avoid a conflict with obtaining data, the proposed study will utilize the health education, health science, and child development classes to collect data.

The proposed study will utilize the teaching methods of lecture/discussion and video, without interactive learning with simulated breast models in the comparison groups. The treatment groups will include interactive learning with simulated breast models, in addition to lecture/discussion and the video. Ogletree et al. (2004)
implemented interventions for the experimental groups; however, the comparison groups did not have any interventions.

In addition to the findings, the studies of Ludwick and Gaczkowski (2001) and Ogletree et al., (2004) were similar in other aspects. Their participants were selected from the high school setting and the teaching programs were presented in the high schools. The average age of the participants was 14 years. Both studies utilized the pre and post-test design with a one-time teaching session. Their teaching methods included audiovisuals, lecture/discussion, anatomical breast models, demonstration, and practice. Both studies utilized the Health Belief Model as their theoretical framework. The studies showed that teaching can improve knowledge and BSE but did not follow-up to see if compliance diminished over time.

The studies of Ludwick and Gaczkowski (2001) and Ogletree et al., (2004) were different in certain areas; one particular area was sample size. Ogletree et al. had a larger sample (n = 255) compared to Ludwick and Gaczkowski (n = 93). In general, the larger the sample, the more representative of the population it is likely to be. Even a very large sample, however, does not guarantee representativeness (Polit & Hungler, 1987).

Another difference between the studies, that could possibly present a gap in the findings, was the fact that Ludwick and Gaczkowski (2001) did not have a comparison group. All their participants received the same teaching methods. Even though Ogletree et al., (2004) utilized a treatment group and a comparison group, they did not administer the immediate post-test to their comparison group due to a class schedule conflict.

In India, a manual on BSE for adolescent female students has been compiled on the basis of advice obtained from experts in medicine, surgery, nursing, and social
science (Devi et al., 1998). It contains sections on the importance of the BSE technique, when it should be practiced, how it is performed, the structure and functions of the breast, and risk factors for breast cancer. Testing was done to ensure that the Hindi and English versions of the manual conveyed identical messages. It was pre-tested by 10 students in the 11th and 12th grades, who were selected at random in a rural school in the Panchkula District of Haryana State. The manual was culturally acceptable to the girls’ teachers and parents (Devi et al., 1998).

The knowledge of BSE and related breast cancer information was assessed in 190 adolescent female students before and three weeks after they received copies of the manual. The participants included all the female students of the 11th and 12th grades who were present on the day of pre-testing. In the baseline assessment, 8% of the students achieved high scores, 83% obtained medium scores, and 9% obtained low scores. A significant improvement was demonstrated after the students had studied the manual. Seventy-nine percent (79%) obtained high scores and the remaining 21% obtained medium scores, reflecting increased knowledge of BSE (Devi et al, 1998).

The teaching strategy in the study of Devi et al. (1998) is quite different from other studies. Of course, such manuals have limitations. They are not as effective as teaching by demonstration and discussion. One has to be strongly motivated to succeed in gaining knowledge from a manual and only the literate can benefit. This teaching method puts more responsibility for learning on the student. It is a strategy of independent learning. It virtually implies that most students have the same learning style.

One study that was found did not teach adolescents about breast health but assessed the knowledge that they already possessed pertaining to breast health. Freeman,
Scott, Waxman, & Arcona (2000) assessed adolescent females’ knowledge of breast cancer and breast cancer prevention. An anonymous survey consisting of ten questions were distributed to 280 females aged 13-17. These questions pertained to breast cancer with an emphasis on BSE, mammography, and risk factors. Questions were analyzed by chi square calculations. Surveys were administered during health class in a local high school. The overall percentage of correct answers was 65%. The participants were knowledgeable about breast cancer as the second leading cause of cancer death (83%), whereas, the knowledge pertaining to risk factors was poor (36%).

The study of Freeman et al. (2000) showed that adolescent females significantly lack knowledge relating to breast cancer. They concluded that adolescent females need to be better educated on the basic facts, including risk factors, screening procedures and BSE.

Also, a most recent study found of BSE among high school students, conducted by Karayurt, Ozmen, and Cetinkaya (2008) did not teach adolescents about breast health. The purpose of the study was to investigate knowledge of risk factors for breast cancer, knowledge of BSE, and to assess the practice of BSE among high school students in Turkey. The students were not taught or provided any information about breast cancer and BSE. The researchers used questionnaires to collect their data. The study concluded that the female high school students had insufficient knowledge about BSE and a low percentage of students reported that they had performed BSE monthly. In Turkey, the Ministry of Health recommends BSE to increase awareness of breast cancer.

The study also indicated that educating the youth about good health behaviors during adolescence can enhance future health and have implications for the entire life
course. The researchers emphasized the need for the development of effective breast health programs for adolescents.

Theoretical Framework

The majority of the studies found that examined breast health beliefs in older women utilized the Health Belief Model (HBM) as the theoretical framework. The very limited research found that studied the breast health beliefs of adolescents incorporated the HBM. Therefore, The HBM has been chosen as the conceptual guide for the proposed study.

The Health Belief Model

Origin and Constructs

The HBM was developed initially in the 1950s by a group of social psychologists in the United States Public Health Service in an effort to explain the widespread failure of people to participate in programs to prevent or to detect disease. Later the model was extended to apply to people’s responses to symptoms and to their behavior in response to diagnosed illness, particularly their compliance with medical regimens (Strecher & Rosenstock, 1997).

The HBM is a value expectancy theory. When value expectancy concepts were gradually reformulated in the context of health-related behavior, the principles were (1) the desire to avoid illness or to get well (value) and (2) the belief that a specific health action available to a person would prevent (or ameliorate) illness (expectancy). The expectancy was further delineated in terms of the individual’s estimate of personal
susceptibility to and severity of an illness, and of the likelihood of being able to reduce that threat through personal action (Strecher & Rosenstock, 1997).

The HBM consists of four concepts: (a) perceived susceptibility to an illness, (b) perceived seriousness of the illness, (c) perceived benefits or the positive outcomes for a presumed action, and (d) perceived barriers or the negative outcomes for a presumed action. Later, Rosenstock, Stretcher, and Becker (1988), added two additional concepts: (a) confidence, which is the individual’s successful performance of a behavior that will help him or her to reach the desirable outcome, and (b) health motivation, which is the individual’s beliefs and degree of interest in his or general health.

The development of the HBM grew out of real concerns with the limited success of various programs of the Public Health Service in the 1950s. These programs included tests or preventive actions, first for tuberculosis (TB), somewhat later for cervical cancer, and dental disease, and still later for rheumatic fever, polio, and influenza. It was also noted that the various preventive measures or tests were usually provided on a demonstration basis, free of charge, or at a very low cost. One such early example was the examination of reasons why a large number of eligible adults declined to participate in TB screening programs provided at no charge in mobile X-ray units conveniently located in various neighborhoods. Program planners were concerned with explaining people’s behavior by illuminating those factors that were facilitating and inhibiting compliance and self-care behavior (Strecher & Rosenstock, 1997). The investigators of these earlier programs used the HBM to focus on public health issues relating to screening and compliance. They found increased perceptions triggered behavior or subsequent action (Strecher & Rosenstock, 1997). These earlier studies also demonstrated
that perceptions and beliefs that compose the model are alterable by promoting awareness through education and intervention programs, which is an important characteristic of the HBM.

The HBM postulates that if individuals are to take disease prevention measures, they must feel susceptible to the disease, believe that occurrence of the disease would have a serious impact on their lives, and believe that preventive measures are beneficial, outweighing any barriers involved in taking such measures. Furthermore, individuals must believe that disease may exist in the absence of symptoms (Fishera & Frank, 1994).

Application of the HBM to the Study of Adolescent Breast Health

As stated earlier, the HBM was developed in an effort to address public health concerns. Initially, the HBM was focused on issues related to screening and compliance. Since those initial uses, however, the HBM has been used as both an explanatory and an intervention tool with a broad spectrum of health-related behaviors (Strecher & Rosenstock, 1997). In this section, the utilization of the HBM in two adolescent breast health studies will be discussed. These studies have been discussed in other sections of this proposal. Therefore, only the relationship of the HBM to the previous discussed studies will be the focus of this section.

A 22-item questionnaire derived from the HBM was used in the research of Cromer et al. (1992) to assess personal attitudes about breast cancer in high school students. The student responded on a five-point Likert Scale (i.e., the higher the rating the stronger the belief) according to her degree of agreement with each of the listed health beliefs. For statistical analysis, health beliefs were grouped as follows (each group
represented by four to six statements); perceived threat of breast cancer (e.g., “Breast cancer is a serious problem”), control over one’s health (e.g., “I feel like I can make a real difference in making me healthy”), perceived benefits (e.g., “Breast cancer found early is more likely to be cured”) and barriers to (e.g., “Examining my breasts is a real hassle”) compliance, and general health motivation (e.g., “I always do what the doctor tells me”).

A comparison of personal health beliefs between those who reported practice of BSE and those who did not was assessed. Mann-Whitney tests were used to identify the relationship of health beliefs with compliant behavior. The results revealed only one health belief that was significantly different between the two groups, which was, a higher degree of perceived control over one’s health among the compliers (Cromer et al., 1992).

Ludwick and Gaczkowski (2001) utilized the HBM to design the teaching interventions in their BSE teaching program for teenage girls. Many forms of instruction, using multiple senses, were implemented. The teaching intervention informed subjects of the risk factors for breast cancer development and fibrocystic changes. This was done to evoke a perception of susceptibility. At the same time, the material was covered so as not to evoke fear, but to inform, so that subjects would realize the seriousness of the disease. Also, the teaching interventions were implemented to increase the participants’ knowledge on the benefits of BSE and to decrease the perceived barriers to performing BSE. Shower cards were given to help the students remember to perform BSE. They served as a cue to action.

Due to the limited research in adolescent breast health, there was limited usage of the HBM. This is another instance in which more research is needed in this area of health promotion, teaching breast health to adolescents.
Gaps in Literature/Knowledge

There were gaps in the professional literature identified by the proposed researcher. The biggest gap in the literature was the lack of research pertaining to breast health of adolescent females. In addition, there were no studies found that focused on breast self-awareness for adolescent females. Three of the five studies found did not link the problem to a theoretical or conceptual framework (Clark, et al., 2000; Devi, et al., 1998). In one instance, the study (Ludwick & Gaczkowski, 2001) did not specifically state the theoretical or conceptual framework but with meticulous reading and interpretation, the investigator of this proposed study was able to determine which framework (HBM) was used. When a few of the researchers utilized a model or framework, there was no explanation as to why it was considered the best model or framework with regard to other models or frameworks. The investigator of this proposed study found it to be a problem because of the fact that there has not been a lot of research conducted on the breast health of adolescents.

The investigator of the proposed study did not find research studies that actually examined teaching methods used in breast health educational programs. Many researchers hypothesized that more females would practice BSE after participating in a breast health educational intervention. Another hypothesis was that females would improve their breast health knowledge and attitudes after participating in a learning program. As the researcher of the proposed study, dissection of the studies was done to find out whether the teaching methods in the studies were appropriate or conducive to improving knowledge and beliefs.
A couple of studies (Freeman, et al., 2000; Karayurt, et al., 2008) found it more interesting to assess adolescent females’ knowledge about breast cancer. Both studies concluded that adolescents’ females lack knowledge about breast health but did not provide ways to teach them about breast health. The proposed study has acknowledged the need of breast health education for adolescent females and will identify an effective teaching strategy.
CHAPTER 3

METHODS

Introduction

The purpose of this quasi-experimental study was to determine if teaching breast health with or without interactive learning with simulated breast models would affect the breast health knowledge and breast health beliefs of adolescent females. A breast health program was administered in public high school settings in north Alabama to female students enrolled in health education, health science, and child development. The proposed outcomes of the research were:

- Improved breast health knowledge of adolescent females as a result of interactive learning with simulated breast models.
- Improved breast health beliefs of adolescent females as a result of interactive learning with simulated breast models.

Research Questions

This study will address the following research questions:

1. Do adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models have a greater increase in breast health knowledge than those who participate in a breast health program that does not include interactive learning with simulated breast models?
2. Is the adolescent female’s perceived susceptibility to breast cancer affected more by the interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

3. Is the adolescent female’s perceived seriousness to breast cancer affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

4. Are the adolescent female’s perceived benefits of breast self-awareness affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

5. Are the adolescent female’s perceived barriers of breast self-examination affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models?

Research Hypotheses

The major research hypotheses examined in this study were:

1. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to have significantly higher breast health knowledge scores than those who
participate in a breast health program that does not include interactive learning with simulated breast models.

2. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe they are susceptible to breast cancer than those who participate in a breast health program that does not include interactive learning with simulated breast models.

3. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe breast cancer is significantly more serious than those who participate in a breast health program that does not include interactive learning with simulated breast models.

4. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are benefits of breast self-awareness than those who participate in a breast health program that does not include interactive learning with simulated breast models.

5. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are fewer barriers of breast self-examination than those who participate in a breast health program that does not include interactive learning with simulated breast models.
Setting and Sample

The appropriate sample size was determined by the following: $\alpha = .05$; one-tailed test; critical value of the test statistic = 1.645; power = .80; effect size = .10. *The Table of Sample Size for Interval Data using One-Tailed Tests with Varying Effect Sizes and Levels of Power* (Hinkle, Wiersma, & Jurs, 1988) indicates that the study needed 619 participants. The sample consisted of approximately 310 middle-class adolescent females, ages 15-18 years, enrolled in a health education, health science, and child development classes at Bob Jones and Sparkman High School. These north Alabama schools were selected because of their high level of interest in new programs to educate their students (as commented by the administrators) as well as their interest in participating in the research project (as expressed by the health education teachers).

Bob Jones High School is part of the Madison City School System. It is the largest high school in the state of Alabama with over 2200 students. It is located in Madison and houses grades 10-12 (Madison City Schools, 2009). Bob Jones economic level is considered middle to upper class because only 11% of Bob Jones High School students’ receive free or reduced-priced lunch. The state’s average for students receiving free or reduced-priced lunch is 48% for grades 9-12. Bob Jones is well below the state’s average for free or reduced-priced lunch. Student ethnicity is as follows: Caucasian, 70%; African-American, 19%; Asian, 6%; Hispanic, 3%; American Indian, 1%; and unspecified, 1% (www.greatschools.net).

Sparkman High School is part of the Madison County School System. It is located in Harvest and houses over 2200 students in grades nine through twelve (Madison County Schools, 2009). Sparkman High School is considered middle class with 17% of
its students eligible for free or reduced-priced lunch. Sparkman is well below the state’s average for free or reduced lunch. Student ethnicity is as follows: Caucasian, 65%; African-American, 29%; American Indian, 2%; Hispanic, 2%; Asian, 1%; and unspecified, 1% (www.publicschoolreview.com).

The decision to include females enrolled in a health education class stemmed from the fact that health promotion topics such as healthy eating, personal hygiene, first aid, safe sex, drug abuse, safe driving, and physical fitness are included in the health education course of study, which is a required class. Females enrolled in a health science class were included in the research study. Although, the health science course of study focuses on the healthcare delivery system and health careers, it also includes health promotion and wellness topics. It is an elective course. Also, the females enrolled in a child development class were potential participants. In addition to exploring the development of children from birth to adolescence, the class also included wellness topics. It was also an elective course. These courses at Bob Jones and Sparkman High School create an opportunity to introduce another health promotion topic, breast health.

Bob Jones and Sparkman High School are operating on the block schedule. To avoid class schedule interruptions, students participated in the breast health program during their health education, health science, or child development. The treatments or group interventions were randomly assigned to classes. There were approximately seven health education, nine health science, and four child development classes participating in the study. The classes had similar demographics and characteristics, which produced comparability among the groups.
Protection of Human Subjects

The researcher submitted protocol and method to the Institutional Review Board (IRB) at the University of Alabama at Birmingham (UAB) for approval. The study involved no more than minimal risk to the human subjects. To protect confidentiality and ensure privacy, the participants did not put their names on the pre-test and survey, post-test and survey, or follow-up test and survey. In order to match data, the participants placed the last four digits of their phone numbers on the tests and surveys. After completion of the test and survey, the participants placed their answer sheet in a large brown envelop. The researcher was available to answer questions or provide additional information about the study.

Focus Group for Instrument Development

The focus group consisted of 5 or 6 participants aged 15-18 year old females. The participants were students who live in the investigator’s neighborhood and attended Madison Academy High School. The focus group meeting was conducted at the investigator’s home. The purpose of the focus group was to provide qualitative information concerning the readability and understanding of the Breast Health Knowledge Test and Breast Health Belief Survey. After completion of the focus group discussion, the instruments were revised (if necessary) and administered to the participants in the pilot study.
Instrumentation

Knowledge

One week before the program commenced, the researcher of the proposed study gave the participants a pre-test to assess prior breast health knowledge. They received a post-test immediately following the program to assess acquired breast health knowledge. A follow-up was conducted 4-weeks after the program to assess retention of breast health knowledge. The pre-test, post-test, and follow-up (Appendices B and C, respectively) were each comprised of 14 items of breast health knowledge. The test items were multiple choices and were derived from the program information presented about breast health. The make-up of the test was as follows: incidence (questions 1, 3); risks factors (questions 2, 7, 9-10); signs (questions 4-5); breast cancer screening (questions 6-8, 13-14), and breast self-awareness (questions 11-12).

An expert panel, consisting of two school nurses, two health education teachers, and two health promotion instructors from UAH, established content validity for the survey and knowledge test. Readability tests and the Simplified Measure of Gobbledygook (SMOG) technique determined that the survey and knowledge test was appropriate for seventh-grade reading level. Reliability was measured by Cronbach Alpha.

Belief Variables

In order to survey the breast health beliefs of adolescent females, an instrument that included the constructs of the HBM was utilized. An examination of individual perceptions is a vital component of the proposed instrument, particularly perceived
susceptibility to breast cancer, perceived seriousness of breast cancer, perceived benefits of breast self-awareness, and perceived barriers of BSE. Also, consideration of an instrument from previous studies includes those that provided support to analyze forces that influence health behavior and people’s responses to preventive health.

One week before the program commences, the researcher of the proposed study gave the participants a pre-survey to assess prior breast health beliefs. They received a post-survey immediately following the program to assess changed breast health beliefs. A follow-up was conducted 4-weeks after the program to assess retention of breast health belief changes (Appendix D).

A revision of Champion’s Breast Cancer Screening Beliefs Scale (CBCSBS) was completed to “fit” the study population as the scale has not been utilized or validated for 15-18 year old females, only with older women. The CBCSBS has been consistently revised and updated to maintain validity and reliability for breast cancer screening behaviors of older women (Champion, 1992; 1993; 1995; 1999; Champion & Scott, 1997) since its initial development (Champion, 1984). The revision of the CBCSBS for this proposed study enhanced its adaptability or suitability for adolescent females so as to ensure a level of validity and reliability of the measurement. The original CBCSBS (Appendix E) contains the following subscales and number of items for measuring beliefs related to breast cancer: susceptibility (5), seriousness (7), benefits of BSE (6), barriers of BSE (6), confidence performing BSE (11), health motivation (7), benefits of mammogram (6), and barriers of mammogram (5). It contains a total of 53 Likert scale items, with a choice of five responses ranging from 1 (strongly disagree) to 5 (strongly agree) (Champion, 1984; Champion, 1993).
For the proposed study, the subscales of susceptibility, seriousness, benefits of breast self-awareness, and barriers of BSE were utilized. The susceptibility subscale has five items that measure the extent to which the individual believes she is vulnerable to breast cancer. The seriousness subscale has seven items that measure how an individual perceives the seriousness of developing breast cancer and the consequences of the illness. The benefits of breast self-awareness subscale have four items that measure an individual’s beliefs about the value of breast self-awareness. The barriers of BSE subscale have six items that measure an individual’s beliefs for not practicing BSE. The remaining scales of CBCSBS were not measurable for the proposed study because they were not relevant to the proposed study’s sample.

The subscales of susceptibility, seriousness, benefits of breast self-awareness, and barriers of BSE received some revisions to “fit” the sample, adolescents (Appendix D). The susceptibility subscale was changed to reflect breast cancer risks. The changes are as follows (see Table 2). The original item one reads, “It is extremely likely I will get breast cancer in the future.” It was changed to read, “If my mother gets breast cancer, I will be at high risk of getting breast cancer.” The original item two reads, “I feel I will get breast cancer in the future.” It was changed to read, “I feel I could get breast cancer as an elderly woman.” The original item three of the susceptibility subscale reads, “There is a good possibility I will get breast cancer in the next 10 years.” The next 10 years were changed to 30 years because the participant would probably be 24-25 years in 10 years, which is not considered a strong breast cancer risk factor. Thirty years would give the participants 44-45 years of age, which is a stronger risk factor. The original item four reads, “My chances of getting breast cancer are great.” It was changed to read, “I am at
risk of getting breast cancer.” The original item five of the susceptibility subscale reads, “I am more likely than the average woman to get breast cancer.” Item five was changed to read, “I am more likely than the average female to get breast cancer if I find changes in my breast tissue.”

Table 2

Subscale of Susceptibility to Breast Cancer

<table>
<thead>
<tr>
<th>Original</th>
<th>Revisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is extremely likely I will get breast cancer in the future.</td>
<td>1. If my mother gets breast cancer, I will be at high risk of getting breast cancer.</td>
</tr>
<tr>
<td>2. I feel I will get breast cancer in the future.</td>
<td>2. I feel that I could get breast cancer as an elderly woman.</td>
</tr>
<tr>
<td>3. There is a good possibility I will get breast cancer in the next 10 years.</td>
<td>3. There is a good possibility I will get breast cancer in the next 30 years.</td>
</tr>
<tr>
<td>4. My chances of getting breast cancer are great.</td>
<td>4. I am at risk of getting breast cancer.</td>
</tr>
<tr>
<td>5. I am more likely than the average woman to get breast cancer.</td>
<td>5. I am more likely than the average female to get breast cancer if I find changes in my breast tissue.</td>
</tr>
</tbody>
</table>

The original items six and seven of the seriousness subscale were not changed (see Table 3). The original item eight reads, “I am afraid to think about breast cancer.” It was changed to read, “I do not like to think about breast cancer but I will think about it if I find a lump in my breasts.” The original item nine was not changed. The original item 10 of the seriousness subscale reads, “Breast cancer would threaten a relationship with my boyfriend, husband, or partner.” Item 10 was revised to read, “Breast cancer is a serious health problem.” According to Erik Erikson’s psychosocial developmental theory,
during the adolescence stage, males and females are acquiring a sense of identity while overcoming role confusion. Also, according to Erikson, males and females are achieving a sense of intimacy while avoiding isolation during the young adult stage (Potter & Perry, 2004). The average adolescent has not reached a relationship with a boyfriend, husband, or partner. Therefore, item 10 was revised because of Erikson’s psychosocial developmental theory. The original item 11 reads, “If I had breast cancer, my whole life would change.” It was changed to read, “If I get breast cancer, my whole life could change.” The original item 12 reads, “If I developed breast cancer, I would not live longer than five years.” It was changed to read, “If I developed breast cancer, I could possibly die.”

Table 3

Subscale of Seriousness of Breast Cancer

<table>
<thead>
<tr>
<th>Seriousness</th>
<th>Original</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. The thought of breast cancer scares me.</td>
<td></td>
</tr>
<tr>
<td>7. When I think about breast cancer, my heart beats faster.</td>
<td></td>
</tr>
<tr>
<td>8. I am afraid to think about breast cancer.</td>
<td></td>
</tr>
<tr>
<td>9. The problems I would experience with breast cancer would last a long time.</td>
<td></td>
</tr>
<tr>
<td>10. Breast cancer would threaten a relationship with my boyfriend, husband, or partner.</td>
<td></td>
</tr>
<tr>
<td>11. If I had breast cancer, my whole life would change.</td>
<td></td>
</tr>
<tr>
<td>12. If I developed breast cancer, I would not live longer than 5 years.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seriousness</th>
<th>Revisions (where applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. The thought of breast cancer scares me.</td>
<td></td>
</tr>
<tr>
<td>7. When I think about breast cancer, my heart beats faster.</td>
<td></td>
</tr>
<tr>
<td>8. I do not like to think about breast cancer but I will think about it if I find a lump in my breasts.</td>
<td></td>
</tr>
<tr>
<td>9. The problems I would experience with breast cancer could last a long time.</td>
<td></td>
</tr>
<tr>
<td>10. Breast cancer is a serious health problem.</td>
<td></td>
</tr>
<tr>
<td>11. If I get breast cancer, my whole life could change.</td>
<td></td>
</tr>
<tr>
<td>12. If I developed breast cancer, I could possibly die.</td>
<td></td>
</tr>
</tbody>
</table>
The benefits of breast self-awareness subscale received revisions because of the BSE controversy, the ACS (2005) guideline that BSE is optional, and the emphasis that has been placed on breast self-awareness by ACS (see Table 4). The original item 13 reads, “When I do BSE, I feel good about myself.” Item 13 was changed to, “Breast self-awareness does not require special training.” The original item 14 reads, “When I complete monthly BSE, I don’t worry as much about breast cancer.” Item 14 was changed to, “Breast self-awareness will help me become familiar with the way my breasts normally look and feel.” The original item 15 reads, “Completing BSE each month will allow me to find lumps early.” Item 15 was changed to, “Breast self-awareness will allow me to be aware of changes in my breast and to bring these changes to the attention of a health care provider.” The original item 16 reads, “If I complete BSE monthly during the next year, I will decrease my chances of dying from breast cancer.” Item 16 was changed to, “Practicing breast self-awareness now will help me to continue this behavior as I get older.” The original items 17 and 18 were deleted because both items emphasized monthly BSE, which is no longer a recommendation by ACS.

The barriers of BSE subscale received only one change. Item 20 that reads, “Doing breast self-examination during the next year will make me worry about breast cancer” was deleted (see Table 5). It was deleted because of the BSE controversy and the ACS (2005) guideline that BSE is optional.
Table 4

*Subscale of Benefits of Breast Self-Awareness*

<table>
<thead>
<tr>
<th>Original</th>
<th>Revisions (where applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. When I complete monthly breast self-examination, I don’t worry</td>
<td>14. Breast self-awareness will help me become familiar with the way my breasts normally look and feel.</td>
</tr>
<tr>
<td>as much about breast cancer.</td>
<td>15. Breast self-awareness will allow me to be aware of changes in my breasts and to bring these changes to the attention of a health care provider.</td>
</tr>
<tr>
<td>15. Completing breast self-examination each month will allow me to</td>
<td>16. Practicing breast self-awareness now will help me to continue this behavior as I get older.</td>
</tr>
<tr>
<td>find lumps early.</td>
<td>17. Deleted</td>
</tr>
<tr>
<td>16. If I complete breast self-examination monthly during the next year,</td>
<td>18. Deleted</td>
</tr>
<tr>
<td>I will decrease my chances of dying from breast cancer.</td>
<td></td>
</tr>
<tr>
<td>17. If I complete breast self-examination monthly, I will decrease my</td>
<td></td>
</tr>
<tr>
<td>chances of requiring radical or disfiguring surgery if breast cancer</td>
<td></td>
</tr>
<tr>
<td>occurs.</td>
<td></td>
</tr>
<tr>
<td>18. If I complete monthly breast self-examination, it will help me to</td>
<td></td>
</tr>
<tr>
<td>find a lump, which might be cancer before it is detected by a doctor</td>
<td></td>
</tr>
<tr>
<td>or nurse.</td>
<td></td>
</tr>
</tbody>
</table>
Table 5

*Subscale of Barriers of BSE*

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Original</th>
<th>Revisions (where applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. I feel funny doing breast self-examination.</td>
<td></td>
<td>19. none</td>
</tr>
<tr>
<td>20. Doing breast self-examination during the next year will make me</td>
<td>20. Deleted</td>
<td></td>
</tr>
<tr>
<td>worry about breast cancer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Breast self-examination will be embarrassing to me.</td>
<td></td>
<td>21. none</td>
</tr>
<tr>
<td>22. Doing breast self-examination will take too much time.</td>
<td></td>
<td>22. none</td>
</tr>
<tr>
<td>23. Doing breast self-examination will be unpleasant</td>
<td></td>
<td>23. none</td>
</tr>
<tr>
<td>24. I don’t have enough privacy to do breast self-examination</td>
<td></td>
<td>24. none</td>
</tr>
</tbody>
</table>

The *Breast Health Beliefs Survey* was submitted to a panel of six. The panel included two school nurses, two health education teachers, and two health promotion instructors from UAH. They assessed the subscales items for content validity. The revised subscales contained a total of 21 Likert scale items (susceptibility, 5; seriousness, 7; benefits of breast self-awareness, 4; barriers of BSE, 5), with a choice of five responses ranging from 1 (strongly disagree) to 5 (strongly agree).

Readability test, using the Simplified Measure of Gobbledygook (SMOG) technique and computerized readability analysis determined the *Breast Health Beliefs Survey* and was written at the seventh grade level. Internal consistency reliability of the *Breast Health Beliefs Survey* subscales determined the statistical relationship between the individual instrument items and the total score. Cronbach’s Alpha was used to obtain internal inconsistency reliability of the subscales.
Pilot Study

The principle focus of the pilot study was to assess the adequacy of the data collection plan. The pilot study was conducted at Union Chapel Church in Huntsville, Alabama. The pilot study was conducted after the focus group discussion of the instruments. The participants of the pilot study were 15-18 year old adolescent females who were members of the youth department at Union Chapel. They were given the *Breast Health Knowledge Test* and the *Breast Health Beliefs Survey*. Two weeks later they were retested and resurveyed with the same knowledge test and the same beliefs survey. A few of the females of the youth department attended Bob Jones and Sparkman High School. They were excluded from the pilot study because of possible research study participation by these females at their respective schools. They would have completed the knowledge test and survey five times if they were allowed to participate in the pilot study and the study at their school, which would render the results of the study inaccurate.

The stability reliability and internal consistency of the instrumentation scales were established. The stability reliability was measured by test-retest procedures and internal consistency by Cronbach’s alpha.

An expert panel, consisting of two school nurses, two health education teachers, and two health promotion instructors from the University of Alabama in Huntsville (UAH) established content validity for the instruments. Readability tests and the SMOG technique determined that the instruments were appropriate at the seventh-grade reading level.
Study Design

The quasi-experimental design was chosen to answer the research questions because the research questions include an independent variable, which will be manipulated to cause a change in the dependent variable. The research questions and research hypotheses required the treatment groups to participate in an interactive breast health program and the comparison groups did not engage in an interactive breast health program. In the study random selection of participants is lacking, however, random assignment of classrooms to a condition will occur. The classroom was used as the unit of analysis. There must be an element of control, independent variables concerning the subjects must be manipulated, and subjects must be randomly selected to qualify as a true experimental design (Bailey, 1991).

The study compared a 90-minute breast health program of interactive learning with simulated breast models (independent variables) and a program that did not include the interactive learning with the simulated breast models (independent variables). The study determined whether a breast health program with or without interactive learning with the simulated breast models (independent variable) affected the breast health knowledge (dependent variable) and breast health beliefs (dependent variable) of adolescent females. The outcomes are expected to be improved breast health knowledge and breast health beliefs of adolescent females when implementing interactive learning with simulated breast models in a breast health program.

The dependent variables (breast health knowledge and breast health beliefs) determined the effectiveness of the manipulation of the independent variable (interactive learning with or without simulated breast models). The adolescent females’ breast health
knowledge (dependent variable) was measured during three time periods: one week prior to the beginning of the breast health program with the *Breast Health Knowledge* pre-test; immediately following the end of the program (post-test); and four weeks after the end of the program (follow-up) (Appendices B & C, respectively). Also, their breast health beliefs were surveyed during the same three time periods as their breast health knowledge (Appendix D).

This quasi-experimental study was reliable because the collection of pre-test data allowed the researcher to determine whether the groups were initially similar in terms of their breast health knowledge and breast health beliefs. If the breast health knowledge and breast health beliefs of the two groups were very different at the beginning, the interpretation of the post-test and follow-up data would have been difficult. If the treatment and comparison groups respond similarly, the investigator could be relatively confident that any post-test and follow-up differences in breast health knowledge and breast health beliefs were the result of the interventions. By including a comparison group, the researcher was able to say that the results of the study were due to manipulation of the variables and not to chance interferences of other variables. If there was an improvement in the breast health knowledge and breast health beliefs of the treatment group at the end of the program the researcher could say that this was probably due to interactive learning with simulated breast models. If there was improvement in the comparison group, the researcher could say that this was probably due to the breast health teaching methods of lecture/discussion and video and not interactive learning with simulated breast models. If there was an improvement in one group (treatment or comparison) and not the other group at the end of the program when the dependent
variables were measured, the researcher could say that this was probably due to the manipulation of the breast health program’s interactive learning with the simulated breasts, because the groups (treatment and comparison) did not receive the exact teaching methods. One group included interactive learning with the simulated breast models and the other group did not have interactive learning with simulated breast models.

In this study, a threat to the internal validity of the research was selection. When individuals are not assigned randomly to groups, there is a possibility that the groups are not equivalent. This creates a selection bias. If the groups are nonequivalent, the researcher is faced with the possibility that any post-test differences are due to initial differences rather than to the effect of the treatment (Polit & Hungler, 1989). In the study, the problem of selection bias has been reduced by including the same or similar demographics and characteristics in the treatment and comparison groups. Also, random assignment of groups (classrooms) to conditions was conducted, as opposed to random selection of participants. Data was collected concerning their breast health knowledge and breast health beliefs (dependent variables) one week prior to the program, immediately following the program, and four weeks post program. The investigator analyzed how much improvement in scores of the two groups had occurred following the interventions, rather than simply comparing the groups’ final test scores. This type of analysis has the effect of removing any pre-intervention differences among the groups, thereby minimizing selection biases.

The objective of the study was to determine if teaching breast health with or without interactive learning with the simulated breast models affected the breast health knowledge and breast health beliefs of adolescent females. The study compared two
breast health programs. One program included interactive learning with simulated breast models; the other program did not utilize interactive learning with simulated breast models. The proposed outcome of this research was that the improvement of breast health knowledge and breast health beliefs would signal a need to include interactive learning with simulated breast models when teaching breast health education and breast self-care in the health promotion of adolescent females. Also, another outcome was that the teaching methods would provide guidelines for health educators to teach breast health effectively to adolescent females in a high school setting.

Program Interventions

The investigator of the study was responsible for presenting the breast health information and activities to ensure consistency across the classrooms and schools. A script was utilized to standardize the treatment and comparison groups so that every class in each condition received exactly the same information and activities.

One week prior to the beginning of the breast health program, each treatment classroom was given a *Breast Health Knowledge Test and Breast Health Beliefs Survey*. After the one week pre-test and pre-survey, the researcher of the study conducted a lecture on an overview of breast cancer, breast cancer facts, and the ACS’s recommendation for detection methods. A video that reviewed breast health, risk factors, breast cancer detection methods, and breast self-awareness followed the lecture. In addition to the video, a demonstration on how to perform BSE with simulated breast models was conducted.
After the BSE demonstration, the participants in the treatment classrooms engaged in a hands-on activity with simulated breast models. They divided into small groups of four. The groups practiced BSE. The presenter of the program (the researcher of the study) moved among the classroom groups and assisted with BSE form and technique. The participants were asked to show any abnormalities found in the simulated breast models. They were shown the lumps in the simulated breast models and encouraged to recheck the models. The program concluded with the administration of the *Breast Health Knowledge Test* and *Breast Health Beliefs Survey*. In addition to the one week pre-instrumentation and immediate post instrumentation, a four-week follow-up test and survey were administered.

The participants in the comparison classrooms were given the same *Breast Health Knowledge Test* and *Breast Health Beliefs Survey* during the three time periods as the treatment classrooms. They received the lecture on an overview of breast cancer, breast cancer facts, and the ACS’s recommendation for detection methods. A video that reviewed breast health, risk factors, breast cancer detection methods, and breast self-awareness followed the lecture. However, the difference between the classrooms was that the comparison classrooms did not engage in a hands-on activity with the simulated breast models. Therefore, the comparison classrooms did not break up into smaller groups. However, the comparison groups completed a “Wellness Inventory” and discussed the inventory to accommodate the time remaining in the time allotted for the breast health program, thereby giving each group equal amount of time (see Table 6).
Table 6

Program Interventions

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Length of Time Required</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test and Survey</td>
<td>20 minutes</td>
<td>T and C</td>
</tr>
<tr>
<td>Lecture</td>
<td>20 minutes</td>
<td>T and C</td>
</tr>
<tr>
<td>Video</td>
<td>15 minutes</td>
<td>T and C</td>
</tr>
<tr>
<td>Demonstration of BSE</td>
<td>10 minutes</td>
<td>T</td>
</tr>
<tr>
<td>Practice BSE at Stations</td>
<td>25 minutes</td>
<td>T</td>
</tr>
<tr>
<td>Immediate Post-Test and Survey</td>
<td>20 minutes</td>
<td>T and C</td>
</tr>
<tr>
<td>Wellness Inventory and Discussion</td>
<td>15 minutes</td>
<td>C</td>
</tr>
<tr>
<td>Follow-up Test and Survey</td>
<td>20 minutes</td>
<td>T and C</td>
</tr>
</tbody>
</table>

*Note:* T = Treatment Group; C = Comparison Group. The pre-test and survey were completed one week before the 90 minutes program. The follow-up test and survey were completed four weeks after the 90 minutes program.

The health education, health science, and child development teachers of the respective classes supervised the males and any females without consent and assent to participate. The supervision took place in another classroom. The alternative activities for the males and nonparticipating females consisted of the teachers administering a “Wellness Inventory” and allowing the students to discuss the inventory. Also, the teachers had each student make two columns on a sheet of paper. In one column students wrote activities they did to maintain their health. In the second column they wrote activities they did that were detrimental to their health. The teacher asked students to
share both good and bad behaviors. The teacher asked, “Which column is longer?” The teacher asked students to select the top three activities in the bad behavior column and write a plan to change the behaviors.

Data Collection

Prior to data collection written permission was obtained from the school superintendent, the school principal, and the parents or guardians (Appendix A). Data were collected from female students in the health education, health science, and child development classes who were present on the day of the breast health program. The classes were randomly assigned to a treatment or comparison group. There were three health education, five health science, and two child development classes at Bob Jones High School. There were four health education, four health science, and two child development classes at Sparkman High School. Data were collected from the participants by way of the instruments for pre-, post-, and follow-up of Breast Health Knowledge and Breast Health Beliefs. In order to match data, the participants placed the last four digits of their phone numbers on the tests and surveys.

Readability level was assessed on documents used in the proposed study to ensure the validity of the collected data. The SMOG readability formula and computerized readability analysis were used to assess the readability levels of the tests, survey, and informed consent letter. The Breast Health Knowledge Test and the Breast Health Beliefs Survey were written at the seventh-grade reading level. The permission letter to the parents or guardians (Appendix A) and the informed consent form (Appendix F) were written at the eighth-grade level.
Data Analysis

The study determined if teaching with or without interactive learning with simulated breast models had an effect on the breast health knowledge and breast health beliefs of adolescent females participating in a breast health program. A breast health program that included interactive learning with simulated breast models was compared to a program that did not include interactive learning with the simulated breast models in a high school setting of adolescent females enrolled in a health education, health science, and child development class. The premier software for Statistical Package for the Social Sciences (SPSS) called Predictive Analytics Software (PASW) Statistics was used to explore and analyze data pertaining to the study. Descriptive statistics were used to describe and synthesize the data through the use of frequencies, means, and standard deviations. Descriptive statistics were used to compute the breast health knowledge and breast health beliefs scores of the two groups. The independent variable of the study was the interactive learning. The dependent variables were breast health knowledge and breast health beliefs (susceptibility, seriousness, benefits, barriers).

After the descriptive data of the breast health knowledge and breast health beliefs scores were computed and interpreted, an independent $t$-test of pre-program scores was performed to determine comparability of the treatment and comparison groups. The $t$-test had four assumptions (Bartz, 1988). They were as follows.

1. The scores must be interval or ratio in nature.

2. The scores must be measured on random samples from the perspective populations.
3. The populations from which the samples were drawn must be normally distributed.

4. The populations from which the samples were drawn must have approximately the same variability.

5. There must be only two group situations to test significance of difference.

Assumption no. 2 was met by random assignment, not random selection. Therefore, a more stringent significance level was used (.01 instead of .05) (Bartz, 1988).

The researcher ran intra-class correlations on scores within the classroom and used the mean of the classroom as the unit of analysis. The intra-class correlation measured the relatedness or the interdependence of the students within the classrooms (Skiddiqui, et al., 1996).

An important aspect of sample size estimation is obtaining precise estimates of the intra-class correlations for the outcome variables under study (Skiddiqui, et al., 1996). The treatments were randomly assigned to the classrooms. Randomization of classrooms rather than students to different treatment conditions was the approach to sampling. In this situation, the treatment effect was evaluated on the basis of the between-class variance. Cornfield (1978) pointed out that in randomization of classes to different treatment conditions; students contribute less information than they would if they were individually randomized to different treatment conditions. This occurs because the students within a classroom cannot be regarded as independent.

The intent of the proposed study was to determine if the breast health teaching method of interactive learning with or without simulated breast models would have an effect on the breast health knowledge and breast health beliefs of the participants,
therefore, the researcher used repeated measures analysis of variance (ANOVA) to answer the research hypotheses.

Research Hypotheses

The major research hypotheses examined in this study were the following:

1. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to have greater breast health knowledge scores than those who participate in a breast health program that does not include interactive learning with simulated breast models.

2. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe they are susceptible to breast cancer than those who participate in a breast health program that does not include interactive learning with simulated breast models.

3. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe breast cancer is significantly more serious than those who participate in a breast health program that does not include interactive learning with simulated breast models.

4. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are benefits of breast self-awareness than those
who participate in a breast health program that does not include interactive learning with simulated breast models.

5. Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are fewer barriers of breast self-examination than those who participate in a breast health program that does not include interactive learning with simulated breast models.

Repeated-measures ANOVA are similar in many respects to one-way ANOVA. The total sum of squares in repeated-measures ANOVA is partitioned differently in order to control for the fact that scores for each classroom are not independent. $SS_T$ (total sum of squares) is partitioned into $SS_1$ (sum of squares for individuals), $SS_o$ (sum of squares for test occasions), and $SS_{Res}$ (residual sum of squares). The $F$ ratio for testing the null hypothesis of no differences between test occasions is $MS_o/MS_{Res}$. The summary of repeated-measures ANOVA (Hinkle, Wiersma, & Jurs, 1988) is summarized in Table 7.
Table 7

Summary ANOVA for a Repeated-Measures Analysis

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td>SS₁</td>
<td>n – 1</td>
<td>SS₁/(n – 1)</td>
<td></td>
</tr>
<tr>
<td>Occasions</td>
<td>SS₀</td>
<td>k – 1</td>
<td>SS₀/(k – 1)</td>
<td>MS₀/MSₚ₀</td>
</tr>
<tr>
<td>Residual</td>
<td>SSₚ₀</td>
<td>(k – 1) (n – 1)</td>
<td>SSₚ₀/(k – 1) (n – 1)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>SS₁</td>
<td>N – 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: SS = sum of squares; df = degree of freedom; MS = mean square; MS₀ = mean square for test occasions; MSₚ₀ = mean square residual; SSₚ₀ = sum of squares residual; k = number of test occasions; n = number of individuals; N = nk = total number of scores.

The study utilized pre, post, and follow-up testing and surveying of the treatment and comparison classrooms, which included a six-group situation. ANOVA is not restricted to two group situations. The means of three or more groups can be compared with ANOVA. This analysis allowed the investigator to compare two or more classrooms means to determine if there were significant differences between the treatment (pre, post, follow-up) and comparison classrooms (pre, post, follow-up). The researcher of the study used repeated measures ANOVA. The researcher tested and surveyed the sample of classrooms with different treatments at different times. In repeated measures analysis, scores for the same classroom were dependent. ANOVA enabled the investigator to examine the joint effects of the independent variables on the dependent variables. The investigator could not get this information by running two separate one-way analyses. Like the t-test, ANOVA is a parametric procedure, utilized to test the significance of differences between means. The problem with computing multiple independent t-tests for
comparing sample means is that, as the number of $t$-tests increases, the Type I error rate increases. With this problem in mind, ANOVA was used to answer the research hypotheses.

The investigator was interested in the effects of the variables, called main effects. The investigator examined the possible effects of a breast health program with and without a hands-on activity with simulated breast models on breast health knowledge and breast health beliefs. If the effect was not the same, there was an interaction between the breast health program with interactive learning and the program without interactive learning. If the effect was the same, there was not an interaction between the breast health program with interactive learning and the program without interactive learning. An interaction means that the effect one independent variable has on a dependent variable is not the same for the other independent variable. The statistic computed in ANOVA was the $F$-ratio statistic.

The assumptions for repeated-measures ANOVA (Bartz, 1988) were as follows:

1. The sample was randomly selected from the population.
2. The dependent variable is normally distributed in the population.
3. The population variances for the test occasions are equal.
4. The population correlation coefficients between pairs of test occasion scores are equal.

If the last two assumptions are not met, the Type I error rate can be seriously affected. However, it can be corrected by changing the degrees of freedom from $(k - 1)$ and $(n - 1)$ to 1 and $n - 1$, respectively.
Limitations

The following were limitations to the study.

1. Because study participation was voluntary, data collected may not have equally represented nonparticipating adolescent females.

2. The study did not include those students who were absent from school on the day the program was implemented.

3. The breast health of all females, ages 15-18 years at Bob Jones and Sparkman High School was not examined.

4. Peer influence on breast health was not assessed.

5. This study did not take into consideration the cultural differences among African-Americans, Hispanics, Asians, Whites, and Native Americans adolescent females’ breast health.

6. The results of the study came from middle-class adolescent females and were not generalized to low-income adolescent females.

7. Data collected in this study may be biased because of the nature of data collection (self-report). The participants’ breast health beliefs were considered self-report data. Participants may tend to answer a question the way they think the researcher wants the question answered, rather than according to their true feelings, thoughts, and practices about the issue. Respondents can easily fall into role selection when answering questions.
CHAPTER 4

DATA ANALYSIS

Introduction

Purpose of the Study

The purpose of this study is to determine if a breast health program with or without interactive learning with the simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females. The HBM constructs of perceived susceptibility, perceived seriousness, benefits of breast self-awareness, and barriers to BSE were utilized to determine the breast health beliefs of adolescent females. Perceived susceptibility and perceived severity must be high in order for the behavior of breast self-awareness to be adopted (Silk, et al. 2006).

The sample consisted of approximately 310 middle-class adolescent females, ages 15-18 years, enrolled in a health education, health science, or child development class at Bob Jones and Sparkman High School. These two north Alabama schools were selected because of their high level of interest in new programs to educate the students (as commented by the administrators) as well as their interest in participating in the research project (as expressed by the health education teachers).

Focus Group for Instrument Development

The focus group consisted of 6 participants aged 15-18 year old females. The participants were students who lived in the investigator’s neighborhood and students at
Madison Academy High School. The focus group was conducted at the investigator’s home on December 5, 2009 from 2 until 3 pm. Informed consent was obtained from each participant’s parents. The purpose of the focus group was to provide qualitative information concerning the readability and understanding of the *Breast Health Knowledge Test* and *Breast Health Beliefs Survey*.

Each focus group participant was given a copy of the *Breast Health Beliefs Survey*. The participants were instructed to read the survey and provide feedback about the understandability of the words, statements, and recommendations. They were given 15 minutes to read and make notes. Fifteen minutes were allotted for group discussion. Each statement was examined for comprehension. The focus group recommended two changes to the *Breast Health Beliefs Survey*. The first recommendation was made in the *Seriousness* subscale, statement #7. The focus group stated that *my heart beats faster* does not describe their feelings. They used the words *stressed out* (see Figure 1). The focus group did not understand the meaning of *funny* in statement #17 of *Barriers-BSE* subscale. They prefer, *uncomfortable* (see Figure 1).

<table>
<thead>
<tr>
<th>Original Statement</th>
<th>Revised Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. When I think about breast cancer, my heart beats faster.</td>
<td>7. When I think about breast cancer, I get stressed out.</td>
</tr>
</tbody>
</table>

Figure 1. Original and Revised Items of the *Breast Health Beliefs Survey*
Each focus group participant was given a copy of the *Breast Health Knowledge Test*. The group was instructed to provide feedback about their understandability of the stem, options, and words of each question on the survey. They were also asked to make recommendations for any changes. The group was given 15 minutes to read and make notes and 15 minutes for discussion. Each question was examined for comprehension.

The focus group recommended three changes to the *Breast Health Knowledge Test*. They recommended changes in the options for question #3. They stated that option *c* and *d* could be confusing because the only words that are different are *deaths* and *incidence*. The focus group recommended a change in question #4. The group did not understand the meaning of *loose breast tissue* in option *b*; therefore, *loose breast tissue* was deleted (see Table 8). The last recommendation was question #11. They did not understand the meaning of *loose* in option *c*. The group suggested changing the word to *soft* (see Table 8).

After completion of the focus group discussion, the instruments were revised and administered to the participants in the pilot study.

**Pilot Study for Instrument Development**

The principle focus of the pilot study was to assess the adequacy of the data collection instruments. The pilot study was conducted at the Union Chapel Church in Huntsville, Alabama. It was conducted after the focus group provided qualitative information concerning the readability and understanding of the *Breast Health Knowledge Test* and *Breast Health Beliefs Survey*.
### Table 8

Original and Revised (where applicable) Items of *Breast Health Knowledge Test*

<table>
<thead>
<tr>
<th></th>
<th>Original</th>
<th>Revised (where applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. Which of the following statements is true with regard to breast cancer in African-American women in the United States?</td>
<td>3. Which of the following statements is true with regard to breast cancer in African-American women in the United States?</td>
</tr>
<tr>
<td>a.</td>
<td>Breast cancer is not a threat to African-American women.</td>
<td>Breast cancer is not a threat to African-American women.</td>
</tr>
<tr>
<td>c.</td>
<td>Breast cancer deaths in African-American women are much higher than that of Caucasian women.</td>
<td>The breast cancer death rates among African-American women are much higher than that of Caucasian women. <em>(revised version)</em></td>
</tr>
<tr>
<td>d.</td>
<td>Breast cancer incidence in African-American women is much higher than that of Caucasian women.</td>
<td>Breast cancer incidence in African-American women is much higher than that of Caucasian women.</td>
</tr>
<tr>
<td></td>
<td>4. All of the following are signs of breast cancer except:</td>
<td>4. All of the following are signs of breast cancer except:</td>
</tr>
<tr>
<td>a.</td>
<td>Lump, hard knot or thickening</td>
<td>Lump, hard knot or thickening</td>
</tr>
<tr>
<td>b.</td>
<td>Loose breast tissue, soft round lump</td>
<td>Soft round lump <em>(revised version)</em></td>
</tr>
<tr>
<td>c.</td>
<td>Dimpling or puckering of the breast</td>
<td>Dimpling or puckering of the breast</td>
</tr>
<tr>
<td>d.</td>
<td>Nipple discharge</td>
<td>Nipple discharge</td>
</tr>
<tr>
<td></td>
<td>8. Normal changes during menstruation include all except:</td>
<td>8. Normal changes during menstruation include all except:</td>
</tr>
<tr>
<td>a.</td>
<td>Breasts feel full</td>
<td>Breasts feel full</td>
</tr>
<tr>
<td>b.</td>
<td>Breasts feel sore</td>
<td>Breasts feel sore</td>
</tr>
<tr>
<td>c.</td>
<td>Breasts feel loose</td>
<td>Breasts feel soft <em>(revised version)</em></td>
</tr>
<tr>
<td>d.</td>
<td>Breasts feel heavy</td>
<td>Breasts feel heavy</td>
</tr>
</tbody>
</table>
The participants of the pilot study were 15-18 year old adolescent females who were members of the youth department at Union Chapel. They were given the Breast Health Knowledge Test, and the Breast Health Beliefs Survey. A few of the females of the youth department attend Bob Jones and Sparkman High School. They were excluded from the pilot study because of possible research study participation by these females at their respective schools. They would have completed the knowledge test and survey five times if they were allowed to participate in the pilot study and the study at their school, which would render the results of the study inaccurate. The test-retest reliability and internal consistency of the instrumentation scales were established. The Breast Health Beliefs Survey and the Breast Health Knowledge Test were administered to 20 adolescent females at the Union Chapel Church. The survey was based on a 5-point Likert scale. The participants were asked to indicate their agreement to 21 statements by selecting from the following responses: strongly disagree =1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5. The knowledge test was comprised of 14 multiple choice questions.

To establish internal consistency reliability, Cronbach’s alpha ($\alpha$) calculations were conducted. Each item in each subscale was deleted and the internal consistency established to determine if the coefficient $\alpha$ increased substantially. Coefficient $\alpha$ increased substantially from .733 to .786 after item # 5 of the Susceptibility subscale was deleted. Item # 5 states, “I am more likely than the average female to get breast cancer if I find changes in my breast tissue.” Coefficient $\alpha$ increased substantially from .710 to .822 after item #13 of the Benefits of Breast Self-Awareness subscale was deleted. Item #13 states, “Breast self-awareness does not require special training” (see Table 9).
To establish stability reliability, test-retest procedures were utilized by distributing the *Breast Health Beliefs Survey* and the *Breast Health Knowledge Test* on two separate occasions (two weeks apart) to the convenience sample of adolescent females at Union Chapel Church. Pearson correlations coefficients ($r$) were computed to determine test-retest reliability for the beliefs survey and the knowledge test. A correlation of -.29 to .80 was found on the subscales of the survey. The susceptibility subscale ($r = -.29$) was found to have the lowest score and the barriers subscale ($r = .80$) had the strongest relationship. A positive correlation of .78 was found for the knowledge test that measured the number of items the participants answered correctly. The results indicated that the instruments were reliable.

Table 9

*Internal Consistency of the Instruments*

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha (Items Deleted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>.869</td>
<td></td>
</tr>
<tr>
<td>Susceptibility</td>
<td>.733</td>
<td>.786</td>
</tr>
<tr>
<td>Seriousness</td>
<td>.715</td>
<td></td>
</tr>
<tr>
<td>Benefits of BSA</td>
<td>.710</td>
<td>.822</td>
</tr>
<tr>
<td>Barriers of BSE</td>
<td>.846</td>
<td></td>
</tr>
</tbody>
</table>

*Note: BSA = Breast Self-Awareness; BSE = Breast Self-Examination.*
Participants

The 310 participants in the study were females in grades 10-12 and ranged in age from 15 to 18 years old. They were students at Bob Jones and Sparkman High School.

Bob Jones High School is part of the Madison City School System. It is the largest high school in the state of Alabama with over 2200 students. It is located in Madison and houses grades 10-12 (Madison City Schools, 2009). Bob Jones economic level is considered middle to upper class because only 11% of Bob Jones High School students’ receive free or reduced-priced lunch. The state’s average for students receiving free or reduced-priced lunch is 48% for grades 9-12. Bob Jones is well below the state’s average for free or reduced-priced lunch. Student ethnicity is as follows: Caucasian, 70%; African-American, 19%; Asian, 6%; Hispanic, 3%; American Indian, 1%; and unspecified, 1% (www.greatschools.net).

Sparkman High School is part of the Madison County School System. It is located in Harvest and houses over 2200 students in grades nine through twelve (Madison County Schools, 2009). Sparkman High School is considered middle class with 17% of its students eligible for free or reduced-priced lunch. Sparkman is well below the state’s average for free or reduced lunch. Student ethnicity is as follows: Caucasian, 65%; African-American, 29%; American Indian, 2%; Hispanic, 2%; Asian, 1%; and unspecified, 1% (www.publicschoolreview.com).

The participants were enrolled in a health education, health science, or child development class. The decision to include females enrolled in a health education class stemmed from the fact that health promotion topics such as healthy eating, personal hygiene, first aid, safe sex, drug abuse, safe driving, and physical fitness are included in
the health education course of study, which is a required class. Females enrolled in a health science class were included in the research study. Although the health science course of study focuses on the healthcare delivery system and health careers, it also includes health promotion and wellness topics. It is an elective course. Also, the females enrolled in a child development class were participants. In addition to exploring the development of children from birth to adolescence, the class also included wellness topics. It is also an elective course. These courses at Bob Jones and Sparkman created an opportunity to introduce the health promotion topic of breast health.

The investigator went into each of the selected classes and explained the nature of the research and gave each potential participant an informed consent and a letter to carry home to their parent/guardian. The students were given three days to return the informed consent. The investigator returned to the classes the next day to distribute the informed consents and letter to those students who were absent from school on the previous day. There were only two students whose parents did not give their consent for their child to participate. Twenty (20) classes participated in the study.

Results

*Equivalence of Treatment and Comparison Groups*

The pre-test equivalence on the knowledge test between the treatment and comparison groups is evidenced by the results of the descriptive statistics and an independent t-test. The highest score possible was 14, which was the number of questions on the knowledge test. The results of the descriptive statistics revealed the breast health knowledge pre-test mean score for the adolescent females in the treatment group was 4.9
and the comparison group was 4.7. The results of the independent t-test for the groups were: \( t (308) = 1.584, p = .114 \) (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the breast health knowledge pre-test scores between the treatment and comparison groups. This indicates that the groups had similar knowledge of breast health before the breast health program interventions.

The susceptibility to breast cancer pre-survey equivalence between the treatment and comparison groups was evidenced by the results of the descriptive statistics and an independent t-test. The results of the descriptive statistics revealed the susceptibility to breast cancer pre-survey mean score for the adolescent females in the treatment group was 12.6 and the comparison group was 12.5. The highest possible score was 20. The results of the independent t-test for groups were: \( t (308) = .338, p = .736 \) (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the susceptibility to breast cancer pre-survey scores between the treatment and comparison groups. This indicates that the groups had similar beliefs about their susceptibility to breast cancer before the breast health program interventions.

The seriousness of breast cancer pre-survey equivalence between the treatment and comparison groups was evidenced by the results of the descriptive statistics and an independent t-test. The results of the descriptive statistics revealed the seriousness of breast cancer pre-survey mean score for the adolescent females in the treatment group was 27 and the comparison group was 26.6. The highest possible score was 35. The results of the independent t-test for the groups were: \( t (308) = 1.199, p = .231 \) (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the seriousness of breast cancer pre-survey mean scores.
between the treatment and comparison groups. This indicates that the groups had similar beliefs about the seriousness of breast cancer before the breast health program interventions.

The benefits of breast self-awareness pre-survey equivalence between the treatment and comparison groups and were evidenced by the results of the descriptive statistics and an independent t-test. The results of the descriptive statistics revealed the benefits of breast self-awareness pre-survey mean score for the adolescent females in the treatment group was 9.8 and the comparison group was 9.8. The highest possible score was 15. The results of the independent t-test for the groups were: $t (308) = - .440, p = .661$ (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the benefits of breast self-awareness between the treatment and comparison groups. This indicates that the groups had similar beliefs about the benefits of breast self-awareness before the breast health program interventions.

The barriers of BSE pre-survey equivalence between the treatment and comparison groups were evidenced by the results of the descriptive statistics and an independent t-test. The results of the descriptive statistics revealed the barriers of BSE pre-survey mean score for the adolescent females in the treatment group were 17.4 and the comparison group was 17.4. The highest possible score was 25. The results of the independent t-test for the groups were: $t (308) = - .316, p = .752$ (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the barriers of BSE pre-survey scores between the treatment and comparison groups. This indicates that the groups had similar beliefs about the barriers of BSE before the breast health program interventions.
Equivalence of Schools

The pre-test equivalence on the knowledge test between the two schools is evidenced by the results of the descriptive statistics and an independent t-test. The highest score possible was 14, which was the number of questions on the knowledge test. The knowledge pre-test mean score for school one was 5 and school two was 4.7. The results of an independent t-test for the schools were: \( t (308) = 1.867, p = .31202 \) (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the breast health knowledge pre-test scores between school one and school two. The results of the descriptive statistics and the independent t-test indicate that the participants from the two schools had similar knowledge about breast health before the breast health program interventions.

The pre-test equivalence on the beliefs survey between the two schools is evidenced by the results of the descriptive statistics and an independent t-test. The susceptibility to breast cancer pre-survey mean score for school one was 12.6 and school two was 12.4. The highest possible score was 20. The results of an independent t-test for the schools were: \( t (308) = .625, p = .533 \) (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the susceptibility to breast cancer pre-survey scores between school one and school two. The results of the descriptive statistics and independent t-test indicate that the participants from the two schools were similar in their beliefs about their perceived susceptibility to breast cancer before the breast health program interventions.

The seriousness of breast cancer pre-survey mean score for school one was 26.9 and school two was 26.7. The highest possible score was 35. The results of an
independent t-test for schools were: $t (308) = .726, p = .468$ (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the seriousness of breast cancer pre-survey scores between school one and school two. The results of the descriptive statistics and the independent t-test indicate that the participants from the two schools were similar in their beliefs about the seriousness of breast cancer before the breast health program interventions.

The benefits of breast self-awareness pre-survey mean score for school one was 9.8 and school two was 9.8. The highest possible score was 15. The results of an independent t-test for schools were: $t (308) = .275, p = .784$ (two-tailed). Since the significance was greater than .05, the results did not show any significant differences in the benefits of breast self-awareness pre-survey mean scores between school one and school two. The results of the descriptive statistics and the independent t-test indicate that the participants from the schools were similar in their beliefs about the benefits of breast self-awareness before the breast health program interventions.

The barriers of BSE pre-survey mean score for school one was 17.3 and school two was 17.4. The highest possible score was 25. The results of an independent t-test for schools were: $t (308) = -.533, p = .595$ (two-tailed). Since the significance was greater than .05, the results of the independent t-test did not show any significant differences in the barriers of BSE pre-survey scores between school one and school two. The results of the descriptive statistics and the independent t-test indicate that the participants at the schools were similar in their beliefs of the barriers of BSE pre-intervention.
Analysis of Research Questions and Hypotheses

Research Question and Research Hypothesis 1

Research Question 1: Do adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models have a significant increase in breast health knowledge than those who participate in a breast health program that does not include interactive learning with simulated breast models? Research Hypothesis 1: Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to have significantly higher breast health knowledge scores than those who participate in a breast health program that does not include interactive learning with simulated breast models.

Null Hypothesis 1: There will be no significant interaction between time and group in the breast health knowledge scores for adolescent females participating in a breast health program that include interactive learning with simulated breast models and those who participate in a breast health program that does not include interactive learning with simulated breast models. Based on the results of the repeated measures ANOVA, the null hypothesis was rejected.

The results of the Box’s Test of Equality of Covariance Matrices were: Box’s $M = 17.996$, $F = 2.968$, $p = .007$, therefore, the covariances were significantly different and the null hypothesis was rejected. The assumption of homogeneity of variance-covariance was not met. The Box M test is highly sensitive. While the assumption was violated, the level of violation does not reach the empirical criterion recommended for adjustment (Stevens, 1996).
The results of the Wilks’ lambda multivariate test for time and group interaction were: $W = .795$, $F = 39.662$, $p < .001$. The significant $F$ means there was no parallelism in the knowledge scores of breast cancer for both groups across time. There was a significant interaction for breast health knowledge between the treatment and comparison groups across time. The partial eta-squared ($\eta^2$) was .205, which indicates that 21% of the total variance in the dependent variable of knowledge was accounted for by the interaction of time and group.

The breast health knowledge scores (total score = 14) of both groups increased significantly after the interventions. The treatment group increased by 5.25 between baseline and post-test while the comparison group increased by 3.72. Between post-test and follow-up, the treatment group declined by only .8. The comparison group lost 1.03. However, the recipients of interactive learning gained more and sustained their gains over the comparison group. Both groups’ scores decreased slightly on the 4-week follow-up (see Table 10 and Figure 2). Differences from parallelism were statistically significant.

Table 10

*Descriptive Statistics of Adolescent Females’ Breast Health Knowledge*

<table>
<thead>
<tr>
<th>Test</th>
<th>Group 1 (Treatment)</th>
<th>Group 2 (Comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Pre</td>
<td>158</td>
<td>4.95</td>
</tr>
<tr>
<td>Post</td>
<td>158</td>
<td>10.20</td>
</tr>
<tr>
<td>Follow-up</td>
<td>158</td>
<td>9.45</td>
</tr>
</tbody>
</table>

*Note.* $n =$ number of adolescent female participants; $M =$ mean; $SD =$ standard deviation.
**Research Question and Research Hypothesis 2**

**Research Question 2:** Is the adolescent female’s perceived susceptibility to breast cancer affected more by the interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models? **Research Hypothesis 2:** Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe they are susceptible to breast cancer.
than those who participate in a breast health program that does not include interactive
learning with simulated breast models.

*Null Hypothesis 2:* There will be no significant interaction between time and
group in the perceived susceptibility to breast cancer scores for adolescent females
participating in a breast health program that include interactive learning with simulated
breast models and those who participate in a breast health program that does not include
interactive learning with simulated breast models. Based on the results of the repeated
measures ANOVA, the null hypothesis was not rejected.

The results of the Box’s Test of Equality of Covariance Matrices were: *Box’s M* =
12.4, *F* = 2.043, *p* = .056, therefore, the covariances were not significantly different and
the null hypothesis was not rejected. The assumption of homogeneity of variance-
covariance was upheld.

The results of the Wilks’ lambda multivariate for time and group interaction were:
*W* = .989, *F* = 1.782, *p* = .170. The nonsignificant *F* means there was parallelism in the
perceived susceptibility of breast cancer scores for both groups across time. There was no
significant interaction for perceived susceptibility of breast cancer between the treatment
and comparison groups across time. Failing to reject parallelism means that differences
between groups in the changes in susceptibility scores across time were not greater than
would be expected by random sampling fluctuation alone. The partial $\eta^2$ was .011, which
indicates that 1.1% of the total variance in the dependent variable of perceived
susceptibility to breast cancer was accounted for by the interaction of time and group.

The perceived susceptibility to breast cancer scores (total score = 20) of both
groups increased after the interventions. The higher the score, the more likely the
participants believe they are susceptible to breast cancer. The lower the score, the less likely the participants believe they are susceptible to breast cancer (see Table 11 and Figure 3). The treatment group increased by 3.81 between baseline and post-survey while the comparison group increased by 3.39. Between post-survey and follow-up, the treatment group declined by only .49. The comparison group lost .51. Groups had similar scores on the immediate post-survey and follow-up susceptibility items. Both groups’ scores decreased slightly on the 4-week follow-up (see Table 11 and Figure 3). Differences from parallelism in the results were not statistically significant.

Table 11

*Descriptive Statistics of Adolescent Females’ Perceived Susceptibility to Breast Cancer*

<table>
<thead>
<tr>
<th>Survey</th>
<th>Group 1 (Treatment)</th>
<th>Group 2 (Comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Pre</td>
<td>158</td>
<td>12.56</td>
</tr>
<tr>
<td>Post</td>
<td>158</td>
<td>16.37</td>
</tr>
<tr>
<td>Follow-up</td>
<td>158</td>
<td>15.88</td>
</tr>
</tbody>
</table>

*Note.* n = number of adolescent female participants; M = mean; SD = standard deviation.
Research Question and Research Hypothesis 3

Research Question 3: Is the adolescent female’s perceived seriousness to breast cancer affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models? Research Hypothesis 3: Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are more likely to believe breast cancer is significantly more
serious than those who participate in a breast health program that does not include interactive learning with simulated breast models.

Null Hypothesis 3: There will be no significant interaction between time and group in the perceived seriousness to breast cancer scores for adolescent females participating in a breast health program that include interactive learning with simulated breast models and those who participate in a breast health program that does not include interactive learning with simulated breast models. Based on the results of the repeated measures ANOVA, the null hypothesis was not rejected.

The results of the Box’s Test of Equality of Covariance Matrices were: Box’s $M = 10.2$, $F = 1.687$, $p = .120$, therefore, the covariances were not significantly different and the null hypothesis was not rejected. The assumption of homogeneity of variance-covariance was upheld.

The results of the Wilks’ lambda multivariate test for time and group interaction were: $W = .996$, $F = .672$, $p = .511$. The nonsignificant F means there was parallelism in seriousness of breast cancer scores for both groups across time. There was a no significant interaction for perceived seriousness of breast cancer between the treatment and comparison groups across time. Failing to reject parallelism means that differences between groups in the changes in seriousness scores across time were not greater than would be expected by random sampling fluctuation alone. The partial $\eta^2$ was .004, which indicates that .4% of the total variance in the dependent variable of perceived seriousness of breast cancer was accounted for by the interaction of time and group.

The perceived seriousness of breast cancer scores (total score = 35) of both groups increased after the interventions. The higher the score, the more likely the
participants believe breast cancer is serious. The lower the score, the less likely the participants believe breast cancer is serious (see Table 12 and Figure 4). The treatment group increased by 1.04 between baseline and post-survey while the comparison group increased by 1.54. Between post-survey and follow-up, the treatment group declined by only .17. The comparison group lost .24. Groups had similar scores on the immediate post-survey and follow-up seriousness items. Both groups’ scores decreased slightly on the 4-week follow-up (see Table 12 and Figure 4). Differences from parallelism in the results were not statistically significant.

Table 12

*Descriptive Statistics of Adolescent Females’ Perceived Seriousness of Breast Cancer*

<table>
<thead>
<tr>
<th>Survey</th>
<th>Group 1 (Treatment)</th>
<th>Group 2 (Comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Pre</td>
<td>158</td>
<td>27.03</td>
</tr>
<tr>
<td>Post</td>
<td>158</td>
<td>28.07</td>
</tr>
<tr>
<td>Follow-up</td>
<td>158</td>
<td>27.90</td>
</tr>
</tbody>
</table>

*Note.* n = number of adolescent female participants; M = mean; SD = standard deviation.
Research Question and Research Hypothesis 4

Research Question 4: Are the adolescent female’s perceived benefits of breast self-awareness affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models? Research Hypothesis 4: Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are benefits of
breast self-awareness than those who participate in a breast health program that does not include interactive learning with simulated breast models.

**Null Hypothesis 4:** There will be no significant interaction between time and group in the perceived benefits of breast self-awareness scores for adolescent females participating in a breast health program that include interactive learning with simulated breast models and those who participate in a breast health program that does not include interactive learning with simulated breast models. Based on the results of the repeated measures ANOVA, the null hypothesis was rejected.

The results of the Box’s Test of Equality of Covariance Matrices were: \( \text{Box’s } M = 13.7, F = 2.265, p = .035 \), therefore, the covariances were significantly different and the null hypothesis was rejected. The assumption of homogeneity of variance-covariance was not met. The Box M test is highly sensitive. While the assumption was violated, the level of violation does not reach the empirical criterion recommended for adjustment (Stevens, 1996).

The results of the Wilks’ lambda multivariate test for time and group interaction were: \( W = .653, F = 81.519, p < .001 \). The significant \( F \) means that there was no parallelism in the perceived benefits of breast self-awareness scores for both groups across time. There was a significant interaction for perceived benefits of breast self-awareness between the treatment and comparison groups across time. The partial \( \eta^2 \) was .345, which indicates that 35% of the total variance in the dependent variable of benefits of breast self-awareness was accounted for by the interaction of time and group.

The perceived benefits of breast self-awareness scores (total score = 15) of both groups increased after the interventions. The higher the score, the more likely the
participants believe there are benefits of breast self-awareness. The lower the score, the less likely the participants believe there are benefits of breast self-awareness (see Table 13 and Figure 5). The treatment group increased by 3.47 between baseline and post-survey while the comparison group increased by .46. Between post-survey and follow-up, the treatment group declined by .3. The comparison group lost .12. The recipients of interactive learning gained more but lost slightly over the comparison group. The treatment group had a significantly larger gain than the comparison group but the comparison group sustained their gain over the treatment group. However, scores of both groups decreased slightly on the 4-week follow-up (see Table 13 and Figure 5). Differences from parallelism were statistically significant.

Table 13

*Descriptive Statistics of Adolescent Females’ Perceived Benefits of Breast Self-Awareness*

<table>
<thead>
<tr>
<th>Survey</th>
<th>Group 1 (Treatment)</th>
<th>Group 2 (Comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Pre</td>
<td>158</td>
<td>9.77</td>
</tr>
<tr>
<td>Post</td>
<td>158</td>
<td>13.24</td>
</tr>
<tr>
<td>Follow-up</td>
<td>158</td>
<td>12.94</td>
</tr>
</tbody>
</table>

*Note.* n = number of adolescent female participants; M = mean; SD = standard deviation.
Research Question and Research Hypothesis 5

Research Question 5: Are the adolescent female’s perceived barriers of breast self-examination affected more by interactive learning with simulated breast models while participating in a 90-minute breast health program or one that does not include interactive learning with simulated breast models? Research Hypothesis 5: Adolescent females who participate in a 90-minute breast health program that includes interactive learning with simulated breast models are significantly more likely to believe there are
fewer barriers of breast self-examination than those who participate in a breast health program that does not include interactive learning with simulated breast models.

**Null Hypothesis 5:** There will be no significant interaction between time and group in the perceived barriers of BSE scores for adolescent females participating in a breast health program that include interactive learning with simulated breast models and those who participate in a breast health program that does not include interactive learning with simulated breast models. Based on the results of the repeated measures ANOVA, the null hypothesis was rejected.

The results of the Box’s Test of Equality of Covariance Matrices were: Box’s $M = 77, F = 12.697, p < .001$, therefore, the covariances were significantly different and the null hypothesis was rejected. The assumption of homogeneity of variance-covariance was not met. The Box M test is highly sensitive. While the assumption was violated, the level of violation does not reach the empirical criterion recommended for adjustment (Stevens, 1996).

The results of Wilks’ lambda multivariate test for time and group interaction were: $W = .432, F = 202.046, p < .001$. The significant $F$ means that there was no parallelism in the perceived BSE barriers scores for both groups across time. There was a significant interaction for perceived BSE barriers between the treatment and comparison groups across time. The partial $\eta^2$ was .568, which indicates that 57% of the total variance in the dependent variable of BSE barriers was accounted for by the interaction of time and group.

The perceived barriers of BSE scores (total score = 25) of both groups decreased significantly after the interventions. The lower the score, the less likely the participants
believe there are barriers of BSE. The higher the score, the more likely the participants believe there are barriers of BSE (see Table 14 and Figure 6). The treatment group decreased by 6.45 between baseline and post-survey while the comparison group decreased by .34. Between post-survey and follow-up, the treatment group increased by only .28. The comparison group gained .35. The sustaining of learning was similar in both groups as evidenced by both groups’ scores increasing slightly on the 4-week follow-up (see Table 14 and Figure 6). Differences from parallelism were statistically significant.

Table 14

*Descriptive Statistics of Adolescent Females’ Perceived Barriers of BSE*

<table>
<thead>
<tr>
<th>Survey</th>
<th>Group 1 (Treatment)</th>
<th>Group 2 (Comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Pre</td>
<td>158</td>
<td>17.37</td>
</tr>
<tr>
<td>Post</td>
<td>158</td>
<td>10.92</td>
</tr>
<tr>
<td>Follow-up</td>
<td>158</td>
<td>11.20</td>
</tr>
</tbody>
</table>

*Note.* n = number of adolescent female participants; M = mean; SD = standard deviation.
Adolescent females who participated in the study had similar knowledge of breast cancer, perceived susceptibility to breast cancer, perceived seriousness of breast cancer, perceived benefits of breast self-awareness, and perceived barriers of BSE before the interventions were implemented.

Figure 6. Profile Plot of Barriers of BSE

Summary

Adolescent females who participated in the study had similar knowledge of breast cancer, perceived susceptibility to breast cancer, perceived seriousness of breast cancer, perceived benefits of breast self-awareness, and perceived barriers of BSE before the interventions were implemented.
The dependent variables (knowledge, susceptibility, seriousness, benefits, barriers) were affected by the independent variables (interactive learning with simulated breast models, no interactive learning with simulated breast models). The knowledge scores revealed that the recipients of interactive learning gained more knowledge about breast health and sustained their gain more than the comparison group. The perceived susceptibility and perceived seriousness of breast cancer scores for both groups were parallel immediately post-survey after the interventions and during the 4-week follow-up, suggesting that the participants perceived themselves as being susceptible to breast cancer and perceived breast cancer as serious regardless of the teaching/learning strategies and the amount of time that had lapsed since the interventions. The treatment group had a significantly larger gain than the comparison group in the perceived benefits of breast self-awareness but the comparison group sustained their gain over the treatment group. The treatment group’s perceived barriers of BSE decreased immediately post-survey suggesting that the treatment group believe there are very few barriers that inhibit BSE after their participation in breast health interactive learning.

In comparing the adolescent females’ knowledge of breast cancer, perceived susceptibility to breast cancer, perceived seriousness of breast cancer, and perceived benefits of breast self-awareness scores from the immediate post-test and survey to the 4-week follow-up; total score for each variable declined and the perceived barriers of BSE scores increased, regardless of breast health interactive learning or no interactive learning.
CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was to determine if a breast health program with or without interactive learning with simulated breast models would affect the breast health knowledge and breast health beliefs of adolescent females. Based on the results of the repeated measures ANOVA, the study found that adolescent females who participated in a 90-minute breast health program that includes interactive learning with simulated breast models were more likely to have significantly higher breast health knowledge scores, significantly more likely to believe they were susceptible to breast cancer, likely to believe breast cancer is serious, significantly more likely to believe in the benefits of breast-self awareness, and significantly more likely to believe there are fewer barriers to BSE as compared to those who participate in a similar program that does not include interactive learning with simulated breast models. The breast health knowledge of the adolescent females was assessed with breast health facts such as: incidence, risk factors, warning signs, and detection methods. The HBM constructs of perceived susceptibility, perceived seriousness, perceived benefits of breast self-awareness, and perceived barriers of BSE were utilized to determine their breast health beliefs.

A national survey of more than 3,000 adolescent females emphasized the importance of breast health education for adolescent females. It was discovered that more than 30% of adolescent females perceived a normal change in their breast to be a sign of
breast cancer and more than 20% thought breast cancer was caused by infection, tanning, drug use, stress, or breast injury (Weiss & Friedman, 2008). There have been reports of adolescent females believing that if they get hit in the breast, they could get cancer. Educating adolescent females about normal breast development, warning signs, and risk factors of breast cancer have proven to be the key to clearing up misconceptions concerning breast cancer. The best way for adolescent females to acquire knowledge and a good understanding about breast health is through a well developed breast health education program that incorporates interactive learning with simulated breast models.

More than 192,000 new cases of invasive breast cancer diagnosed among women in the U.S. in 2009 were projected by ACS (ACS, 2009). Over 40,000 women in the U.S. were expected to die from breast cancer in 2009 (ACS, 2009). A woman is diagnosed with breast cancer every three minutes in the U.S. (ACS, 2011). Because of the alarming statistics mentioned, primary prevention in school health needs to be a major player in the fight against breast cancer. Education is a big part of primary prevention. In addition to early detection, early education is also a key to breast cancer awareness.

Despite the common misconception that only women over 40 get breast cancer, it can and does occur in younger women. Breast cancer is the leading cause of cancer deaths among women ages 15-54, according to the National Cancer Institute, (Cancer Statistics, 2007). In May 2009, a 10-year old girl in California was diagnosed with breast cancer and underwent a mastectomy. Later that year in November, another 10-year old girl was diagnosed with breast cancer. In October 2009, a 13-year old girl in Arkansas was diagnosed with invasive breast cancer and received a lumpectomy (ABC News, 2009). In addition to adolescent girls, breast cancer is also taking a toll on girls in their
late teens and early twenties. While these cases are rare, they are extreme examples of a troubling trend emerging with breast cancer. Young females are getting a disease that usually strikes around menopause—and no one knows why. While breast cancer is overwhelming at any age, females who get the disease in their twenties, their teens or younger face a host of unique issues that complicate an already devastating diagnosis. They face issues all breast cancer patients’ face—dealing with a potentially life-threatening illness, mortality, toxic treatments, and breast surgery. A person who is young deals with those issues at an age when they have their own adolescent/teen problems, so these are accentuated. The mothers of these young girls who have been diagnosed with breast cancer stated that the biggest challenge was to “explain breast cancer” to their daughters. Primary prevention is a proactive level of prevention. We often times wait until something happens to take action as opposed to being ready for devastating events. It is believed that the position of not being proactive in educating young females about breast cancer is taken because breast cancer is rare in adolescent females.

Early cancer detection can save lives and enhance quality of life. Early detection does not receive enough emphasis in healthcare for the young adolescent population. Young females diagnosed with breast cancer and young males diagnosed with testicular cancer face unique challenges such as: body image, peer acceptance, relationships and dating. Proper breast health education encourages young females to be familiar with the look and feel of their breasts. A monthly BSE is an effective way of becoming familiar and comfortable with this area of the body and can facilitate the detection of breast cancer at an early, curable stage. For young males over the age of 14, a monthly testicular exam is an effective way of becoming familiar and comfortable with this area of the body.
and can facilitate the detection of testicular cancer at an early, curable stage. By knowing what feels normal, an adolescent has a better chance of knowing when something feels different so that they may alert their parent or guardian in order to seek prompt medical attention. Proper health education serves to teach young females about changes in their bodies that could be warning signs of breast cancer and young males about changes in their bodies that could be warning signs of testicular cancer. Educating young females and males about cancer empowers them to learn the facts, know their bodies, speak and advocate for their health, and accept support.

There are communities that have taken on the task of educating young girls about breast cancer because of the missed opportunities in schools, particularly, in health education courses. The program, *Project Early Awareness: a Breast Health Education Program for High School Girls*, was established in 2001 at Howard University in partnership with the Prevent Cancer Foundation. The program was designed to promote lifelong good breast health habits for high school females, particularly African-Americans. Since its inception, the program has reached over 4,000 young female high school students in the District of Columbia. *Project Early Awareness* focuses on lowering breast cancer mortality rates by educating females about breast cancer at a young age which may lead to early diagnosis later in life.

Many school organizations and school sports are holding events for breast cancer awareness such as the sale of pink t-shirts and pink arm bracelets to raise money. Obviously, high school females are thinking about breast health. But are the students being taught breast cancer facts? In addition to thinking about breast cancer, high school females should be talking about breast health by participating in meaningful discussions.
with interactive learning guided by trained health educators or healthcare professionals. Many organizations such as *Biden Breast Health Initiatives (BBHI)* and the *Susan G. Komen’s Teens for the Cure: Breast Health Program for High School Girls* have taken the lead to go into the high schools to educate girls about breast cancer.

The *BBHI* was formed in the early 1990s after Jill Biden had several friends diagnosed with breast cancer. She realized that too often, BSE was usually not taught to young women. As an educator of high school and college age students, Jill gathered breast cancer survivors, community leaders, and medical professionals together to help provide crucial information to female students in the 10th, 11th, and 12th grades in Delaware. Currently, the *BBHI* is reaching over 2,500 female students per year in both public and private high schools throughout the state of Delaware.

*Susan G. Komen’s Teens for the Cure: Breast Health Program for High School Girls* provides basic, age-appropriate state-of-the-art breast health information and teach the techniques of BSE. The information is taught to high school girls in the 9th through 12th grades with the guidance of school nurses and health education teachers.

During adolescence, health promotion behaviors often are taught in school. Healthy eating, personal hygiene, first aid, safe sex, drug abuse, safe driving, and physical fitness are examples of health topics covered routinely in most school health education curriculums. However, breast health is one topic that is not often taught. The most commonly stated reason by high school health education teachers for not including breast health in the health education classes is that the instructor is uncomfortable with the subject and do not know how to teach it properly (Darroch, Landry, & Singh, 2000). Also, another reason that has been mentioned by health educators is it simply is not in the
health education course of study. This is an easy way to get out of not including it in the course. Health educators are required to teach all the content in the course of study and may include other appropriate content area, so they can include breast health.

As previously mentioned in chapter one, a missed opportunity for teaching breast health awareness occurs in the 9th-12th grade health education curriculum. The *Alabama Course of Study for Health Education (2009)* incorporates the following eight health content areas: community and consumer health, environmental health, family health, personal health and safety, mental and emotional health, nutrition, prevention and control of disease, and substance use and abuse. Each area has its own content standards. Breast health is not addressed in any of the content areas. Potential standards for breast cancer awareness include: students will… “*discuss breast cancer myths, describe early breast cancer detection methods, and state signs and symptoms of breast cancer.*” There are two content areas in which breast health could be incorporated. One area is family health. Content standard five in family health states, “*identify common causes of disability and premature death.*” Dying at a young age from breast cancer warrants premature loss of life. Examples in the course of study include sudden infant death syndrome, unintentional and intentional injuries, cardiovascular diseases, diabetes, and cancers. Breast health could also be discussed in the content area of personal health and safety. Content standard seven states, “*recognize personal responsibility for lifelong health.*” Examples in the course of study include participating regularly in physical activity, practicing water safety, operating motor vehicles safely, scheduling annual physical exams, cancer screenings, and immunizations. Breast self-awareness could be considered when scheduling annual physical exams and a component of cancer screening for breast cancer.
The *Alabama Course of Study for Health Education (2009)* requires students not only to gain knowledge, but also to practice effective health skills/behaviors and to develop attitudes that promote healthy living. However, the Alabama course of study needs specific content standards for breast health. Health educators would have to teach breast health if there were specific breast health standards in the course of study because as previously mentioned, they are required by the state and local board of education to teach all the content topics and standards.

States such as Michigan, Vermont, Rhode Island, and Texas seem to have the same topics in common in their health education curriculum. The topics they have in common are: nutrition, safety, consumer health, mental health, alcohol, tobacco, drug abuse, HIV/AIDS, violence prevention, personal health/wellness, and family health. Breast health could be included in personal health/wellness and family health.

The California Department of Education has included breast cancer and BSE in their health education curriculum. The standard, *Essential Concepts* includes examining *common types and symptoms of cancer*. Breast cancer is included as a common type of cancer. Breast self-examination is a component of the standard, *Practicing Health-Enhancing Behaviors*. The standard states, *Describe the steps involved in breast self-exams*. The standard does not state demonstrate or practice BSE, therefore, the investigator was unable to locate if BSE was actually taught and if so, how is it taught.

Georgia’s *Standards for Health Education* was designed to incorporate into curricula the six priority adolescent risk behaviors by the CDC. These risk behaviors are: alcohol and other drug use, injury and violence (including suicide), tobacco use, poor nutrition, inadequate physical activity, and risky sexual behavior. The standards were also
designed to encompass a wide range of the following common content areas: community health, consumer health, environmental health, family health, mental/emotional health, injury prevention/safety, nutrition, personal health, prevention/control of disease, and substance use/abuse. Breast health could be included in the content areas of family health and personal health. The investigator was unable to locate how and if breast health is taught.

The National Health Education Standards include the following: Standard 1, health promotion and disease prevention; Standard 2, impact of family, peers, culture, media, technology, and other factors on health; Standard 3, ability to access valid health information and health promoting products and services; Standard 4, ability to use interpersonal communication skills to enhance health; Standard 5, ability to use decision making skills to enhance health; Standard 6; ability to use goal-setting skills to enhance health; Standard 7, ability to practice health-enhancing behaviors and reduce health risks; and Standard 8, ability to advocate for personal, family, and community health. Breast health could be included in Standard 7 (practice health-enhancing behaviors) by practicing breast self-awareness and BSE and Standard 8 (ability to advocate for personal, family, and community health) by young females supporting breast cancer awareness and promoting breast health through educational and fund-raising events.

The AAP and the AAFP recommend that breast health education including self-awareness and BSE should be taught to adolescents in private offices, clinics, and high school health education classes during the preteen and teen years (AAFP, 2007; AAP, 2007). Many health care providers however may utilize their limited time with adolescent patients by discussing the use of alcohol, drugs, smoking, and obesity; the more common
problems of adolescence. Also, if the adolescent is seeking health care from a regular family physician and not a pediatrician, chances are the adolescent will not receive anticipatory guidance in the area of breast health. Because many healthcare providers don’t have the time to focus on breast health, educating adolescent females in the healthcare setting is becoming a missed opportunity. In this study, a breast health program was administered in a public high school setting in north Alabama to female students enrolled in health education, health science, and child development classes.

Promotion of breast health is an attitude that if fostered early in life may pay lifelong dividends. The adolescent period is a time of rapid change, physical and emotional, that provides teaching opportunities for shaping health behaviors into adulthood. Breast health programs focus on adolescent females with the premise that teaching adolescents’ breast self-awareness will increase the likelihood they will continue the practice into adulthood. For example, teaching breast health may influence positive behaviors such as seeking regular professional examinations if she notices changes in her breasts (ACS, 2006; Ludwick & Gaczkowski, 2001; Ogletree et al., 2004).

The investigator of this study did not explore the relationship of what research has been done on interactive learning of breast health among adolescent females because there were no studies/research found that compared utilizing simulated breast models in breast health education programs for adolescents versus not using simulated breast models. Little research has been conducted to explore the breast health education of adolescents. The few research studies that were found examined BSE of adolescent females. There were no studies found that examined breast self-awareness of adolescent females. Of the studies found on breast health education for adolescents, only five were
conducted in 2000 and one in the late 1990s. The breast health education found in the literature search appeared to be geared toward older women and minority women.

The biggest gap in the professional literature was the lack of research pertaining to breast health of adolescent females. The investigator of this study did not find research studies that actually examined teaching methods/strategies used in breast health educational programs. In the few studies that were found, the researchers hypothesized that more females would practice BSE after participating in a breast health educational intervention. Another hypothesis was that females would improve their breast health knowledge and attitudes after participating in a BSE learning program. The teaching methods/strategies were not a focus or point of interest in those studies.

Two studies (Freeman, et al., 2000; Karayurt, et al., 2008) found it more interesting to assess adolescent females’ knowledge about breast cancer without exposing them to any type of breast health learning. Both studies concluded that adolescents’ females lack knowledge about breast health but did not provide ways to teach them about breast health. Research is needed to assess breast health knowledge, beliefs, BSE, breast self-awareness of adolescent females. In addition, research is needed to assess the teaching methods/strategies to evaluate learning retention upon completion of teaching breast health to adolescent females.

One problem encountered during the study was the inability of the high school students to return the consent forms. The problem was not with the parents allowing their child to participate. The problem was getting the students to return the informed consents. This problem was also found in the few research studies that were reviewed; therefore, the problem with returning consent forms seems to be a common problem with
adolescent research. The investigator requested the participants to return the consent forms within three days; however, it was extended to two weeks. Also, there were a few students who did not want to participate. Valid informed consent requires participants’ voluntary agreement, free from coercion and undue influence. There was only one parent that did not allow their child to participate.

Conclusions

Based on the results of the descriptive statistics and the independent t-test, there were no differences between the treatment and comparison groups before the breast health program interventions. Based on the results of the descriptive statistics and the independent t-test, there were no differences between the schools before the breast health program interventions. Adolescent females’ who participated in the study had similar knowledge of breast cancer, similar beliefs of perceived susceptibility to breast cancer, perceived seriousness of breast cancer, perceived benefits of breast self-awareness, and perceived barriers of BSE before the interventions.

The dependent variables (knowledge, susceptibility, seriousness, benefits, barriers) were affected by the independent variable (interactive learning with simulated breast models, no interactive learning). The adolescent females’ knowledge of breast cancer, perceived susceptibility to breast cancer, perceived seriousness of breast cancer, and perceived benefits of breast self-awareness increased immediately after the interactive learning with the simulated breast models. The perceived barriers of BSE decreased immediately after the interactive learning.
Null hypothesis 1 was rejected because there was a significant interaction between time and group in the breast health knowledge scores for adolescent females participating in a breast health program that included interactive learning with simulated breast models and those who participated in a breast health program that did not include interactive learning with simulated breast models. The treatment group had a significant increase in breast health knowledge than the comparison group. The treatment group gained more knowledge about breast health and sustained their gain over the comparison group. Both groups’ scores decreased slightly on the follow-up. Differences from parallelism in the results were statistically significant. Null hypothesis 2 was not rejected because there was no significant interaction between time and group in the perceived susceptibility to breast cancer scores for adolescent females participating in a breast health program that included interactive learning with simulated breast models and those who participated in a breast health program that did not include interactive learning with simulated breast models. There was not a significant difference between the baseline and post-survey scores and the post-survey and follow-up scores of the treatment and comparison group. The higher the score, the more likely the participants believed they were susceptible to breast cancer. The lower the score, the less likely the participants believed they were susceptible to breast cancer. Differences from parallelism in the results were not statistically significant. Null hypothesis 3 was not rejected because there was no significant interaction between time and group in the perceived seriousness to breast cancer scores for adolescent females participating in a breast health program that included interactive learning with simulated breast models and those who participated in a breast health program that did not include interactive learning with simulated breast models.
models. There was not a significant difference between the baseline and post-survey scores and the post-survey and follow-up scores of the treatment and comparison group. The higher the score, the more likely the participants believe breast cancer was serious. The lower the score, the less likely the participants believe breast cancer was serious. Differences from parallelism in the results were not statistically significant. Null hypothesis 4 was rejected because there was a significant interaction between time and group in the perceived benefits of breast self-awareness scores for adolescent females participating in a breast health program that included interactive learning with simulated breast models and those who participated in a breast health program that did not include interactive learning with simulated breast models. The treatment group had a significant increase in the perceived benefits of breast self-awareness scores than the comparison group. The higher the score, the more likely the participants believed there were benefits of breast self-awareness. The lower the score, the less likely the participants believed there were benefits of breast self-awareness. Differences from parallelism were statistically significant. Null hypothesis 5 was rejected because there was a significant interaction between time and group in the perceived barriers of BSE scores for adolescent females participating in a breast health program that included interactive learning with simulated breast models and those who participated in a breast health program that did not include interactive learning with simulated breast models. The treatment group had a significant decrease in the perceived barriers of BSE scores than the comparison group between baseline and post-survey scores. The lower the score, the less likely the participants believed there were barriers of BSE. The higher the score, the more likely the participants believed there were barriers of BSE. Differences from parallelism were
statistically significant. In comparing the adolescent females’ knowledge of breast cancer, perceived susceptibility to breast cancer, perceived seriousness of breast cancer, and perceived benefits of BSE scores during the 4-week follow-up; each score declined slightly regardless of the teaching method. The perceived barriers of BSE increased slightly during the 4-week follow-up. The perceived susceptibility and seriousness of breast cancer scores for the treatment and comparison groups were parallel immediately after the breast health program and during the 4-week follow-up, suggesting that the participants perceived themselves to be susceptible to breast cancer and perceived breast cancer as serious regardless of the teaching methods.

Because of the conclusions, the interventions used in this study have the potential to be an important part of primary prevention efforts that could make a huge public health impact over time. A summary of the conclusions are:

- Students who used interactive learning had higher knowledge retention of breast health/cancer.
- Students who used interactive learning had higher perceptions of benefits of breast self-awareness.
- Students who used interactive learning had lower perceived barriers to breast self-examination.

One would want to increase breast cancer awareness as a continuation of a learned behavior throughout adulthood. When the adolescent reaches adulthood, the behavior should not be new. It should be a behavior that has been promoted and shaped during adolescence so that cultivation of behavior is continued through adulthood. Promotion of breast health is an attitude that if fostered early in life, may pay lifelong dividends.
Discussion

As mentioned previously, the groups and schools were similar before the breast health program interventions were implemented and this is what was expected by the investigator. Also, the results of the knowledge immediate post-test, perceived susceptibility to breast cancer and perceived barriers of BSE immediate post-survey were similar to what was expected by the investigator. However, the investigator expected better results from the 4-week follow-up knowledge test and beliefs survey. The investigator expected the 4-week follow-up scores to be similar to the immediate post-test and survey. The 4-week follow-up knowledge test, perceived susceptibility to breast cancer, and the perceived barriers to BSE scores decreased slightly. However, these scores did not drop to the pre-test and pre-survey scores. The perceived seriousness to breast cancer scores was similar in both groups on the immediate post-test and survey and similar on the 4-week follow-up test and survey. The rational for perceived seriousness being parallel is probably due to the fact that in our society cancer is viewed as serious by people regardless of the type of cancer.

The results of the benefits to breast self-awareness subscale could have been caused by the interpretation of breast-self-awareness by the participants. The investigator did not check to see if the participants understood the difference between breast self-awareness and BSE. The investigator could have checked for understanding by asking the participants questions to assess their comprehension of breast self-awareness.

The results of this study support the learning pyramid; more interactive learning appears to increase both knowledge acquisition and positive health behaviors among adolescent females. The learning pyramid research states that lecture provides only 5% of
learner retention and audiovisuals provides only 20%. These are considered the traditional passive teaching strategies. The learning pyramid research states that group discussion provides a 50% learner retention rate, practice provide 75%, and teach others provide 90%. These are considered teaming active teaching strategies. The breaking up into small groups allowed the participants to discuss the breast cancer information that was given to them and to assist each other with the breast self-awareness and the technique of BSE. The teaching methods of group discussion, practice, and teach others need to be included in all breast health and testicular cancer programs for adolescent females and males.

The results of this study laid the foundation for support of the HBM. Adolescent females who participated in the interactive learning class had higher perceptions of susceptibility to breast cancer. Adolescent females who participated in the interactive learning class were more likely to see the benefits of breast self-awareness. Adolescent females who participated in the interactive learning class had fewer perceived barriers to practice BSE. Research of the HBM postulates that if individuals are to engage in disease prevention measures, they must feel susceptible to the disease, believe that occurrence of the disease would have a serious impact on their lives, and believe that preventive measures are beneficial, outweighing any barriers involved in taking such measures. There is a major focus for health educators to teach decision making skills to adolescents in high school. In order for health educators to teach decision making, the health educator should assess the adolescent’s beliefs about the behavior. Adolescents’ decisions about their health are mostly related to their beliefs. If they believe smoking will not harm them, they are more likely to smoke. Health educators and health care professionals need
to assess breast health beliefs of adolescents and include interactive learning when teaching decision making skills related to breast health.

Limitations and Delimitations

The following study limitations should be noted. First, because the study participation was voluntary, data collected may not equally represent nonparticipating adolescent females. Second, the study did not take into consideration the cultural differences among Caucasians, African-Americans, Hispanics, Asians, and Native Americans in relation to breast health. Culture diversity could have an influence on knowledge and beliefs of breast health. Third, data collected in the study may be biased because of the nature of data collection (self-report). The participants’ breast health beliefs are considered self-report data. Participants may tend to answer a question or respond to a statement the way they think the researcher wants the question or statement answered, rather than according to their true feelings, thoughts, and practices. Lastly, absent students were not able to participate in the study.

The following study delimitations should be noted. Participants were selected from health related classes because the topic of the study was related to health. Also, there were only two high schools selected in north Alabama to participate in the study. The sample of the study was comprised of middle-class adolescent females in two north Alabama high schools; results may not be generalizeable to adolescent females in other geographic locations.
Recommendations

Recommendations for Practice

This study is important because of its implications for health care providers and health educators. The study emphasized an effective method to teach breast health during adolescence, a time when health care providers may not provide adequate information about breast health and when other health education topics often are addressed in school. The study investigated a difficult or uncomfortable subject for high school health educators and how it can be integrated into the health education curriculum by utilizing a hands-on approach (interactive learning). This study may serve as a guide for high school health educators in their quest to teach the difficult health promotion topic of breast health to adolescent females in high school.

Appropriate breast health education is lacking in our schools. During the health education course of study development every seven years, health educators from the secondary and post-secondary levels are selected to serve on the committee and the task force. The development of the course of study provides a time for health educators to take a stand for specific breast health content. It was not included in the 2003 course of study or the 2010. If the health educators will not push the issue, no one else will do so. During the health education course of study development at the state level, health educators should become strong advocates to include breast health as a specific content area at the state board of education. As a result of breast health being a specific content area or standard, a plan of instruction should be provided to guide the health educator with what should be taught and how to teach the content.
Upon reviewing health education curriculums in selected states including Alabama, breast health can be included in certain content areas. Because most health education curriculums have topics that are not specific to breast health, educators need to be trained to incorporate breast health into selected content areas. Therefore, better preparation of health educators to teach breast health is another recommendation. Training health educators to teach breast health in a meaningful way so that they are comfortable with the subject must be considered. Training could include empowering instruction workshops and professional development workshops/conferences for health educators. Breast health education should include more than a video and a giving out a pamphlet to read. The health educators should be trained to incorporate active learning teaching strategies such as: students teaching each other, practice, discussion groups, demonstration, and audio-visuals. In addition to better preparation of the teacher, incorporating active learning will increase the knowledge retention rate of the students/participants. Also, incorporating active learning activities will reach all the different types of learning styles of the students/participants.

Many school districts have professional development days during the school year. Most of these professional development days have sessions for the teachers to attend. There is a need to incorporate a session for health educators to empower them with instruction for topics such as breast health and testicular health. Many school districts have hired instructional coaches to assist teachers with instructional strategies. The instructional coaches present evidence-based practice instructional sessions during the teachers’ regular planning periods and comes into the classroom to work with teachers. The focus is not just working with the novice teachers but working with all the teachers.
The goal of the instructional coach is to increase student engagement and improve student achievement. The instructional coaches should take the lead in training health educators to teach breast health and testicular health to adolescents.

Another important point is when to teach breast health. This study implemented the breast health program with participating classes starting in January through the first week of May. The investigator completed the breast health programs before the second week of May because of the distractions (senior activities, finals, graduation, school ending) toward the end of May. The breast health topic should be treated just as important as the other health topics. It should not be taught the last week of the semester. Students might perceive breast health as an unimportant topic if it is not taught until the last week of the semester since this is a time in which students are focusing on semester exams and the end of school for Christmas break or summer break. Therefore, the timing of the breast health content is very important in order for it to be a meaningful experience for adolescent females.

Because health care providers are utilizing their time discussing the use of alcohol, drugs, smoking, and obesity with adolescents during office visits and don’t have the time to spend on breast health; utilizing one office nurse to teach breast health to adolescent females could be the answer. In addition to teaching one patient at a time about breast health, a session could be included during the office visit to include several patients with interactive teaching strategies. This is a great opportunity for healthcare professionals to target common misconceptions and myths about breast cancer of adolescents---- education.
Recommendations to Improve Study for Future Research

A few changes could be made to improve this study. Future research on teaching breast health to adolescent females in high school could include the HBM construct of self-efficacy. The perceived ability to carry out the practice of breast self-awareness could be assessed in six months. This would give the investigator information concerning whether one is successfully executing the behavior. The current study did not assess the practice of breast self-awareness or BSE of the participants.

Also, there are some researchers and health care providers that argue adolescents are too young to be taught breast health. The reason cited is that teaching breast health to adolescents might do more harm than good because it could scare them. Future research is needed to assess if breast self-awareness or performing BSE is becoming a habit and adolescent females are including it as a health promotion practice several years later after participating in a breast health program.

Future research could assess the participants’ interest in breast health based on the teacher’s classroom environment. The investigator noticed the different behavior in the classrooms. The participants whose teachers appeared to have poor classroom management skills did not appear to have an interest in participating. The participants whose teacher had good classroom management skills were more attentive and scored better on the knowledge test and appeared to take their time completing the survey. They did not complete the instruments in a hurried manner.

Finally, plan a breast cancer informative session for the women at the church in which the pilot study was conducted. During the pilot study at the church, many of the mothers of the participants wanted the investigator to discuss breast cancer in-depth. The
women expressed their interest in the topic of breast cancer. The women were pleased that the investigator was targeting adolescents in the study because of the alarming statistics of breast cancer and a health behavior that is so crucial in adulthood. Breast health programs should have a mission to empower young women by awareness through education. Therefore, breast health is important and should be taught with interactive learning strategies.
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APPENDIX A

PERMISSION LETTERS TO COLLECT DATA
July 3, 2009

Dr. Dee Fowler, Superintendent
Madison City Schools
211 Celtic Dr.
Madison, Alabama 35758

Dear Dr. Fowler:

I am a doctoral student at the University of Alabama at Birmingham (UAB). As part of my dissertation, I am conducting an experimental study to determine if a breast health program without interactive learning with simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females.

I am requesting your permission to conduct a 90-minute breast health program to the female students enrolled in the health education, health science, and child development classes at Bob Jones High school. The treatment group will receive their breast health information by lecture/discussion, video, and interactive learning with simulated breast models. The comparison group will not receive interactive learning with simulated breast models. A consent form will be sent home to the parents or guardian of each potential female participant. I would like to provide you with more details of my proposed breast health program. Therefore I am requesting an opportunity to present my proposed study to you at your earliest convenience.

UAB faculty will supervise the research protocol. The data obtained during the study will add to the limited research in the area of breast health of adolescent females. It will provide health educators strategies to effectively teach breast health to this population. And lastly, the study will help facilitate the development of health education programs aimed at health promotion among adolescents.

You may reach me at (256) 772-2547 ext. 507 or (256) 830-1644. I am looking forward to hearing from you. Thank you so very much for your kind help.

Sincerely,

Jacqueline A. Horton, RN, MSN, FNP
July 3, 2009

Mr. Robby Parker, Principal
Bob Jones High School
650 Hughes Rd.
Madison, Alabama 35758

Dear Mr. Parker:

I am a doctoral student at the University of Alabama at Birmingham (UAB). As part of my dissertation, I am conducting an experimental study to determine if a breast health program without interactive learning with simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females.

I am requesting your permission to conduct a 90-minute breast health program to the female students enrolled in the health education, health science, and child development classes at your school with minimal class schedule interruption. The treatment group will receive their breast health information by lecture/discussion, video, and interactive learning with simulated breast models. The comparison group will not receive interactive learning with simulated breast models. A consent form will be sent home to the parents or guardian of each potential female participant. I would like to provide you with more details of my proposed breast health program. Therefore, I am requesting an opportunity to present my proposed study to you at your earliest convenience.

UAB faculty will supervise the research protocol. The data obtained during the study will add to the limited research in the area of breast health of adolescent females. It will provide health educators strategies to effectively teach breast health to this population. And lastly, the study will help facilitate the development of health education programs aimed at health promotion among adolescents.

You may reach me at (256) 772-2547 ext. 507 or (256) 830-1644. I am looking forward to hearing from you. Thank you so very much for your kind help.

Sincerely,

Jacqueline A. Horton, RN, MSN, FNP
July 3, 2009

Dear Parent/Guardian:

I am a doctoral student at the University of Alabama at Birmingham (UAB). As part of my dissertation, I am conducting a study to determine if a 90-minute breast health program without interactive learning with simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females.

I will present a breast health program to the female students enrolled in the health education, health science, and child development courses with minimal class schedule interruption. I am requesting your permission for your child to participate in the study. One group of students will receive breast health information by lecture/discussion and a video. Another group will receive breast cancer information by lecture/discussion, video, and a hands-on activity with simulated breast models. I have enclosed a consent form for you to sign if you agree to allow your child to participate in the study.

UAB faculty will supervise the research protocol. The data obtained during the study will add to the limited research in the area of breast health of young females. It will provide health educators strategies to effectively teach breast health to this population. And lastly, the study will help facilitate the development of health education programs aimed at health promotion among adolescents.

You may reach me at (256) 772-2547 ext. 507 or (256) 830-1644 for any questions or concerns. Thank you so very much for your kind help.

Sincerely,

Jacqueline A. Horton, RN, MSN, FNP
July 3, 2009

Dr. O. Wendell Davis, Pastor
Union Chapel Missionary Baptist Church
315 Winchester Rd. NE
Huntsville, Alabama 35761

Dear Dr. Davis:

I am a doctoral student at the University of Alabama at Birmingham (UAB). As part of my dissertation, I am conducting an experimental study to determine if a breast health program without interactive learning with simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females.

I am requesting your permission to conduct a pilot study with the 15-18 year old females attending your church. They will be given a breast health knowledge test and a breast health beliefs survey. The test and survey will also be administered one week after the initial administration and a then a two weeks follow-up. The purpose of the pilot study is to assess the adequacy of the data collection plan for the proposed study. The pilot study will determine the reliability of the instruments used for testing and surveying. A consent form will be sent home to the parents or guardian of each potential female participant. I would like to provide you with more details of my proposed breast health program. Therefore, I am requesting an opportunity to present my proposed study to you at your earliest convenience.

UAB faculty will supervise the research protocol. The data obtained during the study will add to the limited research in the area of breast health of adolescent females. It will provide health educators strategies to effectively teach breast health to this population. And lastly, the study will help facilitate the development of health education programs aimed at health promotion among adolescents.

You may reach me at (256) 772-2547 ext. 507 or (256) 830-1644. I am looking forward to hearing from you. Thank you so very much for your kind help.

Sincerely,

Jacqueline A. Horton, RN, MSN, FNP
July 3, 2009

Dear Parent/Guardian of the Youth at Union Chapel Church:

I am a doctoral student at the University of Alabama at Birmingham (UAB). As part of my dissertation, I am conducting a study to determine if a breast health program without interactive learning with simulated breast models will affect the breast health knowledge and breast health beliefs of adolescent females.

Your Pastor, Dr. Davis, has given me permission to utilize the young females, ages 15-18 in my research study. I am requesting your permission for your child to participate in a pilot study. They will be given a breast health knowledge test and a breast health beliefs survey. The test and survey will also be administered one week after the initial administration and a two weeks follow-up. The purpose of the pilot study is to assess the adequacy of the data collection plan for the proposed study. The pilot study will determine the reliability of the instruments used for testing and surveying. I have enclosed a consent form for you to sign if you agree to allow your child to participate in the study.

UAB faculty will supervise the research protocol. The data obtained during the study will add to the limited research in the area of breast health of young females. It will provide health educators strategies to effectively teach breast health to this population. And lastly, the study will help facilitate the development of health education programs aimed at health promotion among adolescents.

You may reach me at (256) 772-2547 ext. 507 or (256) 830-1644 for any questions or concerns. Thank you so very much for your kind help.

Sincerely,

Jacqueline A. Horton, RN, MSN, FNP
APPENDIX B

BREAST HEALTH KNOWLEDGE TEST

(PRE-TEST)
BREAST HEALTH KNOWLEDGE TEST
(PRE-TEST)

1. How does breast cancer ranks as the cause of cancer death among women?
   a. Number one cause
   b. Second leading cause
   c. Third leading cause
   d. Fourth leading cause

2. Which cultural group has the lowest risk of developing breast cancer?
   a. African-American women
   b. European women
   c. American Indian women
   d. Caucasian women

3. Which of the following statements is true with regard to breast cancer in African-American women in the United States?
   a. Breast cancer is not a threat to African-American women.
   b. Breast cancer is the leading cause of death among African-American women.
   c. Breast cancer death rates among African-American women are much higher than that of Caucasian women.
   d. Breast cancer incidence in African-American women is much higher than that of Caucasian women.

4. All of the following are signs of breast cancer except:
   a. Lump, hard knot or thickening
   b. Soft, round lump
   c. Dimpling or puckering of the breast
   d. Nipple discharge

5. What is the best defense against breast cancer?
   a. Early detection
   b. Good hand washing
   c. Reading health education pamphlets
   d. None of the above

6. According to the American Cancer Society, how often should women perform breast self-examination (BSE)?
   a. Once a year
   b. Once a month
   c. Once every six months
   d. It’s optional
7. Which factor increases the risk of breast cancer?
   a. Breast-fed children
   b. Age 50 years
   c. Having 3 children
   d. Being male

8. The following are normal signs of breast changes during menstruation except:
   a. Breasts feel full
   b. Breasts feel sore
   c. Breasts feel soft
   d. Breasts feel heavy

9. Which of the following statements reflects the best approach to teaching a woman about breast self-awareness?
   a. Breast self-awareness is more important than ever for women if they have never had children.
   b. Breast self-awareness is important because 1 out of 10 women will develop breast cancer in her lifetime.
   c. Breast self-awareness will help you feel familiar with your own breasts and their normal variations.
   d. Breast self-awareness will save your life since you are likely to find a cancerous lump between mammograms.

10. What should you do if you feel a lump?
    a. Nothing
    b. Watch it for a few months to see if it will go away
    c. Tell your parent so that they can call your doctor
    d. Panic

11. According to the American Cancer Society (ACS), what age should females have their breasts checked by a health care provider?
    a. Beginning at age 20
    b. Beginning at age 30
    c. Beginning at age 40
    d. Beginning at age 50

12. According to the ACS, how often and when should women receive a mammogram?
    a. Once a year after age 30
    b. Once a year after age 35
    c. Once a year after age 40
    e. Once every 2 years after age 50
APPENDIX C

BREAST HEALTH KNOWLEDGE TEST

(POST-TEST & FOLLOW-UP)
BREAST HEALTH KNOWLEDGE TEST
(POST-TEST & FOLLOW-UP)

1. How does breast cancer ranks as the cause of cancer deaths among women?
   a. Number one cause
   b. Second leading cause
   c. Third leading cause
   d. Fourth leading cause

2. Which women are at highest risk for breast cancer?
   a. African-American women
   b. Caucasian women
   c. American Indian women
   d. European women

3. Which of the following statements is true with regard to breast cancer in African-American women in the United States?
   a. Breast cancer is not a threat to African-American women.
   b. Breast cancer is the leading cause of death among African-American women.
   c. Breast cancer death rates among African-American women are much higher than that of Caucasian women.
   d. Breast cancer incidence in African-American women is much higher than that of Caucasian women.

4. All of the following are signs of breast cancer except:
   a. Soft, round lump
   b. Dimpling or puckering of the breast
   c. Nipple discharge
   d. Change in size and shape

5. What is the “gold standard” test for early detection against breast cancer?
   a. Breast self-examination
   b. Clinical breast examination
   c. Mammogram
   d. All of the above

6. How often should women perform breast self-examination (BSE)?
   a. It’s optional
   b. Once a month
   c. Once every three months
   d. Once every six months
   e. Once a year
BREAST HEALTH KNOWLEDGE TEST (Continue)
(POST-TEST & FOLLOW-UP)

7. Which factor increases the risk of breast cancer?
   a. Breast-fed children
   b. Never having children
   c. Having 3 children
   d. Being male

8. The normal changes of the breast during the menstrual cycle are
   a. Breasts feel light and full
   b. Breasts feel soft and sore
   c. Breasts feel sore and full
   d. None of the above

9. Which of the following statements reflects the best approach to teaching a woman about breast self-awareness?
   a. Breast self-awareness is more important than ever for women if they have never had children.
   b. Breast self-awareness is important because 1 out of 10 women will develop breast cancer in her lifetime.
   c. Breast self-awareness will help you feel familiar with your own breasts and their normal variations.
   d. Breast self-awareness will save your life since you are likely to find a cancerous lump between mammograms.

10. What should a woman do if she finds a lump in her breast?
    a. Wait and see if it gets any bigger
    b. Nothing
    c. Tell the health care provider right away
    d. Tell the health care provider the next time a check-up is scheduled

11. The American Cancer Society (ACS) recommends that women should get their breasts checked by a health care provider
    a. beginning at age 20
    b. beginning at age 30
    c. beginning at age 40
    d. beginning at age 50

12. According to the ACS, how often should women receive a mammogram?
    a. Once a year after age 30
    b. Once a year after age 35
    c. Once a year after age 40
    d. Once every 2 years after age 45
APPENDIX D

BREAST HEALTH BELIEFS SURVEY

(PRE, POST, & FOLLOW-UP)
BREAST HEALTH BELIEFS SURVEY (MODIFIED FOR ADOLESCENTS)

Please mark the appropriate response to the following statements.

<table>
<thead>
<tr>
<th>Susceptibility</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If my mother gets breast cancer, I will be at high risk of getting breast cancer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I feel that I could get breast cancer as an elderly woman.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>There is a good possibility I will get breast cancer in the next 30 years.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I am at risk of getting breast cancer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I am more likely than the average female to get breast cancer if I find changes in my breast tissue.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seriousness</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>The thought of breast cancer scares me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>When I think about breast cancer, I get stressed out.</td>
<td></td>
<td></td>
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<td>8</td>
<td>I do not like to think about breast cancer, but I will think about it if I find a lump in my breasts.</td>
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<td>9</td>
<td>The problems I would experience with breast cancer could last a long time.</td>
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<tr>
<td>10</td>
<td>Breast cancer is a serious health problem.</td>
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<tr>
<td>11</td>
<td>If I get breast cancer, my whole life could change.</td>
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<tr>
<td>12</td>
<td>If I developed breast cancer, I could possibly die.</td>
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<table>
<thead>
<tr>
<th>Benefits Breast Self-Awareness</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>13</td>
<td>Breast self-awareness does not require special training.</td>
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<tr>
<td>14</td>
<td>Breast self-awareness will help me become familiar with the way my breasts normally look and feel.</td>
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<tr>
<td>15</td>
<td>Breast self-awareness will allow me to be aware of changes in my breasts and to bring these changes to the attention of a health care provider.</td>
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<td>16</td>
<td>Practicing breast self-awareness now will help me to continue this behavior as I get older.</td>
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<tr>
<th>Barriers –BSE</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>17</td>
<td>I feel uncomfortable doing breast self-examination.</td>
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<td>18</td>
<td>Breast self-examination will be embarrassing to me.</td>
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<tr>
<td>19</td>
<td>Doing breast self-examination will take too much time.</td>
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<tr>
<td>20</td>
<td>Doing breast self-examination will be unpleasant.</td>
<td></td>
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<tr>
<td>21</td>
<td>I don’t have enough privacy to do breast self-examination.</td>
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APPENDIX E

CHAMPION’S BREAST CANCER HEALTH BELIEFS SCALE
### Susceptibility

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<tbody>
<tr>
<td>1</td>
<td>It is extremely likely I will get breast cancer in the future.</td>
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<tr>
<td>2</td>
<td>I feel I will get breast cancer in the future.</td>
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<tr>
<td>3</td>
<td>There is a good possibility I will get breast cancer in the next 10 years.</td>
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<tr>
<td>4</td>
<td>My chances of getting breast cancer are great.</td>
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<tr>
<td>5</td>
<td>I am more likely than the average woman to get breast cancer.</td>
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### Seriousness

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<tr>
<td>6</td>
<td>The thought of breast cancer scares me.</td>
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<tr>
<td>7</td>
<td>When I think about breast cancer, my heart beats faster.</td>
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<tr>
<td>8</td>
<td>I am afraid to think about breast cancer.</td>
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<td></td>
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<tr>
<td>9</td>
<td>Problems I would experience with breast cancer would last a long time.</td>
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<tr>
<td>10</td>
<td>Breast cancer would threaten a relationship with my boyfriend, husband, or partner.</td>
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<tr>
<td>11</td>
<td>If I had breast cancer, my whole life would change.</td>
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<tr>
<td>12</td>
<td>If I developed breast cancer, I would not live longer than 5 years.</td>
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### Benefits – BSE

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<tbody>
<tr>
<td>13</td>
<td>When I do breast self-examination, I feel good about myself.</td>
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<tr>
<td>14</td>
<td>When I complete monthly breast self-examination, I don’t worry as much about breast cancer.</td>
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<tr>
<td>15</td>
<td>Completing breast self-examination each month will allow me to find lumps early.</td>
<td></td>
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<tr>
<td>16</td>
<td>If I complete breast self-examination monthly during the next year, I will decrease my chances of dying from breast cancer.</td>
<td></td>
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<tr>
<td>17</td>
<td>If I complete breast self-examination monthly, I will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs.</td>
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<tr>
<td>18</td>
<td>If I complete monthly breast self-examination, it will help me to find a lump, which might be cancer before it is detected by a doctor or nurse.</td>
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### Barriers – BSE

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<tr>
<td>19</td>
<td>I feel funny doing breast self-examination.</td>
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<tr>
<td>20</td>
<td>Doing breast self-examination during the next year will make me worry about breast cancer.</td>
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<tr>
<td>21</td>
<td>Breast self-examination will be embarrassing to me.</td>
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<td>22</td>
<td>Doing breast self-examination will take too much time.</td>
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<tr>
<td>23</td>
<td>Doing breast self-examination will be unpleasant.</td>
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<tr>
<td>24</td>
<td>I don’t have enough privacy to do breast self-examination.</td>
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<tr>
<td>Confidence Performing BSE</td>
<td>STRONGLY DISAGREE</td>
<td>DISAGREE</td>
<td>NEUTRAL</td>
<td>AGREE</td>
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<tr>
<td>25 I know how to perform breast self-examination.</td>
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<tr>
<td>26 I am confident I can perform breast self-examination correctly.</td>
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<tr>
<td>27 If I were to develop breast cancer, I would be able to find a lump by performing breast self-examination.</td>
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<tr>
<td>28 I am able to find a breast lump if I practice breast self-examination alone.</td>
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<tr>
<td>29 I am able to find a breast lump, which is the size of a quarter.</td>
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<tr>
<td>30 I am able to find a breast lump, which is the size of a dime.</td>
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<tr>
<td>31 I am able to find a breast lump, which is the size of a pea.</td>
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<td>32 I am sure of the steps to follow for doing breast self-examination.</td>
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<td>33 I am able to identify normal and abnormal breast tissue when I do breast self-examination.</td>
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<td>34 When looking in the mirror, I can recognize abnormal changes in my breast.</td>
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<td>35 I can use the correct part of my fingers when I examine my breasts.</td>
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<table>
<thead>
<tr>
<th>Health Motivation</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>36 I want to discover health problems early.</td>
<td></td>
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<tr>
<td>37 Maintaining good health is extremely important to me.</td>
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<td>38 I search for new information to improve my health.</td>
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<td>39 I feel it is important to carry out activities, which will improve my health.</td>
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<td>40 I eat well-balanced meals.</td>
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<td>41 I exercise at least 3 times a week.</td>
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<td>42 I have regular health checkups even when I am not sick.</td>
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<tr>
<th>Benefits – Mammogram</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
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</thead>
<tbody>
<tr>
<td>43 When I get a recommended mammogram or x-ray of the breast, I feel good about myself.</td>
<td></td>
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<td>44 When I get a mammogram, I don’t worry as much about breast cancer.</td>
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<tr>
<td>45 Having a mammogram will help me find lumps early.</td>
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<td>46 Having a mammogram will decrease my chances of dying from breast cancer.</td>
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<tr>
<td>47 Having a mammogram will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs.</td>
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<tr>
<td>48 Having a mammogram will help me find a lump before it can be felt by me or a health professional.</td>
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Barriers – Mammogram

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<tr>
<th></th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>NEUTRAL</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
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</thead>
<tbody>
<tr>
<td>49</td>
<td>Having a mammogram or x-ray of the breast would make me worry about breast cancer.</td>
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<tr>
<td>50</td>
<td>Having a mammogram would be embarrassing.</td>
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<tr>
<td>51</td>
<td>Having a mammogram would take too much time.</td>
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<tr>
<td>52</td>
<td>Having a mammogram would be painful.</td>
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<td>53</td>
<td>Having a mammogram would cost too much money.</td>
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Dr. Victoria L. Champion developed this questionnaire. Dr. Champion is the Associate Dean in the School of Nursing at Indiana University (IU). She also serves as Research Director at IU.

This questionnaire was sent to me by Dr. Champion with permission to use it in my study and modify as needed.
APPENDIX F

INFORMED CONSENT
TITLE OF RESEARCH: Teaching Breast Health to Adolescent Females in High School: Utilizing Interactive Learning (Simulated Breast Models) versus Not Utilizing Interactive Learning

IRB PROTOCOL NUMBER: X090920018

INVESTIGATOR: Jacqueline A. Horton

SPONSOR: UAB Department of Human Studies

For Children/Minors (persons under 19 years of age) participating in this study, the term You addresses both the participant (“you”) and the parent or legally authorized representative (“your child”).

Explanation of Procedures

I am asking you to take part in a research study that will help us understand if the use of a hands-on activity using artificial breasts will affect the breast health knowledge and beliefs of a teenage girl. This research is a study using about 360 girls, aged 15-18, divided into two groups—those who have the hands-on activity (treatment group) and those who don’t (comparison group). This study will teach teenage girls about breast health in a 90-minute health education, health science, or child development class. The participants with receive a breast health lecture or discussion, watch a breast health video, and complete pre and post tests and surveys about breast health knowledge and breast health beliefs. The treatment groups will take part in a hands-on activity with artificial
breasts and the comparison group will not have a hands-on activity with artificial breasts. You can expect to invest one hour and 45 minutes as a participant in this project.

Risks and Discomforts

The only discomfort or risk for taking part in this study is that you may feel uncomfortable or embarrassed about the subject manner.

Benefits

You may benefit from taking part in this study by learning more about breast cancer and becoming more aware of breast health. The study may provide health educators and health care providers an effective method for teaching breast health to teenage girls.

Alternatives

Your alternative is to not participate in this study and to take the alternative health class.

Confidentiality

Informed consent signed by participants will be kept in a locked filing cabinet in the investigator’s office. All information provided will remain confidential to the extent of the law. You will not have to put your name on the tests or surveys, only the last four digits of your phone number. Research information that identifies you may be shared with the UAB Institutional Review Board (IRB) and others who are responsible for ensuring compliance with laws and regulations related to research, including people on behalf of the Office for Human Research Protections (ORHRP).
Refusal or Withdrawal without Penalty

Taking part in this study is your choice. There will be no penalty if you decide not to be in the study. You are free to participate in the health class for non participants. Withdrawing from the study will not affect your class grade.

Cost of Participation

There will be no cost to you for taking part in the study.

Payment for Participation in Research

You will not receive any money for taking part in the study.

Questions

Call Jacqueline Horton at (256) 830-1644 if you have questions about the research study. If you have questions about your rights as a research participant, or concerns or complaints about the research, you may contact Shelia Moore. Ms. Moore is the Director of the Office of the Institutional Review Board for Human Use (OIRB) at the University of Alabama at Birmingham (UAB). Ms. Moore may be reached at (205) 934-3789 or 1-800-822-8816. If calling the toll-free number, press the option for “all other calls” or for an operator/attendant and ask for extension 4-3789. Regular hours for the Office of the IRB are 8:00 a.m. to 5:00 p.m. CT, Monday through Friday. You may also call this number in the event the research staff cannot be reached or you may wish to talk to someone else.
Legal Rights

You are not giving up any of your legal rights by signing this informed consent document.

Signature Page for Research Involving Children

You are making a decision whether or not to have your child take part in this study. Your signature indicates that you have read (or been read) the information provided above and decided to allow your child to participate. You will receive a copy of this signed informed consent document.

<table>
<thead>
<tr>
<th>Signature of Parent or Legally Authorized Representative</th>
<th>Date</th>
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<table>
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<tr>
<th>Signature of Investigator</th>
<th>Date</th>
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Assent of Child

You have agreed to participate in research titled, Teaching Breast Health to Adolescent Females in High School: Utilizing Interactive Learning (Simulated Breast Models) versus Not Utilizing Interactive Learning.

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<th>Signature of Child</th>
<th>Date</th>
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APPENDIX G

LESSON PLANS FOR BREAST HEALTH PROGRAM
LESSON PLANS: BREAST HEALTH
Duration of Time: 90 minutes

Objectives: Upon completion of this program, the students will be able to:

3. Identify the signs and symptoms of breast cancer.
4. Describe the risk factors of breast cancer.
5. Differentiate among the screening methods of breast cancer.

Activities: The students will complete a Breast Health Knowledge Pre-test and Breast Health Beliefs Pre-survey one week before the program starts. The PI (principal investigator) will conduct a lecture on breast health. The students will view a video: Breast Health: Every Woman’s Responsibility.

The PI will demonstrate breast self-examination and breast self-awareness to the treatment groups.

The students in the treatment groups will divide into smaller groups of 3-4 and practice breast-self examination and breast self-awareness with simulated breast models.

The students will complete an immediate Breast Health Knowledge Post-test and Breast Health Beliefs Post-survey.

The students will complete a 4-week follow-up Breast Health Knowledge Post-test and Breast Health Beliefs Post-survey.

Wellness Inventory for comparison groups, males and females not participating in the study.

Materials: PowerPoint presentation on breast health

Instruments: Breast Health Knowledge Test and Breast Health Beliefs Survey

Video: Breast Health: Every Woman’s Responsibility.

Simulated Breast Models

Wellness Inventory
APPENDIX H

INSTITUTIONAL REVIEW BOARD LETTERS
Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA00005960 and it expires on October 26, 2010. The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56 and ICH GCP Guidelines.

Principal Investigator: HORTON, JACQUELINE
Co-Investigator(s):
Protocol Number: X00920018
Protocol Title: Teaching Breast Health to Adolescent Females in High School: Utilizing Interactive Learning (Simulated Breast Models) versus Not Utilizing Interactive Learning

The IRB reviewed and approved the above named project on 10/30/09. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.
IRB Approval Date: 11/20/09
Date IRB Approval Issued: 11/24/09

Marilyn Doss, M.A.
Vice Chair of the Institutional Review Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

470 Administration Building
701 20th Street South
205.993.3769
Fax 205.934.1301
irb@uab.edu

The University of Alabama at Birmingham
Mailing Address:
AS 470
1520 3RD AVE S
BIRMINGHAM AL 35294-0104
UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA00065960 and it expires on September 29, 2013. The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56.

Principal Investigator: HORTON, JACQUELINE
Co-Investigator(s):
Protocol Number: X099920018
Protocol Title: Teaching Breast Health to Adolescent Females in High School: Utilizing Interactive Learning (Simulated Breast Models) versus Not Utilizing Interactive Learning

The IRB reviewed and approved the above named project on 1/12/10. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.
IRB Approval Date: 1/12/10
Date IRB Approval Issued: 1/12/10

Marilyn Doss, M.A.
Vice Chair of the Institutional Review Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

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