Comparison of Breast Health Teaching Methods for Adolescent Females: Results of a Quasi-Experimental Study

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ABSTRACT

***Purpose**: A breast health educational program was administered in two public high school settings in north Alabama to subjects enrolled in health related courses. The purpose of this quasi-experimental study was to determine if teaching breast health with or without interactive learning would affect the breast health knowledge and beliefs of adolescent females. **Methods:** The sample consisted of 310 adolescent females' ages 15-18 years. 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, 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. **Results:** The results revealed 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. **Conclusions**: This research will add to the limited research in the area of breast health of adolescent females. It will provide 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. **Recommendations:** 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).*

***Key words**: adolescent breast health, breast self-awareness, interactive learning.*

INTRODUCTION

Recent research regarding breast health education in adolescent females is almost nonexistent in the literature. Teaching adolescent females breast self-examination (BSE) and breast self-awareness is less common, and little research has been conducted to explore the breast health education of adolescents. The majority of the breast health studies that have been conducted are specific to older women and minority women. The few research studies found examined BSE of adolescent females but did not compare teaching methods such as utilizing simulated breast models versus not using simulated breast models (Clark, Sauter, & Kotecki, 2000; Ludwick & Gaczkowski, 2001). The few research studies found in the professional literature suggest that educational interventions can improve breast cancer knowledge and attitudes of adolescent females (Ogletree, Hammig, Drolet, & Birch, 2004).

In the absence of known, preventable causes of breast cancer, early detection of the disease is extremely important to ensure the best chances for treatment and survival (Powe, Underwood, Canales, & Finnie, 2005; Susan G. Komen, 2007). 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, 2007). Annual screening mammography generally begins at age 40, this eliminates younger women. Women find the overwhelming majority of their breast masses (70-95%) despite the two other modes of detection (clinical breast exam 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 (American Academy of Pediatrics, 2010; Susan G. Komen, 2007).

Appropriate breast health education is lacking in our schools. Many state mandated health education curriculums have topic areas that are not specific to breast health. The

content standard that is closely related to breast health is "practice health-enhancing behaviors." Health education curriculums are more focused on decision-making skills for risky adolescent behaviors such as alcohol, drug use, injury and violence (including suicide), tobacco use, poor nutrition, inadequate physical activity, and sexual behavior (Alabama Department of Education, 2009; National Health Education Standards, 2009; Centers for Disease Control and Prevention, 2010).

PURPOSE

For this study, the constructs of the Health Belief Model (HBM) that were utilized included: susceptibility, seriousness, benefits of breast self-awareness, and barriers of BSE (Strecher & Rosenstock, 1997; Yarbrough & Braden, 2001). The susceptibility subscale had five items that measured the extent to which the individual believes she was vulnerable to breast cancer. The seriousness subscale had seven items that measured how an individual perceived the seriousness of developing breast cancer and the consequences of the illness. The benefits of breast self-awareness subscale had four items that measured an individual's beliefs about the value of breast self-awareness. The barriers of BSE subscale had six items that measured an individual's beliefs for not practicing BSE. The remaining scales of Champion's Breast Cancer Screening Beliefs Scale (CBCSBS) were not measurable for the study because they were not relevant to the study's sample.

The research questions of this study included: (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? Therefore, the purpose of this study was 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.

METHODS

Participants

The sample consisted of 310 middle-class adolescent females, ages 15-18 years, enrolled in health education, health science, and child development classes. The decision to include females enrolled in these classes is due to the fact that health promotion and wellness topics are taught in these courses which create an opportunity to introduce another health promotion topic, breast health. The two high schools were selected because of their high level of interest in new programs to educate their students.

There were 310 participants who completed the pre-knowledge test and the beliefs survey. There were 308 participants who completed the immediate post-test and survey and 302 who completed the 4-week follow-up. The teachers of the various participating classes notified the researcher of their attendance on selected days in order to have as many of the original 310 participants as possible. The goal was to teach the breast health program on the 100% attendance days in the participating classes.

Prior to data collection written permission was obtained from the school superintendent, the school principal, and the guardian. Data were collected from female students in the selected 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 one high school. There were four health education, four health science, and two child development classes at the other high school. In order to match data, the participants placed the last four digits of their phone numbers on the tests and surveys.

Instruments

The focus group consisted of 6 participants aged 15-18 year old females. The participants were students who attended a high school that was not part of the study. 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 and administered to the participants in the pilot study.

Breast Health Knowledge Test

One week before the program commenced, the researcher of the 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 were each comprised of 14 items of breast health knowledge. The test items were multiple choice and were derived from the program information presented pertaining 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).

Breast Health Beliefs Survey

A revision of 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 revision of the CBCSBS for this 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 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).

The Breast Health Beliefs Survey was submitted to a panel of six experts. The panel included two school nurses, two health education teachers, and two health promotion instructors from a local university. They assessed the subscales items for content validity.

Readability test, using the Simplified Measure of Gobbledygook (SMOG) technique and computerized readability analysis determined the Breast Health Beliefs Survey 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.

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. 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 (See Table 1).

Procedures

The principle focus of the pilot study was to assess the adequacy of the data collection plan. The pilot study was conducted at a church in Huntsville, Alabama. All consent and assent forms, data collection procedures, and instruments were reviewed and approved by the Institutional Review Board of the University of Alabama at Birmingham. The participants of the pilot study were 15-18 year old adolescent females who were members of the youth department at the church. 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 the two participating high schools. 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 a local university established content validity for the instruments. Readability tests and the SMOG technique determined that the instruments were appropriate at the seventh-grade reading level.

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 American Cancer Society's (ACS) 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 same lecture information and video as the treatment group. However, the difference between the groups 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 amounts of time. The teachers of the participating 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.

Data Analysis

Predictive Analytics Software (PASW) Statistics was used to analyze the data. Descriptive statistics were used to describe 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 researcher ran intra-class correlations on scores within the classroom and used the mean of the classroom as the unit of analysis. 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. The researcher used repeated measures analysis of variance (ANOVA) to answer the research questions.

RESULTS

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 results of the repeated measures ANOVA revealed that the knowledge scores of the participants for interactive learning gained more knowledge about breast health and sustained their gain more than the comparison group (See Figure 1). The perceived susceptibility (See Figure 2) and perceived seriousness (See Figure 3) 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 (See Figure 3). The treatment group had a significantly larger gain than the comparison group in the perceived benefits of breast self-awareness (See Figure 4) 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 (See Figure 5).

In comparing results for 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 scores for each variable decreased and the perceived barriers of BSE scores increased (See Figure 4), regardless of breast health interactive learning or no interactive learning.

In the original study the results of the repeated measures ANOVA were not depicted in tables. They were discussed in detail with each research question and hypothesis because of the many tables that were generated by the results. The interpretation and discussion of the results provided sufficient information to allow the reader to fully understand the analyses conducted.

DISCUSSION

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 (American Cancer Society, 2013; Ludwick & Gaczkowski, 2001; Ogletree, Hammig, Drolet, & Birch, 2004). In an attempt to improve early detection, preventive health services such as breast health awareness have been widely promoted among older women. However, the American Academy of Pediatrics and the American Academy of Family Physicians 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 (American Academy of Pediatrics, 2010; American Academy of Family Physicians, 2011).

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 routinely taught. The most commonly stated reason by high school health educators 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).

The study explored an effective method to teach breast health during adolescence by utilizing a hands-on approach (interactive learning), thereby, promoting the outcome of improved breast health knowledge and breast health beliefs of adolescent females as a result of interactive learning with simulated breast models.

Limitations

The following limitation of the study should be noted. First, because the study participation was voluntary, data collected may not have equally represented 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 had an influence on knowledge and beliefs of breast health. Third, data collected in the study may have been biased because of the nature of data collection (self-report). The participants' breast health beliefs were considered self-report data. Participants may have answered a question or respond to a statement the way they think the researcher wanted 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.

CONCLUSIONS

Some researchers contend that traditional pedagogical techniques are not suited for teaching higher ordered thinking such as application, analysis, synthesis or evaluation (Silvia, 2012). However, using active learning activities in the classroom has become a popular teaching technique because such activities are designed to engage students actively in their learning process and are more effective alternatives to the traditional lecture/discussion approach whereby students take a passive role in their own learning process. The scholarship of teaching and learning suggests that students will comprehend better, retain longer, and become more interested in the material when active learning techniques are used (Silvia, 2012; Smithburger, Kane-Gill, Ruby, & Seybert, 2012).

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 HMB 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 (Fishera & Frank, 1994).

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.

RECOMMENDATIONS

This 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.

The Alabama State Department of Education has developed an Alabama Course of Study for Health Education (ALCOS) (Alabama Department of Education, 2009). This document is used by schools across the state during the development of yearly curriculum for health. 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 (Alabama Department of Education, 2009). 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: simulation, using cooperative learning, peer teaching, practice, and discussion groups. In addition to better preparation of the teacher, incorporating active learning is more likely to increase the knowledge retention rate of the students/participants. Also, incorporating active learning strategies addresses the different 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 goes into the classroom to work with teachers. The focus is to work with all the teachers, novice and experienced. 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. Also, breast health should be given the same importance as other health topics. It should not be taught the last week of a 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 winter 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.

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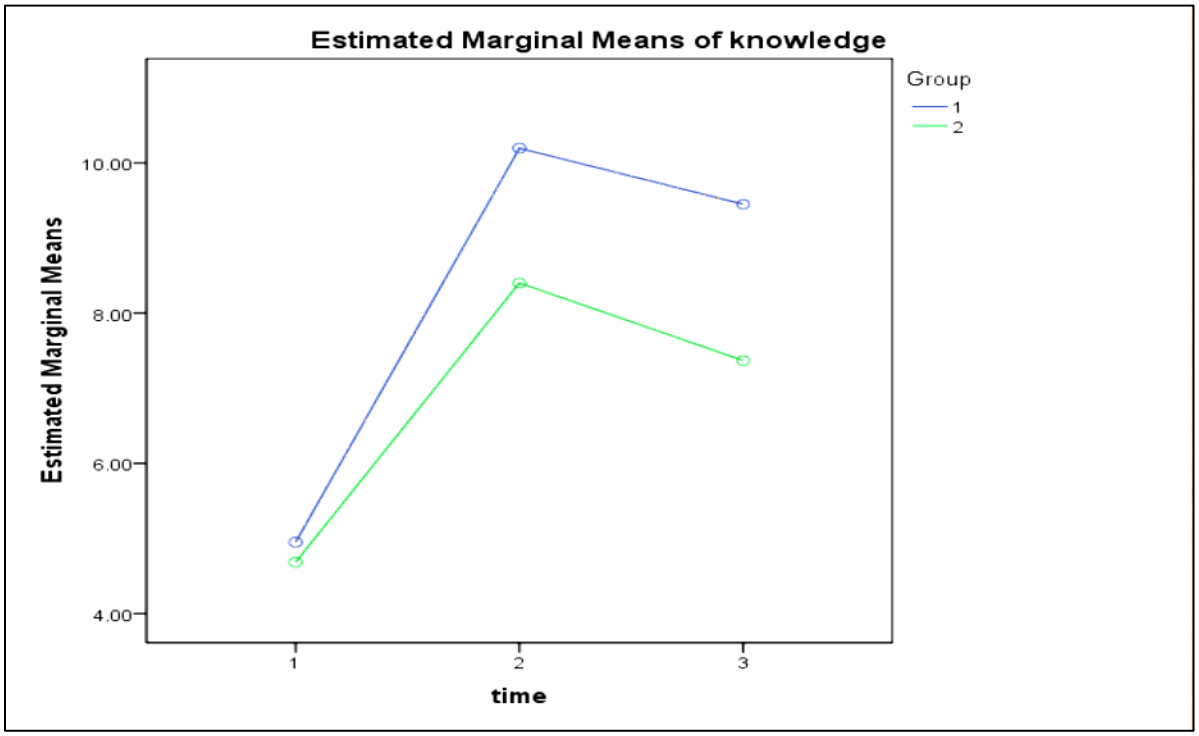
Table 1: Internal Consistency of the Instruments

Instrument (Subscale)	Cronbach's Alpha	Cronbach's Alpha (Items Deleted)
Knowledge	.869	
Susceptibility	.733	.786
Seriousness	.715	
Benefits of BSA	.710	.822
Barriers of BSE	.846	

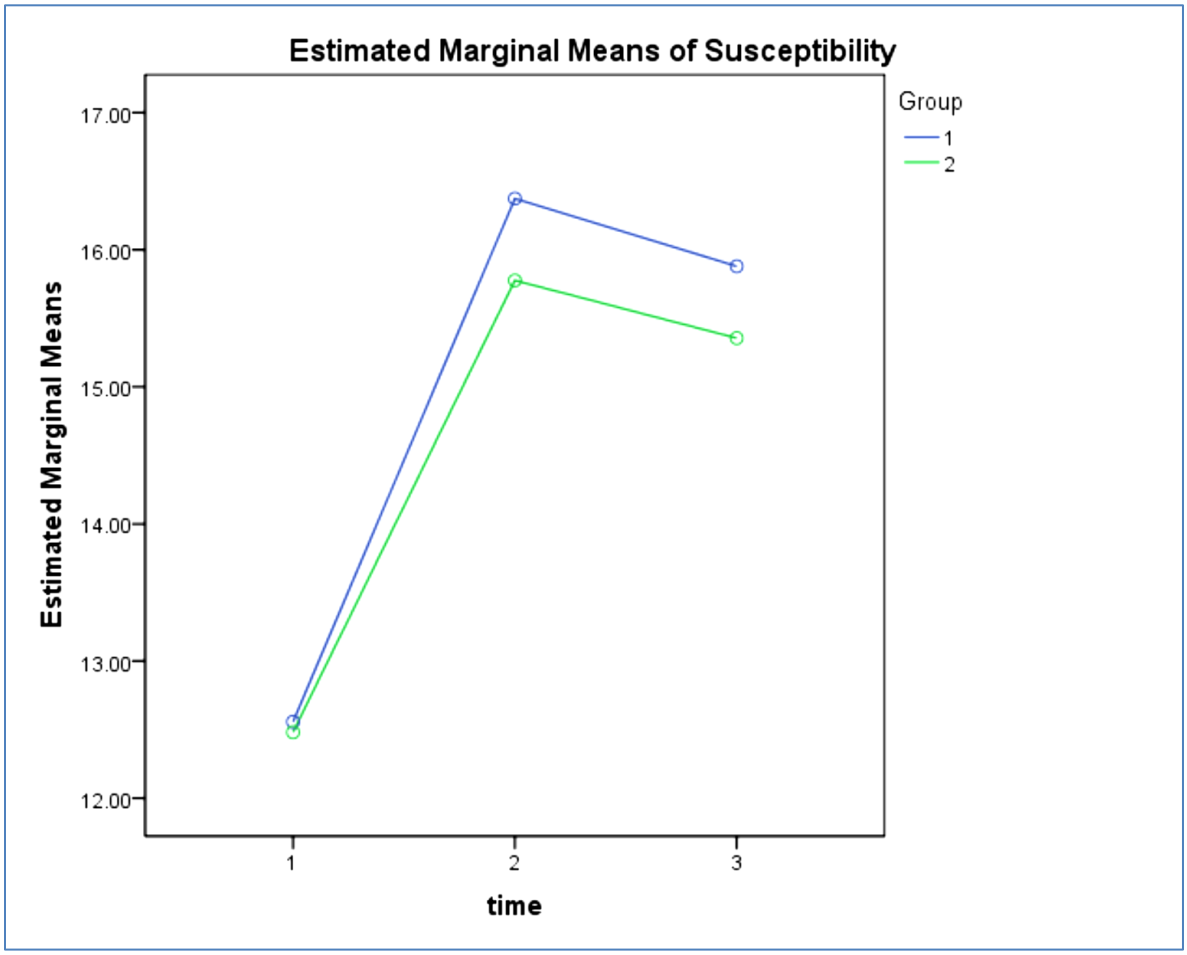
Note: BSA = Breast Self-Awareness; BSE = Breast Self-Examination.

Figure 1: Profile Plot for Knowledge



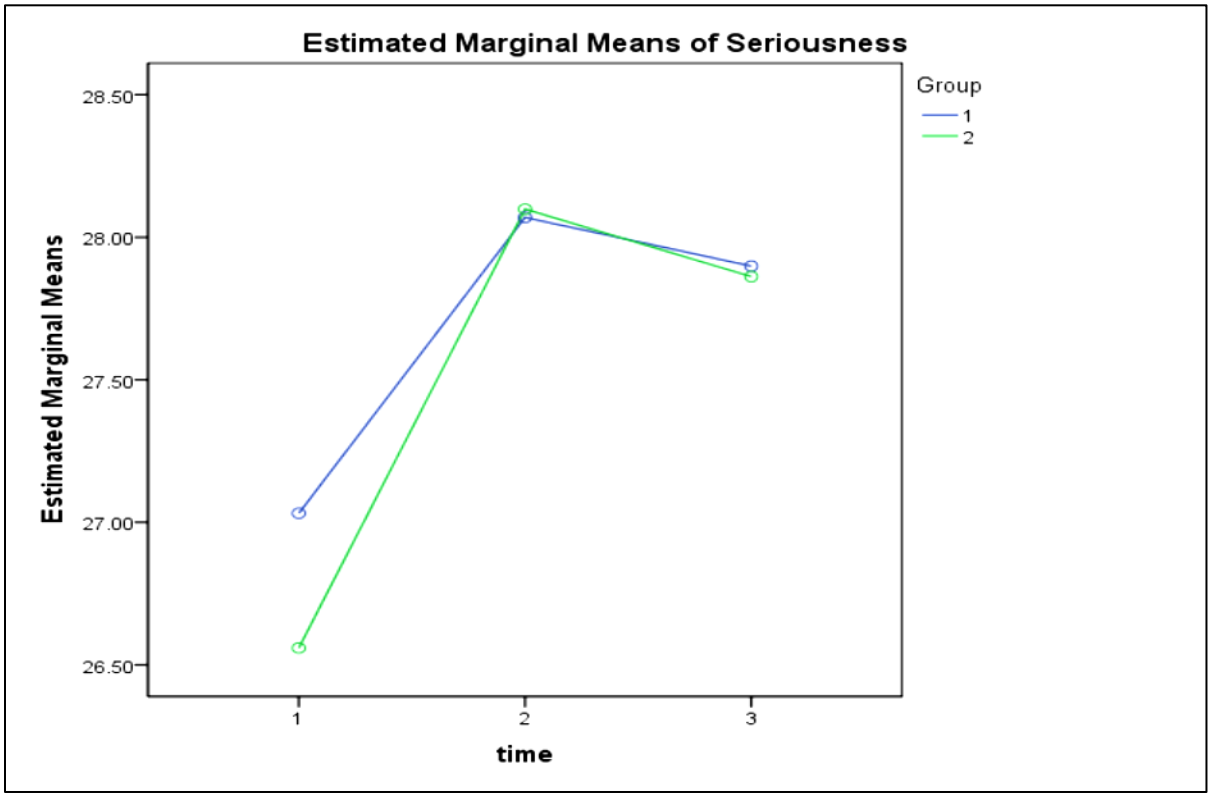
Group 1: Treatment Group
Group 2: Comparison Group

Figure 2: Profile Plot for Susceptibility



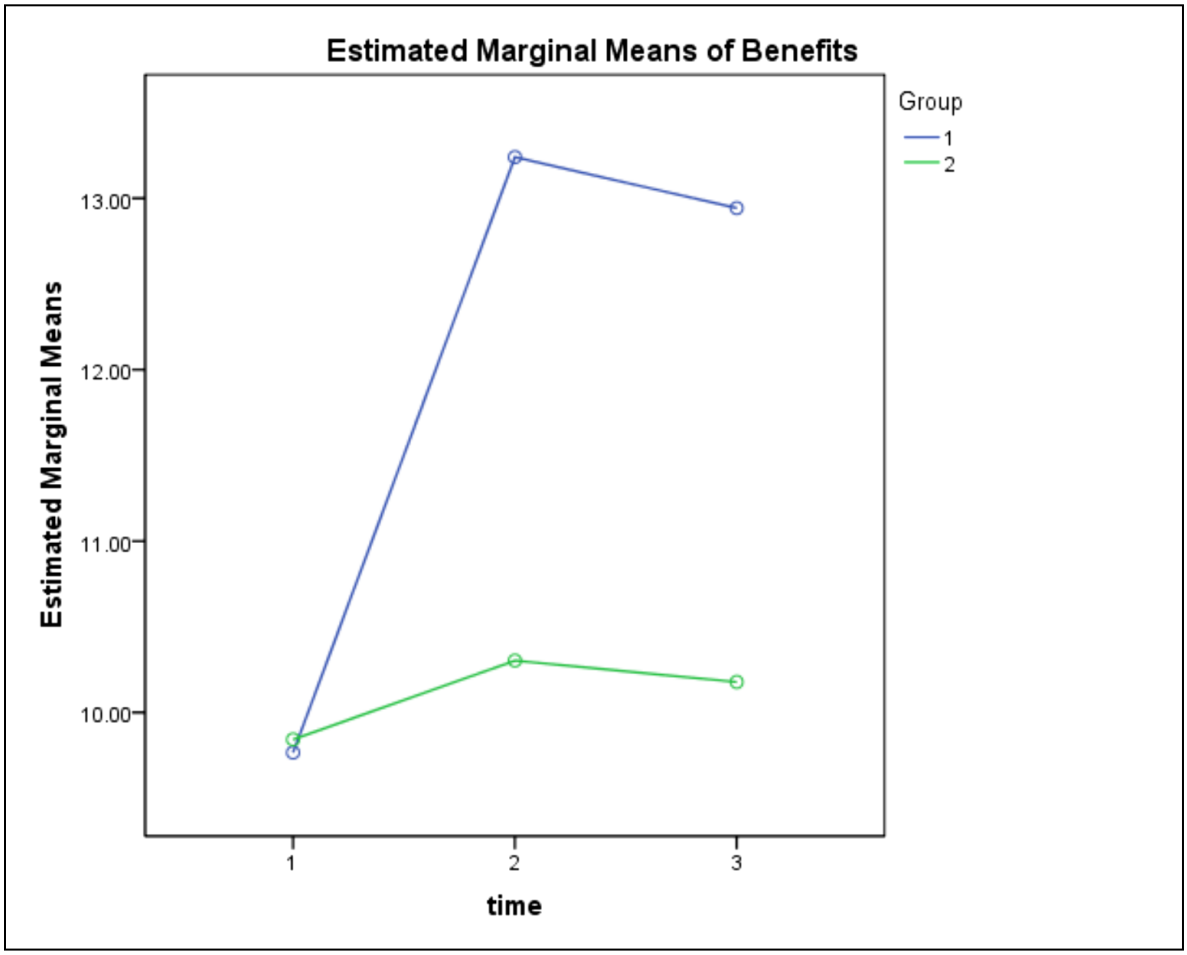
Group 1: Treatment group
Group 2: Comparison group

Figure 3: Plot Profile for Seriousness



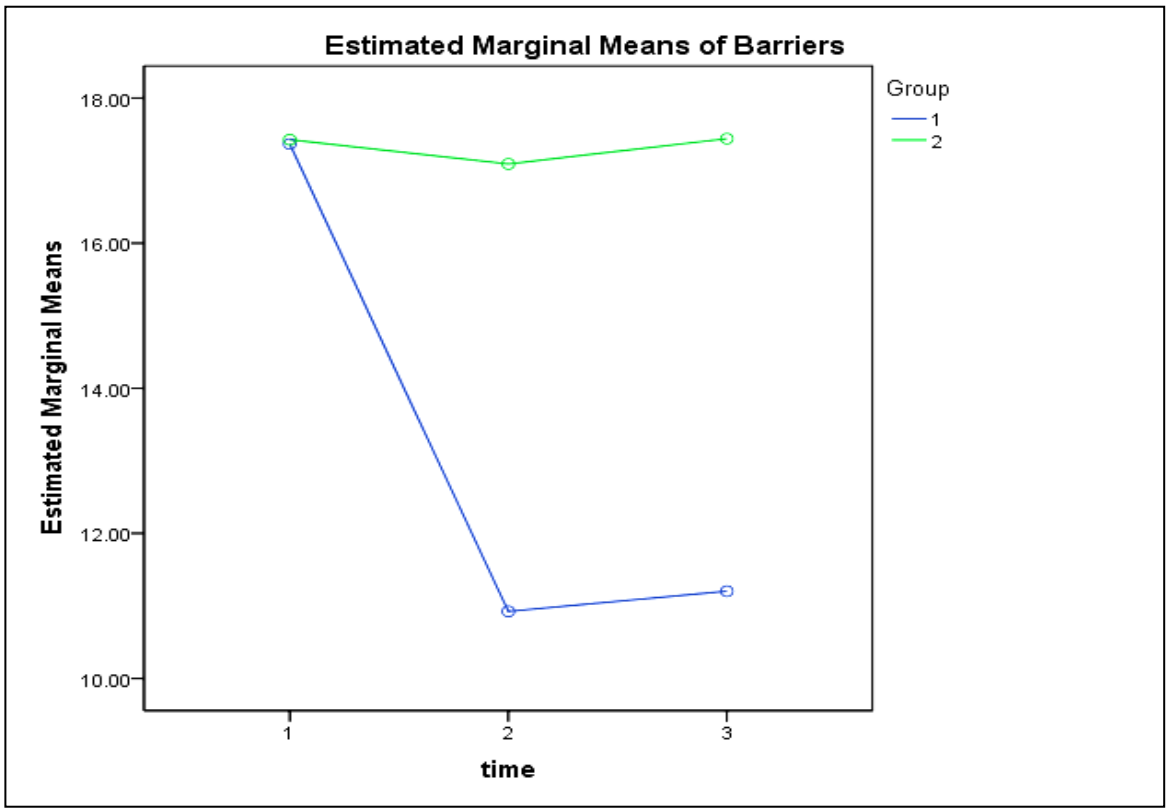
Group 1: Treatment group
Group 2: Comparison group

Figure 4: Plot Profile for Benefits of Breast self-Awareness



Group 1: Treatment group
Group 2: Comparison group

Figure 5: Plot Profile for Barriers



Group 1: Treatment group
Group 2: Comparison group