A PRELIMINARY PSYCHOMETRIC ASSESSMENT OF THE ATTITUDE OF TERTIARY HEALTH TRAINEE UNDERGRADE STUDENTS TOWARDS BREAST - SELF EXAMINATION IN K.N.U.S.T, GHANA.

Authors: Christian Amoah, Nceba Z. Somhlaba, Frimpong-Manso Addo, Vida Maame Kissiwa Amoah, Ebenezer Otu Ayeboafo Ansah, Emma Sethina Adjaottor, Gifty B Amankwah, and Benjamin Amoah.

1 Behavioural Sciences Department, SMD, KNUST, Kumasi, Ghana. Email: camoah5@gmail.com, camoah.chs@knust.edu.gh
2 Komfo Anokye Teaching Hospital (KATH, Psychiatric Clinic), Directorate of Medicine, Kumasi, Ghana. Email: addofm96.9@yahoo.com
3 Department of Psychology, Faculty of Community and Health Sciences, University of Western Cape (UWC), Cape Town, South Africa; Email: nsomhlaba@uwc.ac.za
4 Nursing Department, Garden City University, Kenyasi, Kumasi. Email: maamekissiwa74@gmail.com
5 University hospital, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi. Email: ansahebenezer3@gmail.com
6 Selgen Consult, Accra, Ghana, West Africa. Email: benjaminamoah525@gmail.com

*Correspondence: e-mail@amoah5@gmail.com, camoah.chs@knust.edu.gh Tel: (+233) 265 511 399, (+233)54 250 7656.

Abstract:

Breast self-Examination (BSE) is the cheapest most recommended Breast Cancer (BC) preventive tool for resource deprived settings. There is paucity in the Attitude research domain and comparative gender assessments of the BSE literature. The purpose of this study is to assess the combined and exclusive gender BSE attitude of undergraduate health trainees and to determine significant difference between scores of both genders. Online cross-sectional method was used to assess BSE attitude of 336 purposively sampled KNUST College of Health Sciences (CoHS) students. Compared to the construction groups’ average norm of 101.17 (SD = 9.55), our Study Participants’ BSE attitude is lower (92.51; SD = 11.80). However, using popular mid-point and 3 part scoring methods, our Study Participants’ (SPs) attitude scores are comparable to sub-regional and national findings. Also contrary to the authors’ expectation, the male participants scored generally high BSE attitude but significantly lower compared to their female compatriots (p < 0.5). Implication, contextual challenges and recommendations for future research have been discussed. BSE KAP research and education must involve more males as important BSE stakeholders and there is the need to adjust the curricula of all health trainee students in developing nations to reflect relevant BC preventive measures.

Keywords: Psychometric Assessment, Attitude, Breast Self- Examination, Tertiary, Health Trainee, Undergraduate Students, Ghana
1.0 Introduction

Breast Cancer (BC) is a life-threatening malignant tumor that starts from the cells of the breast tissue [1,2] and spreads through the lymphatic system to invade important body parts and organs through metastasis [3]. This disease causes very high morbidity and mortality among many females and relatively fewer males. The World Health Organization’s International Agency for Research on Cancer (IARC) is the official agency for all research into cancer and GLOBOCAN is its project that provide relevant cancer estimates globally. According to Globocan breast cancer (BC) incidences form 12.3% (i.e., 2 088 8490, out of 17 036 901) of all cancer cases in all ages globally and 6.6 % mortality (626 679 out of 9 489 872 deaths) of all ages as well as all sexes [Globocan (2020). All cancers excl. non-melanoma skin cancer. Available online: https://gco.iarc.fr/today/data/factsheets/cancers/40-All-cancers-excluding-non-melanoma-skin-cancer-factsheet.pdf (accessed on 6th March, 2021)].

The IARC’s Globocan also predicts the future breast cancer incidence and mortality burden worldwide from the 2020 estimates of 2.26 Million and 685 000 to increase to 3.19 Million and 1.04 million in 2040, [GLOBOCAN (2020). Estimated number of new cases from 2020 to 2040, Females, age [0-85+], Breast, World. Available online: https://gco.iarc.fr/tomorrow/en/dataviz/isotype?cancers=20&single_unit=100000. (accessed on 6th March, 2021)]. Ghana’s 5 year, 3 year and 1 year BC prevalence estimates are 99.5, 67.7 and 27.7 per 100 000 respectively. Also its Age-Standardized Incidence Rates (ASR) and mortality per 100 000 for age 0-74 years are 42.8 and 17.4 respectively according to [GLOBOCAN (2020). Estimated number of prevalent cases (1-year) as a proportion in 2020, breast, females, ages 0-74, Ghana, Available online: https://gco.iarc.fr/today/online-analysis-map?projection=globe (accessed on 28th july, 2020)]. According to research [e.g., 4,5,6] in the lifetime of every eight American women, one will acquire Breast cancer (BC) and one out of every thirty five will die, thus a 12.4% risk in their lifetime. There is evidence that male BC incidence is also on the rise globally [4,5,6,7] and on the African continent [8,6 quoting 9,10 & 11] to have reported over three decades ago that there was 5 to 15% increases male breast cancer incidence on the African continent even amid scarcity of data.

Early BC detection through relevant screening methods will not only decrease mortality rates by 25– 30% [12], it can go a long way to enhance treatment by considerably reducing mobidity, mortality, and improving women’s overall quality of life [13] (1). The American Cancer Society recommends clinical breast examination (CBE), mammography and Breast Self-Examination (BSE) as the most effective prevention against the high rising (BC) morbidity and mortality, [American Cancer Society (2016). Breast Cancer Early Detection and Diagnosis – can Breast Cancer be found early? Available online: https://www.cancer.org/content/dam/CRC/PDF/Public/8579.00.pdf accessed on 6th March, 2021]. Ideally, women between 20 and 30 years and above 40 years should undergo a thorough clinical breast examination by a qualified health care provider every three years [14,15].However the high cost of that process makes it inaccessible for women in Low and Middle Income Countries (LMICs) such as Ghana. This plausibly explains why as high as 60% of BC cases are discovered at a later stage [16,17] which has become a hallmark of BC health seeking behaviour with poor treatment outcomes,[18]. For women in non-industrialized (LMICs)
countries, BSE is by far the cheapest/ inexpensive non-intrusive method most BC researchers, health professionals and promoters unequivocally recommend.

Although BSE Knowledge Attitude and Performance (KAP) has received a fair share of research effort around the globe, a perusal of the literature revealed the fact that generally in terms of gender, majority of the BSE research effort have justifiably concentrated on women because of their relatively higher BC incidence, morbidity and mortality. Of those that have exclusively focused on females, there is an overconcentration on Nursing trainee/ professional at the expense of other health professional trainees. Many of these BSE KAP researchers use mostly nurses and nursing trainee students because they consider them BC educators and/ or future educators whose BSE KAP scores by virtue of their exposure via curriculum, could be used as benchmark for comparing the scores of their non – nursing compatriots and the general populace. Even in most cases where there is mixed gender health professional trainees, some researchers [e.g., 19,20] limit their BSE KAP research participation to only the females. That state of affair must change because in this 21st century, a particular gender domination of certain health professions, e.g., of Medicine, Nursing, Laboratory Technology, Physician Assistants etc., is quickly becoming a thing of the past and every health professional; male or female, is duty bound to offer thr life saving BSE education to their clients. Thus, involvement of male and other health trainee students in BSE KAP research is long overdue, as there is evidence that compared to women who become cognizant of BSE from other sources, those that obtained personalized instructions from a health care professional exhibited superior knowledge and portrayed higher confidence and higher probability to practice BSE routinely [19]. This also suggests that many women look up to their health care professionals (males or females) for instructions as far as their breast health is concerned.

From the extant literature, Breast Cancer (BC) Breast Self-Examination (BSE) Knowledge Attitude and Performance (KAP) have received quiet an enormous research effort around the globe and the evidence suggests that much effort have generally genuinely concentrated on females and that males are underrepresented in BSE research participation. Also generally female knowledge of BC and BSE are quiet high but actual BSE performance is disappointingly low. There may be several reasons for the disappointing lack of translation of BC/ BSE knowledge into BSE practice. One such important reason might be that overt behaviour (e.g., BSE practice) does not just occur in a vacuum, it occurs within a physical, psychological and sociocultural environment with varying sets of motivations within each milieu. To be effective at the intensification of BSE education most BSE KAP researcher recommended, educators need more than BSE knowledge and performance. They need a comprehensive understanding of the BSE attitude and the predictors of the actual BSE behaviour through relevant attitudinal change conceptual frameworks. Of the 3 BSE Knowledge Attitude and Performance (KAP) concepts Social Psychologist perceive attitude as the biggest concept. It is defined as “…a positive or negative evaluative reaction towards a stimulus such as a person, action, object, or concept…” p. 639 of [21 quoting 22], which predispose us (humans) to act and feel in a certain way, [23]. It has 3 components, namely; cognitions, emotions or feelings and overt behaviour, [21,23]. Cognition embodies covert mental processes including knowledge, decision, insight, perception, judgement
etc. and emotions has to do with feeling. Any factor(s) whether psychological or sociocultural that affect these covert cognitive processes affects the overt behaviour (e.g., BSE performance).

A recent very comprehensive systematic review Udoh et al., [24] of most BSE researches done in the SSA concluded among others that there is “limited literature on women’s attitudes towards BSE” (p.6). Thus, even among the extant predominantly female literature, there is paucity in the Attitude domain of the whole BSE research area as a lot of the research effort into BSE in Sub-Saharan Africa (SSA) have focused on the knowledge and practice areas at the expense of attitude. They recommended identification of, and evident-based solutions to BSE contextual challenges when they wrote “…this study recommends further studies on knowledge, practice, and attitude of BSE, to identify contextual challenges and provide evidence-based solutions to improve women’s knowledge, practice, and attitude of BSE in SSA…”[24] (p.1).

In the view of the current authors, the contextual challenges are not limited to the individual KAP but the entire BSE KAP research areas. Some of these BSE KAP Contextual challenges include but not limited to (1) BSE KAP psychometric (measurement) challenge (2) under representation of other non-nursing professional health trainees in BSE research participation (3) gender imbalance in the KAP research participation, and related to that, (4) an important male gender related socio-cultural factor as important BC BSE Stake holders and their potential role in the fight against BC. We deliberate a bit on challenges 1 and 4 as aspects of 2 and 3 have been discussed above.

1.1 BSE KAP psychometric (measurement) challenge. The authors have identifies a lack of uniformity in KAP concepts measurements and scoring perhaps related to scarcity of BSE KAP standardized reliable and valid psychometric measures [19]. Due to this lack, most researchers have resorted to self-constructed questionnaire to measure KAP concepts often from literature review. Even though self-construction per say is not bad in itself and has its own advantages (e.g., ability to cover many grounds); one of its limitations is its lack of uniformity in the number, types of specific questions and relevant areas to elicit KAP knowledge. A quick perusal of the literature suggests a great variation in the number of questions used and the domain assessed. For example, while some used 6 questions, others used 4 and yet others used 10 to measure attitude. Related to this measurement challenge is a variation in scoring whereby some attitude researchers use arbitrary mid-point cut – off s [26,27,28,29], while others use a 3 part cut – off points scoring method [e.g.,30,31]. Thus, to be able to compare one’s study results to extant research evidence therefore, one has to use similar scoring methods used in that research. These psychometric challenge are not only limited to the attitude domain but the entire BSE KAP research areas. The solution is to use reliable and valid psychometric measures in combination with self-constructed questionnaire to complement each other to limit this observed BSE KAP psychometric contextual challenge.

1.1 Gender imbalance in the BSE KAP research participation

A perusal of the BSE literature revealed the fact that generally in terms of gender, majority of the BSE research effort have justifiably concentrated on women because of their relatively higher BC incidence, morbidity and mortality. As mentioned above, there is evidence that male BC incidence is also on the increase globally [4,5,6,7] and on the African continent [8,6 quoting 9 & 32] to have reported over three decades ago that there
was 5 to 15% increases male breast cancer incidence on the African continent even amid scarcity of data. Male BC incidence in the developed world is also on the rise. For example in 2017, [33] estimated 252,710 and 2,470 incidences of breast cancer respectively among women and men and that nearly 40,610 and 460 were expected mortality of women and men respectively in the United States of America in 2017 alone. Just as female BC was initially not a 3rd world problem but has now become a public health concern for many LMIC, it will serve the global community, African continent, the sub region and Ghana better to pre-emptively involve males in BC BSE KAP research and education. This is because whether we like it or not, males are becoming important stake holders in the BC BSE fight.

1.2 Males as important BC BSE Stake holders and their potential role in the fight against BC

Quiet apart from gradually becoming BC victims themselves, and as suggested by a 37 year old female research participant in p.115 of Kudzawu et al.,[2], male partners could serve to remind their cherished significant others (mothers, wives, sisters, girlfriends, female colleagues etc.,) to engage in this life saving BSE as many women cite forgetfulness[26,34, 2,29,] as one of the numerous reasons for non BSE performance. By the way, quiet apart from forgetfulness, several other reasons such as time constraints, lack of skills to correctly perform BSE, embarrassment for self-breast manipulation and anxiety related to discovering a lump have been advanced for non-performance of BSE[35]. Also, an important socio-cultural factor bedeviling the fight against BC is that there is evidence that BC victims unduly delay in their BC orthodox health seeking behaviour partly due to lack of support, the dread of divorce and rejection by their husbands once they undergo radical treatment such as mastectomy [18]. More so, the under-represented, and in some cases, excluded males may be the majority at the helm of affairs of organizations and boards taking relevant decisions impacting BC prevention, treatment, BSE education and advocacy. Involving men at all levels of BC BSE activities – research, education and interventions would go a long way to reduce some of the afore mentioned sociocultural impediments and contextual challenges. There is therefore the urgent need to understand men’s perspectives, attitudes and predictors of BSE and exclusive focus on female gender for BC BSE research, education and advocacy is not sustainable and working against its own agenda.

As far as the authors are concerned no study has assessed mixed and exclusive gender attitude towards BSE among health Professional trainees in Ghana and none using a BSE psychometric measure. Also none has attempted to determine if there is significant differences in the average gender BSE Attitude in undergraduate health professional trainees. This study therefore aims among others to;

(i) determine the attitude of mixed gender health trainee undergraduate students towards BSE
(ii) determine the attitude of the exclusive male and female health trainee undergraduate students towards BSE and
(iii) determine if there is a significant difference between average BSE attitude scores of female and male health trainee undergraduate students. For this objective we hypothesize that; H0: There is no significant difference between the mean score for breast self-examination of both genders, and H1: There is a significant difference between the mean score for breast self-examination of both genders.
2.0 Materials & Methods

Being a preliminary study and focusing on undergraduate health trainee students, a purposive sampling method was used to select participants from 6 undergraduate classes from 3 different faculties in the CoHS, KNUST. To qualify to participate in this research, participant had to be a student in KNUST, must be an undergraduate, must be a health trainee student in CoHS, 18 years and above. Exclusion criteria were participants aged below 18 years and post graduate students. Online cross – sectional method was used in this study to ascertain the attitude toward BSE among 336 voluntary participants. For the entire research the questionnaire was developed into a 5 section google form link which were respectively demographic characteristics consisting of 8 questions, BSE attitude measure consisting of 24 items, 18 item Multidimensional Health Locus of Control scale (MHLC), 5 item Satisfaction with Life Scale (SWL), and 5 self-constructed questions assessing actual BSE performance. The google link was forwarded to participants for voluntary participation after going through the participants’ information sheet which included more information about the study and guarantees of confidentiality. The first voluntary 20 participants were used to pretest all three measures used and their Cronbach’s Alpha values reported with the description of each of the measures used for achieving the objectives above.

2.1 Measures Used

The measure used for this manuscript was Breast Self-Examination (BSE) obtained from [36] (pp. 131 – 133). This BSE attitude psychometric measure was developed by [37] consists of 24 items and measures attitude towards BSE. Drawing from attitude category of previous research based on an adapted versions of the Health Belief Model [38,39]. Race and Silverberg [37] developed this BSE to cover perceived seriousness, BC susceptibility, health motivation, breast abnormality activities, performance issues (i.e., time availability, difficulty, self-touch etc.) and concern for others. Each item is a 6 – point Likert scale from strongly disagree (1) to strongly agree (6) with 6 representing the most positive. The scoring is done by simply summing participants' score on each item to obtain a score between 24 and 144 with the highest reflecting a more positive attitude towards BSE. The sourcebook reported a reliability coefficient of 0.83 as a single scale. Pretesting for this measure before data collection yielded a Cronbach’s alpha for this BSE of 0.709 (70.9%). The sourcebook reported a good concurrent validity. It must be mentioned that the rest of the psychological measures (i.e., Multidimensional Health Locus of Control scale (MHLC) and Satisfaction with Life Scale (SWL) used to measure other objectives will be described under material and measures in the follow-up article to be written later.

2.2 Procedure

The researchers solicited voluntary participation from purposively sampled CoHS undergraduate health trainee students. Ethical consent process was undertaken in 2 ways; either online or in hard copy through the class representatives. After giving them information including objectives of the study and assurances of confidentiality, the investigators appealed for their voluntary participation. Those that accepted to participate through direct contact through their class representatives were required to fill a hard copy consent form.
consent, the link to the google form was distributed to participants to logon to complete. Ethical clearance (ref number CHRPE/AP/066/21) was obtained from Committee on Human Research, Publication and Ethics (CHRPE) in KNUST, Kumasi, Ghana. Data collected took place from 4th to 18th February, 2021. On the whole 336 students responded excluding 20 of the early participants used for pretesting to determine if the questionnaire and instructions of measures were comprehensible and suitable. The data was analyzed using SPSS version 20.

2.3 Data Analysis
A descriptive analysis was used to determine the overall attitude, and that of exclusive male and female health trainee undergraduate students towards BSE. For the 3rd objective an independent sample T-test was used to determine if there was a significant difference between average attitude scores of both genders.

3.0 Results
As mentioned above, this study received 336 voluntary participation and out of that majority (59.8%) of them were females while the male respondents were 40.2%. The participants’ age range was between 17 and 38 years, and their mean age was 21 (SD=2.9) years. Table 1 summarizes the demographic characteristics of the Study Participants (SPs).

| Table 1: Demographic Characteristics of Study Participants (SPs) |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Variables                  | Responses                  | Frequency                  | Percentage                  |
| Age                        |                            |                            |                             |
| 16-18                      | 38                         | 11.50                      |
| 19-20                      | 156                        | 47.10                      |
| 21-30                      | 114                        | 47.10                      |
| 24-26                      | 06                         | 01.80                      |
| >26                        | 17                         | 05.20                      |
| Gender                     |                            |                            |                             |
| Male                       | 135                        | 40.20                      |
| Female                     | 201                        | 59.80                      |
| Prog. of Study             |                            |                            |                             |
| Human Biology              | 213                        | 63.40                      |
| Physician Assistant        | 19                         | 05.70                      |
| Nursing & Midwifery        | 101                        | 30.06                      |
| Missing                    | 03                         | 00.90                      |
| Level of Study             |                            |                            |                             |
| 1st Year                   | 63                         | 18.70                      |
| 2nd Year                   | 108                        | 32.30                      |
| 3rd Year                   | 163                        | 48.70                      |
| 4th Year                   | 01                         | 00.30                      |
| Religion                   |                            |                            |                             |
| Christianity               | 314                        | 93.50                      |
3.1 Objective 1
As discussed in the introduction, one of the contextual challenges facing the BSE research area is the issue of measurement of the core concepts of KAP and the varying scoring methods being used by researchers. With Attitude in particular and because most use their own self constructed questionnaire, they use varying scoring methods. While some researchers score their SPs’ attitude using their own methods and based their attitude judgement on arbitrary mid-point cut-off, others use a 3 range (low, moderate and high) criteria. Since this study uses a psychometric measure we score our SPs’ attitude using the instructions for scoring described under measure above. Thus for objective 1, 3 methods namely; the BSE test constructors’ scoring instruction and judge the SPs’ scores using the popular BSE researcher’s mid-point cut-off and the 3 range criterion for easy comparison and discussion with extant BSE attitude research evidence.

3.1.1 Using the Psychometric Test Instruction
Per the test constructor’s instruction, all 24 BSE test items were summed up. The overall average mixed gender score of the current Study participants’ (SPs) on the Breast Self-Examination measure (BSE) is 92.51 (SD = 11.80).

3.1.2 Using Mid–Point Cut - Off
To use the popular mid-point cut off reference point for BSE Attitude scores a score of 72.00 was chosen since the score ranged from 1-144. An average score below and above this point indicate low and high attitude toward BSE respectively. The results for an overall mixed gender combined SPs and exclusive male and exclusive female SPs’ average Attitude scores are as summarized in table 2 below.

| Study Participants                  | Average BSE Attitude Score | Standard Deviation |
|-------------------------------------|----------------------------|--------------------|
| Combined Study Participants         | 92.51                      | 11.80              |
| Exclusive Male gender               | 89.42                      | 12.29              |
| Exclusive female gender             | 94.59                      | 11.02              |

3.2 Objective 2: Exclusive gender averages above and below the 72 mid-point cut - off
For a better picture, exclusive gender averages above and below the 72 mid-point average were computed and tabulated in table 3 below. The exclusive male gender BSE average score was 89.42 (SD = 12.285). Thus, 3.7% and 96.3% of the male participants had BSE average scores below and above the cutoff point with average scores of 48.40 (SD= 17.60) and 91.00 (STD= 8.91) respectively. Similarly, the exclusive female gender BSE average score was 94.59 (STD= 11.02), and 1.5% and 98.5% of the female participants had BSE average score below and above the cutoff point with average scores of 43.67 (SD = 20.13) and 95.36 (SD= 8.91) respectively.
TABLE 3: A distribution of gender BSE average scores above and below the 72 midpoint.

| Gender | Overall Average | % above midpoint (72.00) | % below midpoint (72.00) |
|--------|----------------|--------------------------|--------------------------|
| Male   | 89.42 (SD = 12.285) | 96.3%; w 91.00 (SD = 8.91) | 3.7%; w 48.40 (SD = 17.60) |
| Female | 94.59 (SD = 11.02) | 98.5%; w 95.36 (SD = 8.91) | 1.5%; w 43.67 (SD = 20.13) |

\( w = \) *with

3.2.1 Using the 3 Range Criterion comparison method

Using the 3 range criterion, BSE scores were categorized into 3, namely; low, moderate and high attitude ranging from BSE attitude scores from 1-48, 49-96, and 97-144 respectively. The table 4 below shows the overall mixed gender level of attitude towards BSE. Thus, 61.9% of the study participants had an average attitude to breast self-examination, 36.9% and 1.2% of the participants had respectively high and low attitude towards BSE.

TABLE 4: Attitude towards BSE

| Attitude towards Breast Self-Examination | Frequency | Percentage (%) |
|-----------------------------------------|-----------|----------------|
| Low Attitude (1-48)                     | 4         | 1.2            |
| Average Attitude (49-96)                | 208       | 61.9           |
| High Attitude (97-144)                  | 124       | 36.9           |
| Total                                   | 336       | 100.00         |

A cross tabulation was also performed on gender and results reported in Table 5 below.

Table 5: Cross tabulation between Gender and Breast Self-Examination

| Gender | 1-48= LOW ATTITUDE | 49-96= AVERAGE ATTITUDE | 97-144= HIGH ATTITUDE | Total |
|--------|---------------------|-------------------------|----------------------|-------|
| Males  | Count               |                         |                      | 135   |
| % within Gender | 1.5% | 73.3% | 25.2% | 100.0% |
| Females | Count               | 2                       | 109                  | 201   |
| % within Gender | 1.0% | 54.2% | 44.8% | 100.0% |
| Total   | Count               | 4                       | 208                  | 336   |
| % within Gender | 1.2% | 61.9% | 36.9% | 100.0% |

It was deduced that 1.5% of the male participants had a low attitude, 73.3% had average attitude while 25.2% had high attitude towards BSE. Similarly, majority (54.2%) of the female participants had an average attitude, 44.8% had high attitude whiles 1% had low attitude to BSE.

3.3 Objective 3: Test of Variance.

The study again sought to determine significant difference between the mean score of both genders. Independent sample T-test was used to determine any significance difference among both genders and results reported in table 6 below
Table 6: Independent Sample T-Test

| Breast Self-Examination | Levene's Test for Equality of Variances |
|-------------------------|----------------------------------------|
|                         | F           | Sig | t      | df  | Sig |
| Equal Variance Assumed  | 0.823       | 0.365 | -4.024 | 334 | 0.000 |
| Equal Variance not Assumed |           |     | -3.939 | 265.947 | 0.000 |

The Levene’s test of equality of variances was used to determine if equal variance existed or otherwise using
$H_0$: Equal Variance assumed,
$H_1$: Equal Variance not assumed,
From the hypothesis above, the p-value (0.365) was greater than the significance level of 0.05, hence we fail

to reject the null hypothesis and conclude equal variance assumed at 95% level of confidence. Having

established the above, we proceed to set our hypothesis for the main objective as follows;

$H_0$: There is no significant difference between the mean score of attitude towards BSE for both genders.

$H_1$: There is a significant difference between the mean score of attitude towards BSE for both genders. Since

the p-value (0.000) obtained was less than the significance level of 0.05, we reject the null hypothesis at 95%

confidence interval and therefore conclude that there is a significant difference between the mean score of

attitude towards BSE for both genders.

4.0 Discussion

The objectives of the current study were to psychometrically determine the overall attitude of Study

participants (SPs), determine the exclusive male and female health trainee undergraduate students’ attitude

towards BSE and determine if there was a significant difference between scores of both genders. The female

participants in the current study out-numbered their male compatriots by a 3:2 ratio. The SPs’ age range was

between 17 and 38 years and their mean age was 21 years (SD ± 2.9) – well within prescribed age of practice

of BSE. Per the preamble under results objective 1, the Study Participants’ (SPs) score are discussed based on

3 different approaches of attitude measurement namely; the psychometric test instruction, popular mid-point

cut-offs and the 3 - range criterion of attitude assessment.

The overall average score on the Breast self-Examination (BSE) measure obtained by the combined mixed

gender SPs is 92.51 (Table 2). This figure is lower compared with Race and Silverberg’s [37] Construction

Groups’ (CGs) mean BSE score of 101.17 [(SD=9.55), [36] (p.131). This finding may be explained by the

cultural, demographic and gender differences between the CG and the current SPs. More so, mixed gender

participation in this current study may have lowered our SPs’ overall average score on this BSE psychometric

measure. Future research is needed to validate the psychometric properties and to standardize this BSE

measure to develop culturally relevant norms for easy interpretation of local test scores, to guide research and

enhance BSE research.

Another significant finding is that based on the mid-point criterion, 98.5% of the females SPs’ scored high

attitude with an average score of 94.54 above the cut-off (Table 3). This finding agrees with research evidence

by [40] who had 98.2% medical students and 96.4% of the non-medical students having a high attitude so as
to endorse BSE as a necessity in Saudi Arabia. In the Sub - Saharan Africa this finding is in line but higher

than 73.6% of Nigerian secondary students who had positive attitudes, [27]. It is also similar but higher than
findings by [29] and[26] who found “majority” and 97.1 % respectively having “good attitude” in female

university undergraduates students in the Presbyterian University College of Ghana, Asante Akyem Campus
and combined undergraduate and Senior Secondary School (SSS) female students in KNUST, Kumasi, Ghana respectively. This finding however contradicts findings by [28] who found 68% of Indian Information Technology (IT) professionals to have poor attitude which may be attributable to cultural and religious factors such as social stigma and norms. From (table 3), a female minority (1.5%) of our SPs maintain very low attitude towards BSE and future research should not only be intensified to identifying them and their reasons for such a low BSE attitude, but also urgently educate them. Who knows, they may soon graduate and become important BC BSE stakeholders.

Similarly, even though it is a well-known fact that male hardly engage in BSE for obvious reasons - low incidence of BC, the current study results revealed a surprising high average attitude score of 91.00 (SD=8.91) for the overwhelming majority of 96.3% of males who scored above the 72 mid-point cutoff. This is a welcoming result for BC interventions, education and research since more males control funding and breast health delivery systems. Also as husbands and family heads, this high male attitude, if replicated in the general population, will go a long way to minimize the fear of divorce, reduce stigma, enhance quick interventions and reduce the male gender negative socio-cultural factor contributing to undue delays in BC orthodox health seeking behaviour observed by [18] and described in the introduction above. This finding supports the objectives of the current study and the call for the involvement of many more males in BC research, education, interventions and advocacy. It must be added though that 3.7% of males have a low attitude (table 3) and there is therefore an urgent need for replication of this study to find the percentage of the general male population for urgent BC BSE education.

Using the 3 levels (Low, Moderate and High) of attitude, the current finding of 1.2%, 61.9% and 36.9% of our SPs having low, moderate and high overall attitude towards BSE (table 4) respectively replicates findings by [31], who realized an overall, 2.4% low, 63.3% moderate and 34.3% high attitude in Cameroonian female undergraduates students. A similar study found a reverse trend of 9% low, 29% neutral (moderate) and 62% positive attitude among 183 female Malaysian Pharmacy Students towards BSE which may be explained by cultural differences since they had nearly 82% Chinese among their SPs [30] Again, a cross tabulation figures in (table 5) confirmed the general perception that females maintained a relatively higher attitude towards BSE. Thus, their percentages of (1.5% versus 1 % low; 73.3% versus 54.2% moderate and 25.2% versus 44.8% high attitude for males and females respectively reflect the trend discussed above. Even though most males perceived BSE as not necessary citing low incidence of breast Cancer among males, they maintained a surprising 98.5% moderate to high BSE attitude compared with 99% for females overall score.

Another significant finding is that there was a gender-based significant difference on their BSE attitude scores in favor of female gender with a p -value of (0.000) at 95% confidence interval (Table 6). Even though there are no studies comparing attitude of both genders, this finding is in line with qualitative research evidence by [6] in Malaysia that suggest that males maintain a lower attitude towards BSE because of lower cancer incidences among the male gender. Specifically, [6] noted that the majority of their male participants “considered that BSE is not important for men because they have a low probability of getting breast cancer”p.243, but their respondents that notwithstanding, they encourage their family members to practise BSE. The fact that majority of their male participants encourage their family members to perform BSE is an attestation to the point being made in this research to include and encourage males participation in BSE KAP research and education as they are becoming important stakeholders.
4.3 Summary of Findings
Using psychometric norm and compared to the USA based test Construction groups’ average, the current SP’s had a lower BSE attitude possibly attributable to mixed gender participation, sociocultural and demographic differences in this study. However, using popular midpoint and the 3 part cut-offs, the current SPs’ BSE attitude scores are comparable to research findings from the sub region and from Ghana. Another significant finding was that Males scored significantly lower BSE attitude compared to the scores of their female compatriots which probably reflects the general attitude found in men around the globe. This notwithstanding, most of the males even though perceived BSE as not necessary and cited low incidence of breast Cancer among the male gender as their reasons for relatively lower or non BSE performance, they maintained a surprisingly moderate to high BSE attitude.

4.4 Limitations
The outcomes of the current research must be carefully interpreted because it is not without limitations. In the first place, the evidence so adduced were obtained from only 336 purposely sampled undergraduate health trainee student participants, which may not be very generalizable to the entire KNUST and Ghanaian population. That notwithstanding, this has provided a basis for a much bigger BSE attitude study in Ghana to involve different health trainees and mixed gender at a time and the general populace as a whole. This will also hopefully encourage the use of psychometric tests in the assessment all KAP areas of BSE and spur much more interdisciplinary collaborations research efforts. This research has made meaningful contribution to the BSE attitude research area by providing useful areas for attitude measurement and assessment and may also encourage the construction of reliable and valid psychometric measures for not only BSE attitude, but also Knowledge and Performance.

5.0 Conclusion and Recommendations
BSE KAP research has previously justifiably focused on female but it is time to involves males as they are fast becoming important stakeholders as male BC incidence increase, as more males take on previously female dominated professions that require them to educate their clients on BC and BSE, as heads of families and possibly majority decision makers of organizations and boards on issues affecting BC BSE research and education, potential for males to remind their significant others of life saving BSE, to mention a few. Also, healthcare professionals and trainees have reseived enough research attention, more effort must be focused on the non-health professional population. More so, we reiterate the call by [19] for the need to adjust the curiculum used for taining not only Nurses but all health trainee students in developing nations around the globe to reflect relevant BC preventive measures. Moreover, from the evidence adduced in the current study, researchers, advocates and activists must involve males at all levels of in BC BSE KAP research, intervention and education for reasons given above. Finally, a larger and an expanded investigation with randomly sampled participants is highly recommended to achieve a better evidenced-based knowledge on the real BSE practice not only in tertiary students, but also in the general population of Ghana as a whole.
Author Contributions: Conceptualization, Christian Amoah, Benjamin Amoah, Frimpong-Manso Addo, Vida Maame Kissiwa Amoah, Nceba Z. Somhlaba and Emma Sethina Adjaottor; Methodology, Christian Amoah, Benjamin Amoah, Frimpong-Manso Addo, Vida Maame Kissiwa Amoah and Nceba Z. Somhlaba; Software, Christian Amoah; Ebenezer Otu Ayeboafu Ansah & Gifty B Amankwah; validation, Christian Amoah; Ebenezer Otu Ayeboafu Ansah; Investigation, Christian Amoah, Benjamin Amoah, Frimpong-Manso Addo, Vida Maame Kissiwa Amoah, Nceba Z. Somhlaba and Emma Sethina Adjaottor; resources, Christian Amoah, Benjamin Amoah, Vida Maame Kissiwa Amoah, Nceba Z. Somhlaba; data curation, Ebenezer Otu Ayeboafu Ansah; Writing – original draft preparation, Christian Amoah; Writing – review and editing, Christian Amoah, Benjamin Amoah, Frimpong-Manso Addo, Vida Maame Kissiwa Amoah, Nceba Z. Somhlaba, Emma Sethina Adjaottor; Supervision, Christian Amoah and Nceba Z. Somhlaba, Project Administration, Benjamin Amoah, Christian Amoah, Vida Maame Kissiwa Amoah, and Emma Sethina Adjaottor, funding acquisition, Christian Amoah, Benjamin Amoah, Vida Maame Kissiwa Amoah. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments:
The authors are very grateful to Professor Yaw Osei, a distinguished Psychiatrist and a Clinician, founder and former Head of Department of Behavioural Sciences, S.M.D, KNUST, and currently a Professor of Garden City University – College, Kenyasi, Kumasi for proof reading this article. We also wish to acknowledge colleague lecturers and researchers Fonjo et al., (2018), Sarfo et al, (2013) and Udoh et al (2020) as well as Mena et al (2013) in respective institutions in Ghana for hard work and their publications that help motivate the current research and follow-up papers yet to materialize.

Author Contributions: Conceptualization, Vida Maame Kissiwa Amoah, Emma Sethina Adjaottor and Benjamin Amoah; Data curation, Ebenezer Otu Ayeboafu Ansah; Formal analysis, Ebenezer Otu Ayeboafu Ansah; Funding acquisition, Vida Maame Kissiwa Amoah, Gifty B Amankwah and Benjamin Amoah; Investigation, Vida Maame Kissiwa Amoah, Emma Sethina Adjaottor and Benjamin Amoah; Methodology, Vida Maame Kissiwa Amoah and Benjamin Amoah; Project administration, Vida Maame Kissiwa Amoah, Emma Sethina Adjaottor and Benjamin Amoah; Resources, Vida Maame Kissiwa Amoah, Gifty B Amankwah and Benjamin Amoah; Software, Ebenezer Otu Ayeboafu Ansah and Gifty B Amankwah; Supervision, Emma Sethina Adjaottor; Validation, Ebenezer Otu Ayeboafu Ansah; Writing – review & editing, Vida Maame Kissiwa Amoah, Ebenezer Otu Ayeboafu Ansah, Emma Sethina Adjaottor, Gifty B Amankwah and Benjamin Amoah.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Committee on Human Research, Publication and Ethics (CHRPE) of K.N.U.S.T. Conditional Approval (ref: CHRPE/ RC/ 007/21 on 4th February, 2021) and Final Approval (ref number CHRPE/AP/066/21 and dated 11th of February, 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.
**Data Availability Statement:** The data presented in this study are available in the supplementary material here.

**Conflicts of Interest:** The authors will like to make a disclosure that they are yet to write up another article they seek to publish using part of the source data reporting different study objectives.

**References**

1. Ali, S. and Coombes, R.C. Endocrine-Responsive Breast Cancer and Strategies for Combating Resistance. Nature Reviews Cancer, 2002; 2, 101-112. [http://dx.doi.org/10.1038/nrc721](http://dx.doi.org/10.1038/nrc721)

2. Kudzawu, E., Aabokey, F., & Ahorlu, C. S. K. A Cross Sectional Study of the Knowledge and Practice of Self-Breast Examination among Market Women at the Makola Shopping Mall, Accra, Ghana. *Advances in Breast Cancer Research*, 2016; 05(03), 111–120. [https://doi.org/10.4236/abcr.2016.53013](https://doi.org/10.4236/abcr.2016.53013).

3. Peepliwal, A.K. and Tandale, P. Breast Cancer in India: Etiology, Diagnosis and Therapy. Research & Reviews: Journal of Medical and Health Sciences, 2013; 2, 31-42.

4. Giordano SH, Cohen DS, Buzdar AU, Perkins G, Hortobagyi GN.. Breast carcinoma in men: a population-based study. Cancer. 2004; Jul 1; 101(1):51-7. doi: 10.1002/cncr.20312. PMID: 15221988.

5. Stang, A., & Thomssen, C.. Decline in breast cancer incidence in the United States: what about male breast cancer?. *Breast cancer research and treatment*, 2008; 112(3), 595–596. [https://doi.org/10.1007/s10549-007-9882-3](https://doi.org/10.1007/s10549-007-9882-3).

6. Al-Naggar RA, Al-Naggar DH. Perceptions and opinions about male breast cancer and male breast self-examination: A qualitative study. Asian Pacific J Cancer Prev. 2012;13(1):243–6.

7. RamBihariLal Shrivastava S, Saurabh Shrivastava P, Ramasamy J. Self Breast Examination: A Tool for Early Diagnosis of Breast Cancer. Am J Public Heal Res. 2013;1(6):135–9.

8. Giordano SH, Buzdar AU, Hortobagyi GN. Breast cancer in men. Ann Intern Med. Oct 15; 2002; 137(8):678-87. doi: 10.7326/0003-4819-137-8-200210150-00013. PMID: 12379069.

9. Ojara EA. Carcinoma of the male breast in Mulago Hospital, Kampala. East Afr Med J. Oct; 1978; 55(10):489-91. PMID: 738189.

10. Bhagwandeen SB. Carcinoma of the male breast in Zambia. East African Medical Journal. Feb; 1972; 49(2):89-93.

11. Sasco AJ, Lowenfels AB, Pasker-de Jong P.. Review article: epidemiology of male breast cancer. A meta-analysis of published case-control studies and discussion of selected Etiological factors. Int J Cancer. Feb 20; 1993; 53(4):538-49. doi: 10.1002/ijc.2910530403. PMID: 8436428.

12. Azaiza A, Cohen M. "Health beliefs and rate of breast cancer screening among Arab women". J Women's Health. 2006; 15(5):520–20.

13. Didarloo, A., Nabilou, B., & Khalkhali, H. R. Psychosocial predictors of breast self-examination behavior among female students: An application of the health belief model using logistic regression. *BMC Public Health*, 2017; 17(1), 1–8. [https://doi.org/10.1186/s12889-017-4880-9](https://doi.org/10.1186/s12889-017-4880-9)

14. Abdul- Lateef, S., & Shabaan, M. Assessment of Female Nursing Students knowledge and practice about Breast Self-Examination in Mosul University. *Mosul Journal of Nursing*, 2019; 5(1), 29–35. [https://doi.org/10.33899/mjn.2019.162123](https://doi.org/10.33899/mjn.2019.162123)

15. Wieland, P. A and Hartman R Maternal and child Nursing Care, breast self- examination; 3rd edition, USA; 2011; 103-106.
16. Black, E., & Richmond, R. Improving early detection of breast cancer in sub-Saharan Africa: Why mammography may not be the way forward. *Globalization and Health*, 2019; 15(1), 1–11. [https://doi.org/10.1186/s12992-018-0446-6](https://doi.org/10.1186/s12992-018-0446-6).

17. Mena, M., Wiafe-Addai, B., Sauvaget, C., Ali, I. A., Liasis, S. A., Dabis, F., Anderson, B. O., Malvy, D., & Sasco, A. J. Evaluation of the impact of a breast cancer awareness program in rural Ghana: A cross-sectional survey. *International Journal of Cancer*, 2014; 134(4), 913–924. [https://doi.org/10.1002/ijc.28412](https://doi.org/10.1002/ijc.28412).

18. Opoku S.Y., Benwell & Yarney J. Knowledge, attitudes, beliefs, behaviour and breast cancer screening practices in Ghana, West Africa. *Pan African Medical Journal*, 2012; 11, 28. [https://doi.org/10.11604/pamj.2012.11.28.548](https://doi.org/10.11604/pamj.2012.11.28.548).

19. Misauo M.; Anosike I.; Ojo E.; Ismaila B. Knowledge and Attitude to Breast Self-Examination Among a Cohort of Medical Students in Nigeria. J Med Trop. 2011;13(1).

20. Sheikh Alaudeen, S. R. B., & Ganesan, K. Knowledge, attitude, and practice of malaysian medical students towards breast cancer: A cross-sectional study. *Internal Medicine and Care*, 2019; 3(1). [https://doi.org/10.15761/imc.1000125](https://doi.org/10.15761/imc.1000125).

21. Passer, M.W & Smith, P.E Psychology the Science of Mind and Behavior, New York, McGraw-Hill, 2011; 5th International Ed.

22. Crano, W. D., & Prislin, R. Attitudes and persuasion. Annual Review of Psychology, 2006; 57, 345–374.

23. Lahey, B.B Psychology an Introduction. New York, McGraw-Hill, 2012; 11th International Ed.

24. Udoh, R. H., Tahiru, M., Ansu-Mensah, M., Bawontuo, V., Danquah, F. I., & Kuupiel, D. Women’s knowledge, attitude, and practice of breast self-examination in sub-Saharan Africa: A scoping review. *Archives of Public Health*, 2020; 78(1), 1–10. [https://doi.org/10.1186/s13690-020-00452-9](https://doi.org/10.1186/s13690-020-00452-9).

25. Doshi, D., Reddy, B. S., Kulkarni, S., & Karunakar, P. Breast self-examination: Knowledge, attitude, and practice among female dental students in Hyderabad city, India. *Indian Journal of Palliative Care*, 2012; 18(1), 68–73. [https://doi.org/10.4103/0973-1075.97476](https://doi.org/10.4103/0973-1075.97476).

26. Fondjo, L. A., Owusu-Afriyie, O., Sakyi, S. A., Wiafe, A. A., Amankwaa, B., Acheampong, E., Ephraim, R. K. D., & Owiredu, W. K. B. A. Comparative Assessment of Knowledge, Attitudes, and Practice of Breast Self-Examination among Female Secondary and Tertiary School Students in Ghana. *International Journal of Breast Cancer*, 2018; 2018. [https://doi.org/10.1155/2018/7502047](https://doi.org/10.1155/2018/7502047).

27. Ifediora, C. O., & Azuike, E. C. Tackling breast cancer in developing countries: insights from the knowledge, attitudes and practices on breast cancer and its prevention among Nigerian teenagers in secondary schools. *Journal of Preventive Medicine and Hygiene*, 2018; 59(4), E282–E300. [https://doi.org/10.15167/2421-4248/jpmh2018.59.4.964](https://doi.org/10.15167/2421-4248/jpmh2018.59.4.964).

28. Kalliguddi, S. Sharma, S & Gore, C. A. Knowledge, attitude, and practice of breast self-examination amongst female IT professionals in Silicon Valley of India. *Journal of Family Medicine and Primary Care*, 2019; 6(2), 568–572. [https://doi.org/10.4103/jfmpc.jfmpc](https://doi.org/10.4103/jfmpc.jfmpc).

29. Sarfo, L. A., Awuah-Feasah, D., Acheampong, E., & Asamoah, F. Knowledge, attitude, and practice of self-breast examination among female university students at Presbyterian University College, Ghana. *American Journal of Research Communication*, 2013; 1(11), 395–404.

30. Ali, A. N., Yuan, F. J., Ying, C. H., & Ahmed, N. Z. Awareness, Knowledge and Attitude towards
Breast Self-examination: A Cross-sectional Study among Female Pharmacy Students in Malaysia. *International Research Journal of Oncology*, 2019; 2(4), 1–10.

31. Nde, F. P., Assob, J. C. N., Kwenti, T. E., Njunda, A. L., & Tainenbe, T. R. G. Knowledge, attitude and practice of breast self-examination among female undergraduate students in the University of Buea Women's Health. *BMC Research Notes*, 2015b; 8(1), 4–9. [https://doi.org/10.1186/s13104-015-1004-4](https://doi.org/10.1186/s13104-015-1004-4).

32. Sasco AJ, Lowenfels AB, Pasker-de Jong P. Review article: epidemiology of male breast cancer. A meta-analysis of published case-control studies and discussion of selected aetiological factors. *Int J Cancer*. Feb 20; 1993; 53(4):538-49. doi: 10.1002/ijc.2910530403. PMID: 8436428.

33. Paulsson, A. K., Sherertz, T., & Park, C. C. Breast cancer. *Handbook of Evidence-Based Radiation Oncology*, 2018; 343–399. [https://doi.org/10.1007/978-3-319-62642-0_17](https://doi.org/10.1007/978-3-319-62642-0_17).

34. Florence, A. O., Felicia, A. E., Dorcas, A. A., & Ade-Aworetan, F. A. An Assessment of the Knowledge and Practice of Self Breast Examination (BSE) amongst University Students. *Health*, 2016; 08(05), 409–415. [https://doi.org/10.4236/health.2016.85043](https://doi.org/10.4236/health.2016.85043).

35. Karayurt O, Ozmen D, Cetinkaya AC. Awareness of breast cancer risk factors and practice of breast self-examination among high school students in Turkey. *BMC Public Health*. Oct 17; 2008; 8:359. doi: 10.1186/1471-2458-8-359. PMID: 18928520; PMCID: PMC2587470.

36. Corcoran, K., and Fisher, J. Measure for Clinical Practice A Sourcebook, New York, The Free Press, 1987;. A Division of Macmillan Inc.

37. Race, K.H & Silverberg, J. A. Toward a Reliable Measure of Breast Self-Examination Attitudes and Performance Barriers. *Evaluation Review*, 1996; 20 (5), 541–551.

38. Champion, V. L. Relationship of age to factors influencing breast self-examination practices. *Health Care for Women International*, 1992; 13:1-9.

39. Salazar, M., and W. Carter. Evaluation of breast self-examination beliefs using a decision model. *Western Journal of Nursing Research*, 1993; 15:403-21.

40. Ibnawadh, S.K. Alawad, M.A., Alharbi, S.S. Alduawihi, N.A. Alkowiter, F.S. Alsalhy, A.E. Alzahrani, A.A. Alenizy, L. Knowledge, Attitude and Practice of Breast Self-examination among Females in Medical and Non-medical Colleges in Qassim University. *Journal of Health Specialties*, 2017; 5(4), 219-24. [https://doi.org/10.4103/jhs.JHS](https://doi.org/10.4103/jhs.JHS).