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## Breast Cancer Knowledge among Students at a State Comprehensive University

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## Breast Cancer Knowledge among Students at a State Comprehensive University

### Cover Page Footnote

This research was made possible by a Research Assistantship Grant awarded through the USC Upstate Office of Sponsored Awards and Research Support (SARS). In addition, the authors would also like to offer special thanks to Dr. Warren "Wren" Bareiss for providing vital comments that helped to strengthen this manuscript.

## **Breast Cancer Knowledge among Students at a State Comprehensive University**

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Breast cancer is one of the most common cancers affecting women worldwide and the second leading cause of cancer deaths among women in the United States (American Cancer Society, 2022a). Over 287,000 new cases of breast cancer occur in the United States each year, claiming the lives of more than 43,000 women annually. However, this disease does not affect all woman in the same way. For instance, black women have higher breast cancer mortality rates than white women, despite having relatively lower breast cancer incidence (American Cancer Society, 2019; DeSantis et al., 2019; Kroenke et al., 2014). Reasons for the disparities in breast cancer mortality include cultural barriers, socioeconomic status, access to health care, tumor biology, lifestyle factors, diet, and knowledge of breast cancer and its risks, among other factors (Cunningham et al., 2013; Gerend & Pai, 2008; Komen, 2016). These disparities are widening throughout much of the United States (American Cancer Society, 2020b).

**Breast Cancer in Men.** On the other hand, breast cancer in men is considered rare and is therefore understudied (Giordano, 2018; Thomas, 2010). In fact, most of the studies that have focused on breast cancer knowledge have focused mainly on women. This is, in part, due to the gendered construction of breast cancer as a woman's disease (Quincey et al., 2016; Skop et al., 2018). In the United States, an estimated 2,700 new cases of breast cancer in men are diagnosed each year, resulting in more than 500 deaths annually (American Cancer Society, 2022b). While breast cancer in men accounts for only 1% of all breast cancers (Faria et al., 2021), the number of breast cancers in men has been increasing gradually (Giordano, 2018; Woods et al., 2020) even at a time when breast cancer incidence rates among women have been declining in the United States (Thomas, 2018). Furthermore, breast cancer among men is diagnosed at a much later stage than among women, leading to a worse overall prognosis and survival rate among male breast cancer patients, compared to their female counterparts (Halbach et al., 2020; Wang et al., 2019). In addition, breast cancer has been diagnosed in males as young as 5 years of age (Thomas, 2018), highlighting the risks for breast cancer in young men. As with women, black men are at a relatively higher risk for breast cancer compared to non-Hispanic white men (Giordano, 2018; Hassett et al., 2020). Even though breast cancer may not be as common in men as it is in women, well-

informed men can play a critical role in increasing awareness and stemming the tide of breast cancer in the general population (Sambaje & Mafuvadze, 2012).

For primary prevention of breast cancer, knowledge of the risk factors and risk reduction strategies are essential. Lack of knowledge about breast cancer is considered a key factor in breast cancer mortality for both men and women (Conway-Phillips, 2009; Faria et al., 2021). Lack of adequate breast cancer knowledge has also been associated with failure to screen, whether through mammogram, clinical breast examination, or breast self-examination (Faria et al., 2021). In addition, lack of adequate breast cancer knowledge has also been associated with delay in seeking treatment, which leads to poor breast cancer outcomes. Breast cancer that is diagnosed at an early stage when it is not too large and has not metastasized is more likely to be treated successfully (Rahman et al., 2019). Conversely, people who delay seeking medical attention for breast cancer are at risk of developing a more advanced stage cancer, which is often untreatable (Akinyemiju et al., 2013). Even though studies have consistently shown that breast cancer knowledge is key to early detection, there is a general lack of knowledge about breast cancer risk among women, in general, but also more specifically among men (Hughes, 2013). Previous studies have focused on women above 40 years of age, in part, due to the general notion that breast cancer risks tend to increase after age 40 (Komen, 2015). This focus on older women invariably means that younger people, including both males and females, remain underrepresented in breast cancer research (Elimimian et al., 2021).

**Breast Cancer in Younger People.** Breast cancer among younger people tends to be diagnosed in its later stages, resulting in a more aggressive type. In addition, young women have higher risk of metastatic recurrence and a higher breast cancer mortality rate, owing to delayed diagnosis (American Cancer Society, 2020a). Since, according to both CDC and American Cancer Society guidelines and health insurance practices, people under the age of 40 are not eligible for regular mammogram or clinical breast exam (CDC, 2022; Durham, et al., 2022), breast cancer awareness and knowledge among this age group becomes especially critical for facilitating early warning signs. Knowledge of breast cancer signs, symptoms, and risk factors is central to seeking medical attention and to the improvement of breast cancer intervention (Samah et al., 2016). However, there is a paucity of information in the current literature about breast cancer knowledge among younger people under the age of 30 in the United States, especially among college students who form an important segment of this group age group.

College students are at a critical stage in their development since most health behaviors are developed at this stage in life (Bhandari et al., 2016). Considering that breast cancer risks increase with increasing age (Bray et al., 2004), an understanding of breast cancer knowledge and risk among younger populations is key to the formulation of necessary intervention measures to mitigate their breast

cancer risks as they grow older. Students who have breast self-awareness are more likely to take appropriate steps for monitoring and seeking interventions that are necessary to improve long-term breast cancer outcomes. If adopted at an early age, behaviors such as breast self-examination are likely to continue into adulthood and throughout life (Ludwick & Gaczowski, 2001). When started early, breast self-awareness can become an important gateway to health promotion behaviors which set the stage for adherence to clinical breast examination and mammography screening later in life (Karayurt et al., 2008). On the other hand, a lack of knowledge, not only about the risks for breast cancer, but, more importantly, about how to detect the disease at an early stage, invariably leads to misconceptions regarding its curability and the effectiveness of early detection among the students (Mafuvadze et al. 2012).

Studies that have assessed breast cancer knowledge and awareness among college students have mainly been done outside of the United States in countries such as Angola (Sambanje & Mafuvadze, 2012), Ethiopia (Ameer et al., 2014), Malaysia (Samah et al., 2016), Jordan (Alsarairah & Darawad, 2019), Nigeria (Nde et al., 2016), Pakistan (Noreen et al., 2015), Saudi Arabia (Alomair et al., 2020), and United Arab Emirates (Rahman et al., 2019), among others. Despite the United States having one of the highest breast cancer rates in the world, little is known about breast cancer knowledge and awareness among college students in the U.S. The current study seeks to fill this gap by investigating the knowledge and awareness of breast cancer among undergraduate students at a State Comprehensive University (SCU) in the Southeastern United States.

**State Comprehensive Universities.** SCUs (also known by other names such as Regional Comprehensive Universities, Public Regional Universities, and Public Comprehensive Universities, among others), are four-year institutions with a wide range of undergraduate programs funded by a state (Henderson, 2009). One major appeal of SCUs is that they have lowered barriers to admissions and therefore enroll the largest proportions of marginalized, underrepresented, and economically disadvantaged students – including women, military veterans, adult learners, racial minorities, immigrants, first-generation, and low-income students (Fryar, 2015; McClure, 2018; Orphan & Broom, 2021; Zack, 2018). In addition, SCUs demonstrate a close relationship with the region and its economy, create a teaching and student-centered environment, and are more affordable (AASCU, 2002; Henderson, 2007; Orphan, 2018; Sherman, 2021).

Currently, there are over 400 SCUs in the United States, educating around 70% of undergraduates at four-year public institutions - making SCUs very significant in educating undergraduate students in the United States (American Enterprise Institute, 2019; Fryar, 2015; McClure, 2018; Schneider & Deane, 2015). However, SCUs receive little attention from researchers, policy makers, and the public (Henderson, 2009). This is, in part, due to the fact that higher education

experts and researchers tend to pay more attention to elite liberal arts colleges and flagship universities (Zack, 2018). This dearth of information on SCUs is what motivated E. Aldan Dunham's 1969 book on *Colleges of the Forgotten Americans* to bring attention to a sector of higher education in the United States that had largely been overlooked. According to Dunham (1969), these institutions were overlooked because of the types of students they typically served – students from working-class families who sought an accessible, affordable pathway to middle-class stability (McClure et al., 2020). Even though more research has been conducted on SCUs within the past 10 years or so, including the creation of *Teacher Scholar: The Journal of the State Comprehensive University*, and a special issue in the journal, *New Directions for Higher Education*, a lot is still unknown about SCUs in general and about the students who are enrolled in the institutions, in particular.

Much of the recent literature on SCUs has focused on what can be described as the “structural” aspects of these institutions. These include the origin and evolution of SCUs (McClure, 2018), their defining criteria, values, or mission (Orphan, 2020; Schneider & Deane, 2015; Warshaw et al., 2020), graduation, enrollment, or retention rates (McElroy & McElroy, 2017; McClure & Fryar, 2020), faculty experience or welfare (Henderson, 2011; Orphan & Broom, 2021), institutional challenges and how the SCUs are coping (Zeig, 2016), academic programs or curriculum (Kaplin, 2013), student services or support (Kastle et al., 2021), and SCUs which are part of historically black colleges and universities (Commodore & Njoku, 2020).

Few studies have actually focused on SCU students themselves. These studies have focused on SCU students as African American bidialectal students (Chambers, 2014), first-generation college students (King et al., 2017), adult learners or non-traditional students (Zack, 2018), international students (Olt & Tao, 2020; Yakaboski et al., 2017), advising experiences of graduate and undergraduate learners (Powers & Wartalski, 2021), and their career preparedness (Woodard & McDonald, 2021). However, there has been little to no attention on the health-related knowledge of the students in these institutions. In light of the important role that SCUs play in educating post secondary students in the United States, the dearth of information on these students' health knowledge and beliefs creates a vacuum of information that makes these institutions a fertile ground for studying breast cancer knowledge among university students.

## Methodology

**Setting.** This study was conducted among undergraduate students at a SCU in the Southeastern United States. Like most SCUs, this was a four-year public educational institution serving primarily undergraduates who live within the region, often commute, and pursue a mix of arts, sciences, and professional degrees. The university has approximately 6000 students, spread across six different colleges.

The university has a diverse student body. Around 40% of the students are black, while around 50% are white. The remainder are divided between Hispanic (around 5%), Asian (around 2%) and others (around 3%). A majority of the students are female (around 68%) while around 32% are male.

**Study Design and Sample.** The study sample consisted of 265 students selected through a convenience sample of respondents representing each of the six colleges at the University. The students were drawn from 27 different disciplines, both biological/medical-related and non-biological/non-medical related disciplines. Emails requesting permission to recruit study participants were sent to instructors representing each college and students who voluntarily agreed to take part in the study were recruited. Participants were assured anonymity and informed of their right to voluntary participation and withdrawal from the study at any stage. Informed written consent was obtained from each student who agreed to participate. Participants were given a self-administered questionnaire in a classroom setting and asked to complete the questionnaire anonymously. Necessary IRB approval was sought and received prior to selection of study participants and administering of the questionnaire.

**Instruments.** This study used a modified version of the Breast Cancer Perceptions and Knowledge Survey previously used by Sambanje and Mafuvadze (2012). We dropped the questions that did not apply to our context and replaced those with relevant questions that had been used in previous studies on breast cancer awareness. The instrument was first pilot tested on a convenience sample of 20 students. Results of the pilot test were used to revise the questionnaire prior to being administered to the target population.

The questionnaire consisted of three sections. The first section consisted of questions relating to respondents' sociodemographic characteristics such as gender, age, annual household income, race, marital status, academic major, and academic year. Our review of existing literature suggested that these specific factors would influence participants' knowledge of breast cancer and their understanding of its risks (Table 1). The second section included 13 questions/statements which assessed basic knowledge and perceptions about breast cancer (Table 2). The third and final section consisted of 14 questions/statements which assessed basic understanding of breast cancer risk factors (Table 3). With regards to the questions in the last two sections of the questionnaire, participants were asked to indicate which statements were true or false. Each correct answer was assigned a score of 1, while incorrect or "I don't know" answers were assigned a score of 0. The answers were scored based on established facts about the disease as stated by the American Cancer Society, Centers for Disease Control and Prevention, and the Susan G. Komen Organization (Appendices 1 and 2). To assess overall breast cancer knowledge, we combined the 13 scores from the second part of the questionnaire with the 14 scores from the third part of the questionnaire to create a

single variable with a maximum score of 27. Using this combined score of 27 items, we further created three categories of “poor overall knowledge” (scores of 0-8), “satisfactory overall knowledge” (scores of 9-18), and “good overall knowledge” (scores of 19-27).

**Statistical Analysis.** Statistical analysis was done using the Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics with cross-tabulations were performed and frequencies generated for correct and incorrect answers for each measurement of breast cancer knowledge and risk factors. Association between the variables was analyzed using multiple logistic regression with the significance level set at  $p < 0.05$  for all variables used in the analysis.

## Results

**Socio-demographic Characteristics.** As presented in Table 1, out of the 265 students who were included in the study, a majority were women (63%), under 20 years of age (52%), single (92%), white (55%), in their freshman or senior year (28% each), and from families with a household income of \$25,000-\$49,999 (34%).

**Perceptions and Knowledge of Breast Cancer.** Regarding perceptions and knowledge of breast cancer, our results show that there was a good basic knowledge about breast cancer among study participants (see Table 2). A majority of the students gave correct answers to 11 out of 13 (or 85%) of the statements used to assess basic knowledge and perceptions about breast cancer. The only statements where a majority of students did not exhibit correct basic knowledge were statements relating to whether black women are more likely to develop breast cancer than white women (where only 37% of the students gave the correct answer) and whether the students personally knew someone who had died from breast cancer (only 42% of the students answered in the affirmative).

**Understanding of Breast Cancer Risk Factors.** While a majority of our study participants correctly answered questions about basic knowledge and perceptions about breast cancer, there was, at the same time, a widespread lack of knowledge about the risks for breast cancer, as shown in Table 3. Out of the 14 statements used to assess breast cancer risks, a majority of our participants demonstrated a correct understanding in only 5 (36%) of the statements. For instance, a majority of the students incorrectly assumed that physical height (i.e. being tall), wearing tight bras, or a hard blow to the breast could lead to breast cancer. On the other hand, a majority of students were generally not aware of breast cancer risks or predispositions associated with obesity, breast implants, race/ethnicity, or physical inactivity. The best-known risk factor was a family history of breast cancer, where 90% of our respondents provided the correct answer (see Appendices 1 and 2 for the correct answers to each of the statements used to assess basic breast cancer knowledge and risks).



Table 1. *Socio-demographic Characteristics of Participants*

Characteristics		N=265
		%
Gender	Male	37
	Female	63
Age (Years)	<20	52
	21-25	40
	26-30	4
	Over 30	4
Marital Status	Single	92
	Married	7
	Divorced	1
Race	Black	34
	White	55
	Asian	3
	Hispanic	4
	Other	4
Class	Freshman	28
	Sophomore	21
	Junior	22
	Senior	28
Family Income	Less than \$25,000	23
	\$25,000-\$49,999	34
	\$50,000-\$99,000	26
	\$100,000 or more	17

Table 2. *Perceptions and Knowledge of Breast Cancer*

Question	Study Participants (n=265) %		
	Correct	Incorrect	Don't Know
Breast cancer can affect men	89	5	6
Women younger than 30 years of age cannot get breast cancer	92	4	4
*I personally know someone who has been diagnosed with breast cancer	76	11	13
Even if found early, the chance of surviving breast cancer is low	71	11	18
Black women are more likely than white women to develop breast cancer	37	17	46
Only women with large breasts can get breast cancer	95	1	4
A lump always means having breast cancer	92	2	6
Breast Cancer is the second most common cancer among women in the U.S.	69	7	24
A family history with breast cancer increases risk	83	6	11
The risk of developing breast cancer increases with age	57	15	28
About 1 in 8 women will develop breast cancer in the course of their lifetime	55	8	37
Chemotherapy is the only form of treatment for breast cancer	66	11	23
*I personally know someone who has died from breast cancer	42	43	15
<b>Note:</b> *See explanatory note on these two statements in Appendix 1			

Table 3. *Understanding Breast Cancer Risk Factors*

Risk Factor	Study Participants (n=265) %		
	Correct	Incorrect	Don't Know
A stressful life	57	20	23
A hard blow to the breast	29	41	30
Having children before age 30	50	10	40
Being overweight	47	22	31
A family history of breast cancer	90	5	5
Breast implants	28	38	34
Wearing tight bras	31	30	39
Breast feeding	57	11	32
Radiation to the chest or face before age 30	69	9	22
Race/ethnicity	43	30	27
Eating grilled food; food containing chemicals	40	25	35
Height (being too tall)	8	62	30
Smoking	67	14	19
Physical activity	32	43	25

**Overall Knowledge.** Our study found a low overall knowledge of breast cancer among the students. As shown in Table 4, only 24% of the respondents had “good” overall breast cancer knowledge. The majority (76%) had poor or only satisfactory overall knowledge about breast cancer.

Table 4. *Distribution of Students’ Overall Breast Cancer Knowledge*

Level of Knowledge	Scores	Study Participants (n=265) %
Poor	1 – 9	7
Satisfactory	10 – 18	69
Good	19 – 27	24

To better understand the factors associated with overall breast cancer knowledge, we ran a multiple logistic regression analysis using the forward method. Of the predictors tested (see Table 5), the two factors that had a statistically significant effect on overall breast cancer knowledge were gender (OR = 2.563,  $p = 0.017$ ) and race (OR = 0.450,  $p = 0.044$ ). Female students were more than twice as likely to have good overall breast cancer knowledge compared to males. With regards to race, overall breast cancer knowledge decreased by 55% among racial minority groups, compared to whites. However, no significant relationship was seen between academic major ( $p = 0.597$ ), marital status ( $p = 0.196$ ), age ( $p = 0.358$ ), family household income ( $p = 0.119$ ), and overall breast cancer knowledge.

Table 5. *Logistic Regression Analysis of Predictors of Overall Breast Cancer Knowledge*

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
							Lower	Upper
Gender	.941	.396	5.664	1	.017	2.563	1.181	5.566
Academic Major	-.279	.504	.307	1	.579	.756	.282	2.031
Marital Status	1.509	1.166	1.674	1	.196	4.520	.460	44.430
Age	.703	.764	.846	1	.358	2.019	.452	9.026
Family Household Income	-.653	.418	2.435	1	.119	.520	.229	1.182
Race	-.798	.396	4.054	1	.044	.450	.207	.979
Constant*	1.569	.958	2.679	1	.102	4.800		

**Notes:**

\*Predicted probability is high breast cancer knowledge.

Reference categories for predictors: Gender=Males; Academic Major=Bio/Med Students; Marital Status=Single; Age=Age 25 or younger; Household Income=Under \$50k; Race=White.

*B* – This is the unstandardized regression weight.

*S.E.* – This is the standard error

*Wald* – This is the test statistic for the individual predictor variables.

*Df* – This is the degree of freedom.

*Sig* – This is the significance level.

*Exp(B)* – This are the odds ratios for the predictors

## Discussion

This study was designed to assess breast cancer knowledge and awareness among undergraduate university students at a state comprehensive university in the Southeastern United States. As previous studies have argued, lack of adequate breast cancer knowledge negatively affects whether one will seek breast cancer care, the timing of the care, the development of the disease, and the prognosis (Caplan, 2014; Peek et al., 2008). In addition, lack of awareness of breast cancer also results in failure to seek medical care or to undergo treatment (Kaiser et al., 2013), thus resulting in a more aggressive cancer (Caplan, 2014). Our results show a widespread lack of adequate knowledge about breast cancer among undergraduate college students. In this sense, our results are consistent with studies that have investigated breast cancer knowledge among college students in other countries (Ameer et al., 2014; Samah et al., 2016; Alsarairh & Darawad, 2019; Alomair et al., 2020; Nde et al., 2016; Noreen et al., 2015; Sambanje & Mafuvadze, 2012). While other studies had found that age, level of educational, household income, and family history of breast cancer were significantly associated with the knowledge level (Bhandari et al., 2016), the only two factors that had a significant effect on breast cancer knowledge in our study were respondents' gender and race.

Regarding gender, our study found that being female was associated with increased breast cancer knowledge. It is not surprising that female students have a better overall breast cancer knowledge than male students. Although male breast cancer is rare, as we have already seen, males do develop breast cancer (Chavez-Mcgregor et al., 2013; Ottini, 2014; Weiss et al., 2005). In many ways, the risks for breast cancer among men mirror some of the risk factors in women, though there are some differences as well. Some of these risks include aging, family history of breast cancer, radiation exposure, obesity, race, estrogen treatment, and presence of a rare genetic condition known as Klinefelter Syndrome, among other factors (Khan et al., 2015). Lack of awareness of the risk of breast cancer in men contributes to late diagnosis and poor prognosis (Wang et al., 2019). This highlights the need to increase breast cancer awareness among male students. Such awareness could include information on how to identify symptoms, perform breast self-examination, and seek early health intervention (Al-Haddah, 2010). In addition to using this knowledge for their own breast health, breast-cancer literate men can also play a critical role in early detection in their female partners and to help reduce the barrier to appropriate breast health intervention for those partners.

Regarding race, our study found that white undergraduate students demonstrated better overall breast cancer knowledge than racial minority students. For instance, our study found that 54% of the white students had "good" overall breast cancer knowledge, compared to only 40% of black students. In addition, the odds of having good breast cancer knowledge decreased by 55% among non-white students, compared to their white counterparts. In this sense, our finding is

consistent with studies in the general population that have found that African Americans suffer from a deficit in knowledge related to breast cancer (Alpeter, 2005; Freedman et al., 2016; Manning et al., 2013). Since, as discussed earlier, black women have higher breast cancer mortality rates than their white counterparts, the observed black-white disparity in breast cancer knowledge among college students should be of concern. The disparities in breast cancer knowledge can only exacerbate existing racial disparities in breast cancer mortality, especially considering the critical role that adequate breast cancer knowledge plays in early detection, diagnosis, and intervention (Noreen et al., 2015). Since the family is considered as the primary unit of health socialization, without adequate knowledge about breast cancer, college students who may themselves be future parents will not be in a position to disseminate that knowledge to their offspring. This will only help to perpetuate the cycle of breast cancer illiteracy and the concomitant racial disparities.

Some research on health socialization has found important racial and ethnic differences in family discourse regarding certain health experiences. For instance, in a qualitative study to understand several racial and ethnic group members' experiences as breast cancer survivors, Ashing-Giwa and her team (2004) found that there was a code of silence about cancer among certain racial and ethnic minority families. This sentiment was best captured in a statement made by an African American respondent in the study who pointed out that historically, when diagnosed with cancer, African Americans did not openly talk about the disease. This was due to the cultural belief that in African American families it was considered "a disgrace to have such a disease as cancer" (p. 421). Other respondents attributed this "code of silence" to "lack of knowledge about cancer." It is easy to see how the culture of silence about breast cancer that Ashing-Giwa and company found among racial minority families could affect black students' overall knowledge about breast cancer. The general lack of breast cancer awareness among older African American women, coupled with cultural beliefs that inhibit family discourse about breast cancer, highlight the need for concerted efforts in developing appropriate health educational programs to increase breast cancer awareness among younger minority women.

Given the number and types of students that attend SCUs, examining ways to create or increase awareness about breast cancer, in addition to other public health concerns among the students, is essential. Given that most SCUs are experiencing financial strain (Street, 2022), a possible inexpensive strategy could be to integrate health literacy within the general education curriculum. Since all students at SCUs are required to take general education courses, this could be a very effective, but relatively inexpensive, pathway for introducing health literacy across the curriculum. A variant of this could be a required freshman seminar, similar to a University 101 course, covering selected health literacy themes such as breast

cancer. Alternatively (or in conjunction with the previous recommendations), since many SCUs are small and therefore do not have the luxury of hosting a teaching hospital where health literacy can be taught, like in flagship universities, breast cancer awareness can be provided through the student affairs offices in such SCUs.

### **Conclusion**

The goal of the current study was to investigate the knowledge and awareness of breast cancer among female and male undergraduate students attending a SCU in the southeastern United States. Our results show a widespread lack of overall breast cancer knowledge and associated risk factors among the students. However, this general lack of knowledge is more pronounced among males than females, and among non-white than white students. This underscores the need for effective breast cancer awareness and prevention programs that reach all students, in general, but that are also targeted towards specific at-risk groups identified in this study. In particular, given the observed racial disparity in breast cancer knowledge, it is evident that existing awareness campaigns are not reaching all racial and ethnic groups in the same way. This suggests the need to specifically focus such campaigns on college students, and especially racial minority groups such as African Americans, using means and measures that are more culturally appropriate, accessible, and effective. Our findings also suggest that breast cancer awareness programs should be made more expansive (i.e., integrated in the general education curriculum) and should not simply focus on females but should also target males, since well-informed males can play a significant role in stemming the tide of breast cancer as potential patients, future educators, and caregivers, among others.

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Appendix 1. *Answers to Statements Assessing Basic Perceptions and Knowledge of Breast Cancer*

<b>Statement</b>	<b>+Correct /Desired Answer</b>
Breast cancer can affect men	True
Women younger than 30 years of age cannot get breast cancer	False
I know personally someone who has been diagnosed with breast cancer	True*
Even if found early, the chance of surviving breast cancer is low	False
Black women are more likely than white women to develop breast cancer	False
Only women with large breasts can get breast cancer	False
A lump always means having breast cancer	False
Breast Cancer is the second most common cancer among women in the U.S.	True
A family history with breast cancer increases risk	True
The risk of developing breast cancer increases with age	True
About 1 in 8 women will develop breast cancer in the course of their lifetime	True
Chemotherapy is the only form of treatment for breast cancer	False
I personally know someone who has died from breast cancer	True*
<p><b>Notes:</b>            *While there is no right or wrong answer to these two statements, according to the literature, and as explained in the text, a respondent who answers these two questions in the affirmative, indicating personal knowledge of someone who has either been diagnosed with, or died from, breast cancer is considered to have more awareness of breast cancer than a respondent who does not have such personal knowledge (taken together with responses to the other questions).</p> <p>+See the methodology section for an explanation of how we arrived at the correct answers</p>	

Appendix 2. *Answers to Statements Understanding of Breast Cancer Risk Factors*

<b>Statement</b>	<b>+Correct/ Desired Answer</b>
A stressful life	False
A hard blow to the breast	False
Having children before age 30	False
Being overweight	True
A family history of breast cancer	True
Breast implants	False
Wearing tight bras	False
Breast feeding	False
Radiation to the chest or face before age 30	True
Race/ethnicity	True
Eating grilled food; food containing chemicals	True
Height (being too tall)	False
Smoking	True
Physical activity	True
<b>NOTE:</b> +See the methodology section for an explanation of how we arrived at the correct answers	