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Abstract

A university-public health collaborative was formed to more fully understand cancer risk among rural women in Georgia. *Objectives:* This study sought to gain an understanding of racial differences with regard to behavioral risk, perception of breast cancer risk, and perception of barriers to screening. *Design:* Differences in subjects' risk and risk perception were assessed by creating, piloting, and administering a written survey at local health departments. *Sample:* A purposive sample of females enrolled in breast and cervical cancer screening programs in four rural counties in southeast Georgia (n = 147) were surveyed. Subjects were randomly invited to participate. Incentives were provided to enhance participation. *Results:* White females were significantly more likely than were black females to perceive pollution (*OR*: 4.63; p = 0.038), smoking (*OR*: 2.39; p = 0.018), age (*OR*: 3.01; p = 0.013), and hormone replacement therapy (*OR*: 3.17; p = 0.005) as factors influencing their breast cancer risk, and to perceive cost as a barrier to screening (*OR*: 2.89; p = 0.032). From a risk perspective, black females were more likely than white females to have had five-or-more pregnancies (p = 0.005), and to have given birth before age fifteen (p = 0.011). *Conclusions:* This study provided important baseline data about breast cancer risk necessary in developing effective health promotion programs.

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Racial Differences in Perception of Breast Cancer Risk in Rural Southeast Georgia

Excluding skin cancer, breast cancer is the most commonly diagnosed malignancy among women in the United States (American Cancer Society [ACS], 2005). Breast cancer is the second most deadly form of cancer among women, accounting for approximately fifteen percent of all cancer deaths (Landis, Murray, Bolden, et al., 2000), and has a significant fiscal impact on the nation, with treatment cost estimates in the U.S approximating six billion dollars annually (ACS, 2005). All women are at-risk, and many factors are thought to contribute to their increased likelihood of developing breast cancer. Among the risks that have been linked to increased breast cancer morbidity and mortality are: socioeconomic and cultural factors (Casey, Thiede Call, & Klingner, 2001; Friedman, Webb, Weinberg, et al., 1985; Hughes, Lerman, & Lustbader, 1996; Meade & Calvo, 2001), biologic factors (ACS, 2005; Butler, Potischman, Newman, et al., 2000; Lynch & Lynch, 2002; Gail, Brinton, Byer, et al., 1989; McPherson, Steel, & Dixon, 2000), breast cancer knowledge and behavior (Oliviera & Christos, 1997; Hoffman-Goetz, Apter, Demark-Wahnefried, et al., 1998), and race/ethnicity (Jemal, Murray, Samuels, et al., 2003).

In considering race, the data suggest that white women have higher incidence rates of breast cancer than black women, however, mortality rates are disproportionately higher among black women (ACS, 2005; Parker, Davis, Wingo, et al., 1998; Chevarley & White, 1997). In addition, the five-year cancer survival rate is lower among black females as compared to white females (O'Malley, Earp, Hawley, et al., 2001; Blumenthal, 2001). This disparity may be related, in part, to being diagnosed at a much later stage (Eley, Hill, Chen, et al., 1994; McCarty, Burns, Coughlin, et al., 1998; Douglass, Bartolucci, Waterbor, et al., 1995; Hunter, 2000; Makue, Breen, & Fried, 1999). Racial differences in mortality from breast cancer might be attributable to biologically different forms of the disease, as well as disparities in screening behaviors by race. According to several studies, non-white women, in particular black women, are more likely to underutilize available screening services (Douglass et al., 1995; Gornick, Eggers, Reilly, et al., 1996; Foxall, Barron, Houfek, et al., 2001; Calle, Flanders, Thun, et al., 1993; Facione, 1999), resulting in poorer health outcomes. Many factors influence the decision to utilize breast cancer screening services, including one's perception of risk from breast cancer (Hallal, 1982; Holtzman & Celentano, 1983; Rutledge, 1987; Hopwood, 2000; Paul, Barratt, Redman, et al., 1999; Farley & Flanery, 1989; Caplin, Wells, Haynes, et al., 1992). In addition, individual perceptions may be shaped by a number of factors associated with the lack of culturally competent education about the frequency of breast cancer and the benefits of early detection (Erwin, Spatz, Stotts, et al., 1999; Egbert & Parrott, 2001). A woman's vicarious experiences with family and friends, along with her spiritual beliefs, are also thought to influence the perception of breast cancer risk.

Reducing mortality rates and increasing testing, screening, and the proportion of cancer survivors living five-or-more years after diagnosis are among the goals of *Rural Healthy People 2010* (Gamm, Hutchison, Dabney, & Dorsey, 2003). Regardless, little population-based research is available in Georgia vis-à-vis rural females' perceptions of breast cancer risk, what perceived barriers may exist related to obtaining screening, or about rural females' health status. Moreover, there exist in the literature few

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studies that illustrate how these factors may differ by race.

The purpose of this study was to determine the point prevalence of perceptual and behavioral factors related to breast cancer risk in a purposive sample of women enrolled in breast cancer screening programs in four rural counties in southeast Georgia. Specifically, this study sought to understand the factors that influence rural women's perceptions of breast cancer risk, their perceptions of barriers to screening, and racial differences that may exist with regard to lifestyle and behavior.

METHODOLOGY

Target Population

The geographic boundaries of this study consisted of four of the ten counties comprising the South Central Health District (SCHD): Dodge, Pulaski, Telfair, and Wheeler counties. The study targeted women enrolled in the Breast and Cervical Cancer Program (BCCP) in these areas, purposively selected because BCCP provides mammograms at no cost to low-income women 50-and-older who are uninsured or under-insured. Program access is achieved through county health departments, which provide local coordination for screening, diagnostic evaluation, treatment, and follow-up. When this study was conducted, Dodge, Pulaski, Telfair, and Wheeler counties had 110, 32, 69, and 56 women, respectively, enrolled in BCCP; sample selection was based on these numbers.

Target Sample

Sample size was determined based on a formula for estimating proportions (Daniel, 1987). Specific parameters for sample size calculations included 95 percent confidence and five percent level of precision. With 267 total enrollees in the four counties, we estimated that 157 surveys were needed to achieve desired accuracy. Based on the number of enrollees in each county, we estimated that the study needed to recruit 64 participants from Dodge County, 19 from Pulaski County, 41 from Telfair County, and 33 from Wheeler County.

Content Validity

A unique data collection instrument was created to assess behavioral and perceptual factors related to breast cancer. The lead author of the study created the first draft of the survey. Subsequent drafts were reviewed and modified by staff members at SCHD who had significant interaction with the target population, including the Women's Health Coordinator, the Women's Health Education Coordinator, a Nurse Practitioner, an Outreach Aide in BCCP, and the District Health Program Manager. In addition, SCHD staff was directly involved in all data collection efforts. Two additional faculty members in a related department also reviewed the final draft for readability and content. Modifications were made based on their comments.

Prior to initiating data collection, a pilot test of the survey was administered to a small group of BCCP enrollees in one of the district counties not selected for this study. Fifteen women were asked to complete the survey then give comments to staff administering the instrument. Solicited feedback was included to improve readability, content, format, and comprehension.

Sample Selection

Participant files were maintained in the county health departments where specific services are provided. Based on the number of BCCP enrollees needed, a simple random sampling procedure was utilized to produce a numeric list of potential subjects. This list was matched to another file containing client contact information to create a sequenced participant list; this information was not divulged to anyone outside the District's

operational staff. The client list was then relayed to staff members involved in data collection, who then attempted to contact each enrollee appearing on the list via telephone in the order in which they appeared, noting each attempt that resulted in a busy signal or that went unanswered. Disconnected or nonviable numbers eliminated enrollees from further consideration. Once contacted, subjects were invited to participate by visiting their local health department and completing the survey. Subjects not interested in participating were removed from the list; no attempt was made to assess their unwillingness to participate. Data collectors continued using this systematic approach until a sufficient number of subjects had been selected. To increase participation, incentives were offered, including a free bone density scan and a Wal-Mart gift card in the amount of $25.00.

Survey Administration

The preferred method of data collection was for each participant to complete the survey independently. Those collecting data were instructed not to initially explain the meaning or intent of any item or word on the survey, however, assistance was rendered if a subject requested help. Surveys were collected between September 2002 and December 2002.

Survey Variables

The survey was constructed in sections to assess population characteristics, perceptions of personal health, levels of physical activity, weekly fruit and vegetable consumption, alcohol consumption, tobacco use, breast cancer knowledge and individual screening behavior, perceived breast cancer risk factors, and perceived barriers to screening. For purposes of this study, race was dichotomized to include only black and white participants. Perceived breast cancer risk factors and perceived barriers to screening were dichotomized (yes/no) in order to investigate proportional differences by race. For a more detailed explanation of how data were assessed in the survey, please refer to Table 1.

Data Analysis

Data were analyzed using SPSS for Windows Version 10.0 (SPSS, 2000) and SAS Version 8.1 (SAS, 1999). The Mantel-Haenzel-Cochran (MHC) Chi-square test was used to investigate proportional differences by race with regard to population, behavioral, screening, and perception variables ($\alpha = 0.05$). Holmes' Sequential Standardization technique was also used to identify specific proportional differences in population, behavioral, and screening variables. In addition, the Fisher's Exact Test was employed for cross tabulations with very small expected values. Odds ratios and 95% confidence limits were calculated to assess the magnitude of observed differences by race. All data analysis was either supervised or conducted by faculty within the Center for Biostatistics at Georgia Southern University.

RESULTS

A total of 147 enrollees in the South Central Health District's Breast and Cervical Cancer Program completed surveys during the designated period. In Dodge (n = 54), Telfair (n = 35), and Wheeler (n = 28) counties, approximately 85% of target numbers were achieved; collected surveys in Pulaski County (n = 24) exceeded the target. Among all women who participated, 51.7% (n = 76) were white and 48.3% (n = 71) were black; no statistical differences were found in the proportion of white and black women who participated by county (p = 0.680).

Population Characteristics

The population characteristics of both racial groups were remarkably similar.

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Slightly more than one-half of white females in the sample (52.6%) were 50-to-59 years old, compared to one-in-three (35.2%) black females, and a greater percentage of black females (38.0%) were between 40-and-49 years of age, as compared to white females (27.6%). Over one-half of white females (58.2%) and 40.0% of black females reported they were married. Similar proportions of black (36.2%) and white (37.1%) females were poorly educated (i.e., did not complete high school); black (49.3%) and white (48.6%) females reported that they had received a high school diploma at nearly equivalent levels. The majority of females reported living in homes with an annual income of less than $10,000. Among black females, greater than four-in-ten (41.8%) reported no annual household income and nearly one-in-four (22.4 %) had an annual income of less than $10,000. For white females, one-in-four (25.7%) had no annual household income and nearly four-in-ten (39.2%) reported less than $10,000 per annum. The data indicate that 56.6% of white participants and 47.9 % of black participants reported that menstruation began for them at either 12-or-13 years of age. In addition, 44.9% of blacks and 46.0% of whites reported that menopause occurred between 30-and-49 years of age.

Differences by race were detected on only two socio-demographic variables: number of pregnancies (p = 0.005) and age at first delivery (p = 0.011). The proportion of black females reporting five-or-more pregnancies (36.6%) was significantly higher than that reported by white females (13.2%). Regarding age of first delivery, the proportion of black females (9.9%) who reported giving birth before age fifteen was significantly higher than that reported among white females (0.0%). Further, white females (43.4%) were nearly twice as likely as black females (22.5%) to report that their first delivery occurred between 20-and-24 years of age.

Behavioral Characteristics

Results of the analysis of behavioral risk variables by race are presented in Table 2. Nearly six-in-ten white females in the sample reported consuming five-or-more servings of vegetables per week, as compared to four-in-ten black females (p = 0.011). Though no statistical differences were detected in any of the other comparisons, the data suggest that black females in the sample were more 1.43 times as likely as whites to perceive their health as either very good or excellent (p = 0.381), 1.11 times as likely to report eating five-plus servings of fruit per week (p = 0.635), and 1.76 times as likely to engage in 30-or-more minutes of weekly exercise (p = 0.124). Black females were 1.42 times as likely as white females to report drinking alcohol (p = 0.298), but white females were 1.37 times as likely as black females to be smokers (p = 0.326).

Perceptions of Risk and Barriers to Screening

Table 3 shows results of the relative risk analysis conducted on perceived breast cancer risk by race. White females were 4.63 times as likely as black females to perceive pollution as one of the factors that might influence their breast cancer risk (p = 0.038). Similarly, white females were more likely to perceive smoking (*OR*: 2.39; p = 0.018), age (*OR*: 3.01; p = 0.013), and hormone replacement therapy (*OR*: 3.17; p = 0.005) as factors influencing their breast cancer risk. And though no other statistical differences were detected, white females in

Table 1

Population, behavioral, and screening survey variables, South Central Health District, Georgia Division of Public Health, 2003

Variable	Survey Strata
Race	Black; White
Age (in years)	<20; 20-29; 30-39; 40-49; 50-59; 60-69; 70-79; ≥80
Marital status	Single; Married; Separated; Divorced; Widowed; Living with Someone (Not Married)
Number of times pregnant	0; 1; 2; 3; 4; ≥5
Age at first delivery (in years)	<15; 15-19; 20-24; 25-29; 30-34; ≥35
Age at first menses (in years)	≤11; 12; 13; 14; 15; ≥16
Age at menopause (in years)	Not Applicable; Experiencing Symptoms; 20-29; 30-39; 40-49; ≥50
Highest level of education	None; <High School; High School Graduate; Other
Annual household income	None; <$10,000; $10,000-14,999; $15,000-24,999; ≥$25,000
Perceived health	Excellent; Very Good; Good; Fair; Poor
Weekly fruit consumption	0; 1; 2; 3; 4; 5; 6; 7; ≥8
Weekly vegetable consumption	0; 1; 2; 3; 4; 5; 6; 7; ≥8
Types of physical activity	Not Applicable; Running; Walking; Other
Physical activity (times/week)	0; 1; 2; 3; 4; 5; 6; 7; ≥8
Physical activity (minutes/week)	0; 1-5; 6-10; 11-15; 16-20; 21-25; 26-30; ≥31
Alcohol consumption	Yes; No
Smoking status	Never Smoked; Current Smoker; Former Smoker
Knowledge of BSE	Yes; No
Last performed BSE	Never; <1 mo; 1-6 mo; 7-12 mo; 1-2 yrs; >2 yrs
Clinical breast exam	Yes; No
Last clinical breast exam	Never; <1 yr; 1-2 yrs; 3-5 yrs; >5 yrs
Reason for breast exam	Not Applicable; Routine Checkup; Problem with BSE; Other
Last mammogram	Never; <1 yr; 1-2 yrs; 3-5 yrs; >5 yrs

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Table 2

Behavioral risk variables by race, South Central Health District, Georgia Division of Public Health, GA, 2003

Behavioral Risk Variable	Black Females	White Females	*p*-Value
Perceived personal health as "very good" or "excellent"	16.9%	11.8%	0.381
Consumed five-or-more servings of fruit per week	36.6%	32.9%	0.635
Consumed five-or-more servings of vegetables per week	40.2%	59.2%	0.011
Consumed alcohol	22.5%	15.8%	0.298
Current smoker	18.3%	25.0%	0.326
Physically Inactive	31.7%	40.0%	0.351
30+ Minutes of Physical Activity per Week	22.4%	12.7%	0.124

the study were more likely than black females to perceive most listed factors as legitimate risk concerns. However, black females perceived breast size, race, and low income as risk factors in slightly higher proportions than did white females.

The vast majority of females reported perceiving no barriers to screening, regardless of race (Table 4). White females were 2.89 times as likely as black females to perceive cost as a barrier to breast cancer screening (p = 0.032). No statistical differences were detected by race in any of the other factors examined, however, white females were only one-half as likely as black females to view transportation as a barrier to screening; embarrassment, inconvenience, and fear of radiation appeared to be non-factors.

DISCUSSION

This research was conducted to establish point prevalence data regarding the perceptual and behavioral factors related to breast cancer risk among a purposive sample of women enrolled in breast cancer screening programs in four rural counties in southeast Georgia. In a collaborative between academia and public health practitioners, the study examined racial differences that existed regarding rural females' lifestyle and behavior, including behavioral risk, perceived breast cancer risk, and barriers to screening. Apart from the significance of providing southeast Georgia with a set of baseline data, understanding racial differences in this population was of particular importance, since nearly three-in-ten (28.7%) women in the state are black, and since many reside in rural areas of the state (U.S. Census Bureau, 2003). In addition, developing culturally sensitive and effective health promotion strategies to reduce the impact of breast cancer in the region is predicated upon understanding such differences.

Participants were surprisingly similar on most socio-demographic variables under study, yet despite these parallels there were several findings worth noting. Black females were more likely than whites to report five-or-more pregnancies and to give birth at a younger age. These findings suggest a reduced risk among

Table 3

Perceived Risk by Race, South Central Health District, Georgia Division of Public Health, GA, 2003

Perceived Risk	% Answering "YES" Black Females	% Answering "YES" White Females	*p*-Value[1]	Odds Ratio[2]	95% CI
History of childbirth	2.8	5.3	0.682 *	1.96	0.34 – 10.80
Use of birth control pills	22.5	27.6	0.477	1.31	0.62 – 2.78
Pollution	2.8	11.8	0.038	4.63	0.97 – 22.25
Smoking	22.5	40.8	0.018	2.39	1.15 – 4.87
Sexually transmitted diseases	1.4	5.3	0.368 *	3.89	0.42 – 35.66
Alcohol consumption	9.9	14.5	0.394	1.55	0.56 – 4.24
Breast size	11.3	9.2	0.681	0.80	0.27 – 2.33
Race	5.6	1.3	0.197 *	0.22	0.02 – 2.05
Low income	8.5	2.6	0.156 *	0.29	0.06 – 1.50
Lack of exercise	14.1	14.5	0.946	1.03	0.41 – 2.60
Family history	42.3	52.6	0.208	1.52	0.79 – 2.91
Age	11.3	27.6	0.013	3.01	1.23 – 7.33
Access to health care	8.5	10.5	0.668	1.28	0.42 – 3.87
Hormone replacement therapy	14.1	34.2	0.005	3.17	1.40 – 7.20

[1] An asterisk denotes use of the Fisher's Exact Test

[2] Odds ratios were calculated using black females as the referent group

black females relative to their white counterparts, since pregnancy at a young age, especially before the age of twenty, has been associated with markedly reduced rates of breast cancer in some populations (Vogel, 2000), and women who give birth after thirty years of age may increase their likelihood of developing breast cancer by as much as twofold (Kelsey, Gammon, & John, 1993; Spicer, Krecker, & Pike, 1995). The two groups did not differ statistically on any of the other socio-demographic variables. Still, given the inverse relationship between breast cancer risk and socioeconomic factors such as literacy, educational level, income, and access to health care (Meade & Calvo, 2001; Friedman et al., 1995; Kagawa-Singer, 1995; Hayward, Shapiro, Freeman, et al., 1988), and given the demographic makeup of our sample, many residents of the region may be at-risk due to these factors.

Individual biologic factors are also associated with breast cancer risk. Empirical data suggest that early age at menarche and late age at menopause are related to increased risk of developing breast cancer. Compared with those who experience menarche at age sixteen, girls who undergo menarche two-to-five years earlier have a ten-to-thirty percent greater risk of developing breast cancer later in life (Butler et al., 2000). Similarly, women who experience menopause at age 55-or-older are fifty percent more likely to

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develop breast cancer than those whose onset of menopause is between 45-and-55 years of age (McPherson et al., 2000). No differences associated with race were detected among those in our sample for either age at menarche or age of menopause. However, a sizeable proportion reported beginning menstruation at 12-to-13 years old, which for them may suggest an elevated risk of developing breast cancer. And though four-in-nine women in our study (45.5%) appeared to be at a reduced risk of breast cancer from having experienced menopause between 30-and-49 years of age, a notable percentage (3.5%) was at-risk due to late menopause. As is the case with many other chronic diseases, the absolute risk of breast cancer increases with age (Kosary, Ries, Miller, et al., 1995).

Analysis of behavioral risk by race yielded only one statistically significant result. Subjects did not differ in their perceptions of personal health, physical activity levels, fruit intake, alcohol consumption, or smoking, however, white females were significantly more likely to eat five-or-more servings of vegetables each week. Though few differences were detected, the findings did reveal several areas of practical significance worth noting. First, weekly physical activity levels and fruit consumption were disappointing, with three-in-ten subjects physically inactive and 8.8 percent eating no fruit in a typical week. We were less concerned with participants' vegetable intake because both groups indicated a reasonable weekly consumption of vegetables. As a function of program enrollment, each woman is provided with preventive health messages related to making changes to her diet, particularly in light of the role of lifestyle and behavior modification as an important determinant in defining one's risk of chronic disease, including cancer (Brownson, Rakowski, Enrich, et al., 1998). The substantial number of program enrollees not engaging in appropriate behavior modifications is a serious health problem in itself, but the above finding may also imply that less-than-effective preventive public health messages are being delivered to those currently using these services. As such, administrators may consider a full assessment of this important program feature to maximize its future effectiveness.

Several important differences by race in the ways in which women perceived their breast cancer risk emerged. For instance, white women were more likely to perceive pollution, age, smoking, and hormone replacement therapy as predictors of risk. However, what concerned us was the apparent limited ability of all study participants to recognize these factors as potentially serious. This result may imply that less-than-effective public health messages are being delivered to those currently using services, since history of childbirth, age, use of birth control pills, family history, alcohol consumption, and hormone replacement therapy are among the most well-known breast cancer risk factors in women nationwide (ACS, 2005). Increased knowledge is associated with increases in perceived risk of breast cancer (Paul et al., 1999). This knowledge, along with the subsequent set of beliefs formed, is typically gained via vicarious interactions, or exposure to health professionals (Erwin et al., 1999; Egbert & Parrott, 2001). Black women have recognized feeling a greater sense of risk as compared to their white counterparts, though not universally so. In cases where perceptions of breast cancer risk are lower, cultural forces such as interpersonal relationships and

Table 4

Perceived Barriers by Race, South Central Health District, Georgia Division of Public Health, 2003

Perceived Barrier	% Answering "YES" Black Females	% Answering "YES" White Females	*p*-Value [1]	Odds Ratio [2]	95% CI
None	77.5	71.1	0.375	0.71	0.34 – 1.51
Cost	8.5	21.1	0.032	2.89	1.06 – 7.87
Pain and/or discomfort	7.0	9.2	0.631	1.34	0.41 – 4.43
Embarrassment	0.0	0.0	--	--	--
Transportation	2.8	1.3	0.610	0.46	0.04 – 5.19
Inconvenience	1.4	0.0	0.483 *	--	--
Fear of radiation	1.4	0.0	0.483 *	--	--

[1] An asterisk denotes use of the Fisher's Exact Test

[2] Odds ratios were calculated using black females as the referent group

spirituality may be contributory factors (Hughes, Lerman, & Lustbader, 1996).

Education and income have each been documented as barriers to screening participation in other studies (Pearlman, Rakowski, Enrich, et al., 1996; Han, Wells, & Primus, 2003). Additionally, rural populations tend to report a significant number of barriers resulting in poor access to health services (Paskett, Tatum, Rushing, et al., 2004). Regarding the women in our sample, we were encouraged by the low percentage who perceived barriers to screening; pain and discomfort were the barriers most often listed. Nevertheless, fewer than one-in-ten cited this as a barrier to seeking screening. Cost was the sole barrier that differed by race; white women were nearly three times as likely as their black counterparts to perceive cost as barrier. Embarrassment, known to predict self-efficacy in the ability to comply with breast and cervical cancer screening (Garber, Jessop, Foti, et al., 2003), did not factor into women's perceptions of screening in this study.

Several other limitations also necessitate that caution be used in interpreting study findings. First, all measures were self-report, thus the extent to which participants were inclined to provide socially desirable responses is not fully known. For example, social desirability could explain in part the high levels at which participants reported no perceived barriers to screening. Second, the scope of the study design (i.e., the purposive sample) limits our ability to generalize to all women in the region. Since women recruited into the study were already enrolled in a breast cancer screening program, their perceptions of barriers related to screening may not necessarily be congruent with other rural women. In other words, we may be "Speaking to the Choir" of women who do not view cost, embarrassment, etc. as impediments to their participation, or who might have overcome the barriers they encountered along the way, resulting in their eventual enrollment in screening. Nevertheless, findings should stimulate future research in this area, with the emphasis placed on also recruiting those *not enrolled* in a formal program to more accurately assess barriers to screening that may exist among all rural women. Third, the current study was also limited in that it did not control for outside factors

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that might have posed threats to external validity, for example, the receipt of transportation by participants and how that might have affected their perceptions. The potential for threat due to volunteer bias is well-known (see Campbell & Stanley, 1966) and may also have played a role in the current study. Insofar as there was no intent to generalize results, and given the limited resources available, there was no attempt to ascertain whether study participants were different than those who elected not to participate. Study designs that control for each of the aforementioned factors should be a priority in future research efforts. Finally, since this study was non-experimental and provided only a snapshot of current status, conclusions concerning any causal relationships that may exist among the variables under study are not warranted.

CONCLUSIONS

Despite its limitations, this study was meaningful in that it contributed to the southeast region of Georgia by providing baseline data about breast cancer risk, which is an important first-step in the delivery of effective programs and in understanding a traditionally underserved group. As population-based research continues to increase in Georgia, a commitment to improving health outcomes for all, but especially among the rural citizenry, is essential. To this end, it is important that similar partnerships and collaboratives be created to further advance our understanding of the magnitude of health disparities in Georgia. The diverse population characteristics of the state warrant additional investigation into racial/ethnic differences related to risk. Moreover, broader understanding of barriers to screening would assist Georgia in reaching its *Healthy People 2010* objectives for cancer. Population-based research should continue to be the focus for improving the lives of all Georgians, since it is through these efforts that more effective public health interventions can be designed and successfully implemented in the underserved and rural areas of the state.

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