



Liz Whitney Quisgard. *Byzantine Pattern #3*. Acrylic on canvas, 49" × 38".  
Courtesy of Longstreth-Goldberg ART, Naples, Florida.

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# Sociocultural Characteristics and Responses to Cancer Education Materials Among African American Women

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*Culture has been linked to cancer-related beliefs and practices. The purpose of the present study was to examine the effects of culture on responses to cancer education materials.*

*Religiosity, collectivism, racial pride, and time orientation were measured among 1,227 African American women. Analyses tested the hypothesis that women scoring higher and lower on each construct would differ in their liking, attention, attitude change, recall, and perceived relevance of tailored materials that did or did not frame cancer issues in a cultural context. Responses to culturally tailored materials were no different than responses to other materials, regardless of women's cultural characteristics. However, for all types of materials, women scoring high on religiosity or racial pride paid more attention to materials, liked them more, and found them more personally relevant than women low on these constructs (all  $ps < .005$ ). Women scoring high on present time orientation paid less attention to materials than women low on this construct ( $P < .01$ ). In this population of women, cultural characteristics appear to moderate responses to tailored health education materials.*

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## Introduction

In a growing number of studies, cultural norms, beliefs, and values have been linked to cancer-related outcomes.<sup>1-4</sup> According to the Institute of Medicine's 2002 report titled *Assessing Health Communication Strategies for Diverse Populations*, intervention planners hoping to reach and influence diverse populations must understand and address the social and cultural context in which individuals' decisions and

actions are made.<sup>5</sup> Failure to do so may compromise communication effectiveness. For example, cancer prevention materials designed for the general public may be perceived by certain cultural groups as unattractive, irrelevant, or unclear.<sup>6</sup>

Theories of information processing such as Petty and Cacioppo's 1981 Elaboration Likelihood Model<sup>7</sup> suggest that presenting cancer information in a more culturally relevant context should enhance its persuasiveness. According to the model, people are more likely to actively and thoughtfully process information when they are motivated and able to do so. A key determinant of motivation is perceived personal relevance of the message. Thus the model asserts that relevant messages motivate people to process information more actively, including considering messages carefully, relating the messages to other information they have encountered, and comparing the messages to past experiences.<sup>8,9</sup> Studies have shown that messages processed in this way (ie, "elaborated" on) tend to be retained for a longer period of time and are more likely to lead to enduring attitude and behavior change.<sup>10-13</sup>

Tailored communication is one recent strategy that has been shown to enhance elaboration on health messages.<sup>14</sup> Tailoring is a form of customized communication in which specific messages are provided to specific individuals, based on unique characteristics of each person as gathered through a personal assessment.<sup>15</sup> Using computers to process and generate tailored materials, it becomes possible to deliver highly individualized communication to large populations.<sup>16</sup> In studies conducted to date, tailored messages have elicited more favorable reactions than non-tailored materials<sup>17</sup> and have been found to be more effective in changing cancer-related behaviors such as cigarette smoking,<sup>18</sup> diet,<sup>19,20</sup> and mammography.<sup>21</sup> We would generally expect more favorable responses to tailored materials when there is concordance between a person's cultural characteristics and the type of materials they receive. While numerous studies have evaluated materials that were targeted to population subgroups using cultural variables<sup>22-24</sup> and a few studies have tested tailored materials that took culture into consideration,<sup>25-28</sup> none have specifically examined effects of materials tailored to different individuals based on each person's unique status on cultural variables.

In this study, we identified four sociocultural constructs prevalent among African American women in St. Louis, Missouri, and associated with health-related beliefs or practices. These constructs — religiosity, collectivism, racial pride, and time orientation — were measured at baseline among all women in the study and, for those assigned to a "cultural tailoring" group, were used as

the basis of tailoring cancer education materials. As we have described elsewhere,<sup>29</sup> *religiosity* includes a range of dimensions from church attendance and prayer to participation in religious ceremonies, spirituality, and beliefs about God as a causal agent.<sup>30-32</sup> *Collectivism* is the belief that the family or group, not the individual, is the basic unit of society.<sup>30,33</sup> Its priority is collective survival, and its dimensions include cooperation, concern and responsibility for others, family security, and respect for traditions and elders. *Racial pride* involves interest and involvement in traditional practices and holding positive attitudes about one's race.<sup>32,34-36</sup> *Time orientation* reflects a person's tendency to think and act according to consequences that are primarily immediate (ie, present time orientation) or more distal (ie, future time orientation).<sup>33,37</sup>

This paper examines the independent and interactive effects of (1) personal cultural characteristics and (2) the type of cancer education materials received (ie, culturally tailored or not) on African American women's liking, attention, attitude change, recall, and perceived relevance of tailored cancer education materials. Analyses tested the hypothesis that women scoring higher and lower on each construct would differ in their responses to tailored materials that did or did not frame cancer issues in a cultural context. Specifically, we hypothesize that responses to materials will be most favorable when there is concordance between a woman's personal cultural characteristics and the type of cancer education materials she receives. At present, there is surprisingly little empirical evidence to support or refute the expected benefits of culturally relevant cancer communication.<sup>5</sup> Findings from this study can contribute valuable new information to our understanding of this important public health challenge.

## Methods

### Participants

Participant recruitment occurred in the waiting rooms of 10 public health centers in urban St. Louis, Missouri. African American women 18 to 65 years of age who had never been diagnosed with breast cancer, were able to read materials written at a fifth-grade level, and had daily access to a working telephone (for contact during follow-up interviews) were eligible to participate. In all, 1,241 women were enrolled in the study. Of these, 14 were removed from the sample because they did not provide personal identification information (n = 2), were found to be age-ineligible (n = 2), or enrolled twice (n = 10); this left a final sample size of 1,227.

## Procedure

Eligible women who provided written informed consent completed a self-administered baseline questionnaire and received \$20 for their participation. Random assignment to study group occurred automatically within a database software program into which participants' data were entered. Women were randomly assigned in a 1:1:1:1 ratio to one of four study groups: behavioral construct tailoring (BCT), culturally relevant tailoring (CRT), a combination of BCT and CRT approaches (BCT+CRT), or delayed intervention/usual care (CONTROL). Randomization created groups of equal size: BCT = 311 (25.3%), CRT = 309 (25.2%), BCT+CRT = 288 (23.5%), and CONTROL = 319 (26.0%). At 1 and 6 months post-baseline, participants were contacted by telephone to complete a follow-up interview; women received \$20 for each interview completed. Those in the BCT, CRT, and BCT+CRT groups each received one tailored magazine before the 1-month follow-up, and two more tailored magazines before the 6-month follow-up. Because women in the CONTROL group did not receive magazines and because this paper reports only on women's responses to the magazines, CONTROL group women are excluded from all analyses reported in this paper.

## Baseline Questionnaire

The baseline questionnaire assessed the behavioral and sociocultural constructs that would be used as the basis for tailoring the BCT, CRT, and BCT+CRT magazines. Behavioral constructs included mammography- and fruit/vegetable-related knowledge, beliefs, barriers, stage of readiness, self-efficacy, and actual behavior. Sociocultural constructs were religiosity, collectivism, racial pride, and time orientation. Because this paper reports on only the sociocultural variables, they alone are described here.

Each sociocultural construct was measured using a brief scale developed by the project team. Each stage of the scale development process relied heavily on input and review by African American women in St. Louis. We began by reviewing the published research literature and identifying more than 200 candidate items from 20 existing scales. Items consistent with the objectives of our study were selected and supplemented by new items generated by the research team. We then tested this pool of items using cognitive response methods<sup>38,39</sup> among 24 lower-income African American women in St. Louis. Based on findings from this research, items were retained, revised, or eliminated. The resulting scales were then reviewed by a community advisory board of seven African American women who work at pub-

lic health centers serving the target population, and modified as per the board's recommendations. This development process has been described in greater detail in a previously published report.<sup>40</sup>

All items included in the final scales for religiosity, collectivism, racial pride, and time orientation are shown in Table 1. For the religiosity, racial pride, and time orientation items, the 4-point response scale was as follows: 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. For the collectivism items, the 4-point response scale was as follows: 1 = not at all important, 2 = not very important, 3 = somewhat important, and 4 = very important. These scales were examined in psychometric testing in a pilot sample of 72 African American women from low-income urban housing communities.<sup>40</sup> All scales were tested for internal consistency as well as temporal stability in a test-retest procedure (2-week interval). Internal consistency and temporal stability were, respectively, religiosity (9 items;  $\alpha=.88$ ,  $r=.89$ ,  $P=.001$ ), collectivism (6 items;  $\alpha=.93$ ,  $r=.85$ ,  $P=.001$ ), racial pride (7 items;  $\alpha=.84$ ,  $r=.52$ ,  $P=.001$ ), present time orientation (5 items;  $\alpha=.73$ ,  $r=.52$ ,  $P=.01$ ), and future orientation (5 items;  $\alpha=.72$ ,  $r=.54$ ,  $P=.07$ ). A total score on each scale was computed for each woman in the study by summing across the individual items that make up the scale. Scale scores were dichotomized (high/low) due to limited variability. Specific cut points approximated a median split and sought to create roughly equal-sized groups of women who were high and low on each construct for intervention purposes.<sup>3</sup>

## Tailored Magazines

There were three different types of tailored magazines (BCT, CRT, and BCT+CRT), each corresponding to one of the study groups receiving an intervention. Across all three groups, women 40 years of age and older received magazines that promoted mammography. Women ages 18 to 39 years received magazines that promoted increased fruit and vegetable consumption. All elements of the tailored magazines were developed with extensive participation from African Americans in St. Louis. This participation included paid project staff, a community advisory board of African American women, artistic contributions from local black artists, and individual and group interviews with community members, clergy, health workers, and cancer survivors. In addition, formative research and testing of measures and messages were conducted with more than 100 African American women.<sup>40</sup>

Each full-color issue of the magazine was eight pages long and standard size (8.5" × 11"). The front cover included the participant's name (ie, "personalization"<sup>16</sup>) and featured artwork from local black

artists. The back cover included the name, logo, and service information (eg, hours, address, contact information) of the health center at which the participant enrolled in the study, as well as a photograph and biographical information about the featured cover artist. On the six interior pages, magazines included 10 tailored stories. Six of these stories addressed either mammography or fruit and vegetable consumption (based on the participant's age), and four stories addressed topics unrelated to these study outcomes (described below). All stories were drawn from the project's tailored message library that included approximately 800 text messages and 600 graphic images. A postcard inserted into magazine issues No. 1 and No. 3 reminded participants that they would soon be called to complete a follow-up telephone interview and reminded them to call the project hotline if there were any

changes in their address or phone number. The community advisory board chose the name *Reflections of You* for the magazine.

### Behaviorally Tailored Magazines

The behaviorally tailored (BCT) magazines promoting increased fruit and vegetable consumption were tailored on diet-related knowledge, self-efficacy for increasing fruit and vegetable consumption, perceived barriers to eating fruits and vegetables, perceived importance of eating more fruits and vegetables, level of interest in starting to eat more fruits and vegetables, and actual dietary practices (eg, current level of fruit and vegetable consumption, preferences for certain fruits and vegetables). The BCT magazines promoting mammography were tailored on breast cancer-related knowledge, perceived risk and family

Table 1. — Participant Responses to Sociocultural Scale Items at Baseline

Sociocultural Scale Items	Strongly Agree*
<b>Religiosity:</b>	
I am often aware of the presence of God in my life. (n = 1,215)	68.2%
I have a personal relationship with God. (n = 1,219)	64.6%
When I am ill, I pray for healing. (n = 1,211)	63.0%
I pray often. (n = 1,216)	62.8%
My spiritual beliefs are the foundation of my whole approach to life. (n = 1,207)	46.3%
I rely on God to keep me in good health. (n = 1,213)	44.3%
I talk openly about my faith with others. (n = 1,219)	43.3%
I often read religious books, magazines, or pamphlets. (n = 1,220)	33.2%
I often watch or listen to religious programs on TV or radio. (n = 1,218)	33.0%
<b>Collectivism ("How important is it that you and your family..."):</b>	
...take responsibility for caring for older family members? (n = 1,215)	83.2%
...do everything you can to help each other move ahead in life? (n = 1,211)	74.8%
...turn to each other first in times of trouble? (n = 1,214)	73.4%
...call, write, or see each other often? (n = 1,219)	73.1%
...raise each other's children whenever there is a need? (n = 1,209)	72.0%
...let relatives stay with you for a short time when they need some help? (n = 1,220)	58.7%
<b>Racial pride:</b>	
Being black is an important part of who I am. (n = 1,207)	70.8%
I think everyone should be taught about how black people helped to build America. (n = 1,220)	68.2%
Black women should keep up with issues that are important to the black community. (n = 1,220)	68.0%
Black people make America strong. (n = 1,214)	50.4%
Racial pride is important for developing strong black families. (n = 1,195)	50.0%
The women I respect most in life are black. (n = 1,213)	46.7%
I feel a strong connection to other black women. (n = 1,199)	45.9%
<b>Present time orientation:</b>	
What happens to me in the future is out of my control. (n = 1,192)	11.1%
If I want something now, I always buy it no matter what the price. (n = 1,215)	10.1%
As long as I feel good now, I don't worry about having health problems later in life. (n = 1,219)	6.2%
My day-to-day life is too busy to think about the future. (n = 1,220)	5.7%
There's no sense thinking about the future before it gets here. (n = 1,203)	5.2%
<b>Future time orientation:</b>	
I often think about how my actions today will affect my health when I am older. (n = 1,217)	41.7%
I have a plan for what I want to do in the next five years of my life. (n = 1,214)	33.1%
When I plan a party or get-together, I always start weeks ahead of time. (n = 1,200)	28.4%
I often save money or use lay-away to buy things I can't afford now. (n = 1,209)	27.3%
The choices I have made in life clearly show that I think about the future. (n = 1,206)	27.0%
* For Collectivism, this is the percentage reporting "very important."	

history of breast cancer, perceived barriers to mammography, past history of mammography, and current stage of readiness to get a mammogram. All magazines also included stories not related to diet or mammography; these stories were tailored on participants' age and level of interest in 14 different topics (eg, relationships and romance, beauty, parenting, books and reading, local black history). These non-cancer-related stories, which were included to give the magazines variety and appeal, were also a part of the CRT and BCT+CRT group's magazines.

### **Culturally Relevant Magazines**

Regardless of whether culturally relevant (CRT) magazines focused on promoting mammography or fruit and vegetable consumption, all CRT magazines were tailored on religiosity, collectivism, racial pride, present time orientation, or future time orientation. Specifically, stories were tailored based on both a participant's overall scale score on each sociocultural construct (ie, "construct tailoring") and her responses to individual items within each scale (ie, "item tailoring"). Table 2 provides examples of both types of tailored messages. Cultural construct tailoring was used only if a woman scored high on a given scale, not low. When a woman scored high on multiple cultural constructs, the two highest scores (based on proportion of maximum score) determined which would be used as the basis of tailoring in her magazine.

### **Behaviorally and Culturally Tailored Magazines**

The BCT+CRT approach included equal numbers of BCT and CRT stories in the magazines.

### **Follow-up**

Participants were contacted by telephone to complete a follow-up interview at 1 and 6 months post-baseline. Follow-up interviews were similar to the baseline assessment, but they included additional items assessing participants' responses to the tailored magazines. These follow-up measures are the key dependent variables in analyses reported in this paper and are described below.

### **Measures**

Measures of women's responses to the tailored magazines were based on McGuire's Communication/Persuasion Model,<sup>41,42</sup> which identifies 13 successive outcomes of communication ranging from affective (eg, liking) and cognitive (eg, comprehension)

effects to behavior change. According to the model, higher order effects such as behavior change are more likely to result from a communication if certain prior outcomes have been achieved. For example, we would expect that tailored cancer prevention magazines would be more effective in encouraging women to think about getting a mammogram or eating more fruits and vegetables if the women were exposed to the communication, attended to it, liked it, found it interesting, understood it, and learned from it. This study examined four variables from the Communication/Persuasion Model — attention, liking, yielding (ie, attitude change), and memory storage — that were selected because they have been found in past research to vary by exposure to tailored interventions. A fifth variable — perceived relevance of the tailored magazines — was also included based on recent work that suggests it may be an important mechanism through which tailoring achieves its effects.<sup>14</sup>

**Attention:** This composite variable was based on the sum of two item scores. For the first item, remembering receiving the magazine, values ranged from 0 to 2, where 0 = no recall, 1 = prompted recall, and 2 = unprompted recall. For the second item, reading the magazine, values ranged from 0 to 3, where 0 = reading none of the magazine, 1 = reading some of it, 2 = reading most of it, and 3 = reading all of it. Combining these scores resulted in a single attention variable with values ranging from 0 (low attention) to 5 (high attention).

**Liking:** This composite variable was based on the sum of three item scores. The first item was a 10-point Likert-type rating of how much the participant liked the magazine, where 0 = not liking it at all and 9 = liking it a lot. The second item used a 3-point rating to determine how much the participant liked the magazine compared to other health information from a doctor's office, where -1 = liking it less, 0 = liking it about the same, and +1 = liking it more. The third item used a 4-point Likert-type response scale to assess how interesting participants found the stories to be, where 0 = not at all interesting, 1 = somewhat interesting, 2 = interesting, and 3 = very interesting. The composite score for this variable was created by summing the three-item scores but weighting the "interest" item double because it had more variability and was thought to be less susceptible to a social desirability bias than more direct measures of liking. Thus, the "interest" item was thought to provide more meaningful information than the direct measures of liking. This resulted in a single liking variable with values ranging from -1 to 16.

**Yielding:** This composite variable was based on participants' response to an open-ended question asking what they remembered most about the maga-

Table 2. — Sample Cancer Prevention Messages Tailored on Responses to Sociocultural Scales and Items

Tailoring on Cultural Scale Scores		
Scale Score (cut point)	Cancer Behavior	Message Excerpt*
High religiosity (≥31)	Get a mammogram	When you understand that the Creator shapes and guides our day-to-day lives, you realize that tools of modern medicine like computers, x rays, and mammogram machines are part of God's plan for us. We must not ignore these gifts. We can use them along with prayer to stay healthy.
	Eat more fruits & vegetables	After Ida Mae had been scolded by Sandra about not eating enough healthy foods, she prayed about it. "I asked the Lord what I should do. His reply was that I must be willing to take responsibility for my own health. After all, God helps those who help themselves."
High collectivism (≥22)	Get a mammogram	You love your family and want the best for them. But sometimes you have to put your needs first. This is hard because we were taught that love means self-sacrifice. But you betray yourself if family and work keep you from the care you need, like getting a mammogram.
	Eat more fruits & vegetables	Just as we picked up a lot of our tastes in food and cooking from our mothers, aunts, and grandmothers, the children around us will follow in our footsteps. Having healthy snacks around the house and preparing healthy meals will make us healthier and help change others' habits too.
High racial pride (≥24; 23 if age ≥40)	Get a mammogram	Women in our community must educate themselves about breast health. Black women are more likely to die of breast cancer than other women, in part because their cancers are often found too late. Mammograms are the best way to find breast cancer early so it can be treated.
	Eat more fruits & vegetables	As black women, we need to learn how to respect our bodies. One way to do this is to start eating more traditional vegetable dishes like cabbage, sweet potatoes, and okra. They give our bodies vitamins, nutrients and fiber. To get you started, here's a healthy soul-food recipe to try.
High present time orientation (≥10)	Get a mammogram	Every year, sisters, mothers, grandmothers, and friends die of breast cancer that was found too late. Sometimes in life we're "too late" because we forgot or didn't have time, and we miss an opportunity. Getting a mammogram is one opportunity that's too important to miss.
	Eat more fruits & vegetables	Every day there are two lists: the things that have to get done today and the things that can wait. Some things always seem to get moved to the "tomorrow" list, like eating more vegetables and fruits. You know it's important, but can't get to it today. So try changing just a little at a time...
High future time orientation (≥16; 15 if age ≥40)	Get a mammogram	Barbara calls herself a "plan-aholic." She plans everything ahead of time. She finishes her Christmas shopping in October and is thinking about New Year's resolutions in July. So when her doctor told her it was time for a mammogram, she started planning for it right away.
	Eat more fruits & vegetables	By eating a healthy diet today, you can help protect yourself against diseases that may not show up for years. Did you know that eating carrots, squash, sweet potatoes, and dark green vegetables like broccoli and spinach has been linked to lower risk of cancer?
Tailoring on Individual Items From Each Cultural Scale		
Item** (scale, response)	Message Excerpt	
I pray often. ( <i>Religiosity; strongly agree</i> )	Prayer is talking to the Creator and listening for His reply. Patrice talks to God about everything in her life. She says, "Before and after my mammogram each year, I think about good health. If I feel fearful, I turn it over to Him. And afterwards, I thank Him for my continued good health."	
Take responsibility for caring for older family members. ( <i>Collectivism; very important</i> )	Taking care of our elders is an honorable duty and a labor of love. One thing we can do to care for our elders is be sure they get proper health care. This includes getting a mammogram 1–2 years from age 40 to 75 and talking with the doctor about mammograms after age 75.	
Being black is an important part of who I am. ( <i>Racial pride; strongly agree</i> )	Elaine looked at the couple standing at the FREE MAMMOGRAMS table at the festival. The short, dark-skinned woman looked like someone who took care of herself. The man beside her held her hand. Watching them, Elaine felt good about her self and somehow connected to them.	
As long as I feel good now, I don't worry about health problems later in life. ( <i>Present time; strongly agree</i> )	Why should you worry about your future health? You can't do anything about it or can you? Actually, you can get into habits that protect your future health. Decide to eat a healthful diet. Develop the habit of eating 5 servings of fruit, vegetables, and juices each day.	
Choices I have made show that I think about the future. ( <i>Future time; strongly agree</i> )	My mother often said to us, "The choices you make in life will affect your future, so make good choices." Wise choices go a long way towards securing health. Become informed about the tests and screenings you need, like getting a mammogram every 1-2 years after age 40.	
* Messages have been abridged with minor modifications to keep message concepts intact and fit the table.		
** Exact wording of items shown in Table 1.		

zines, and a closed-ended follow-up to the open-ended question that asked whether their response was a positive, negative, or neutral evaluation of the magazines. Women who answered the first question by mentioning something about the health focus of their tailored magazine (ie, breast cancer/mammography or diet/fruit and vegetables) and responded “negative” to the second question received a score of -1. If their response to the first question did not mention the health focus of their tailored magazines, they received a score of 0. If their response to the first question mentioned the health focus and they responded “neutral” to the second question, they received a score of +1. If their response to the first question mentioned the health focus and they responded “positive” to the second question, they received a score of +2. This resulted in a single yielding variable with values ranging from -1 to +2.

**Memory Storage:** This composite variable was based on the sum of two item scores. For the first item, recall of the health content within the magazine, values ranged from 0 to 2, where 0 = no recall when prompted or recall of incorrect content when prompted, 0.5 = recall of both correct and incorrect content when prompted, 1 = recall of correct content when prompted or recall of correct and incorrect content when not prompted, and 2 = unprompted recall of correct health content. The second item assessed what, if any, non-health-related content from the magazines the participant recalled without prompting. For this item, 0 = no recall and 1 = recall of at least one non-health topic that appeared in the tailored magazines. This resulted in a single memory storage variable with scores ranging from 0 to 3.

**Relevance:** This composite variable was based on the sum of three item scores. The first item measured each participant’s perceptions of how well the stories in the magazines related to her as an African American woman, where 0 = not at all well, 1 = not very well, 2 = somewhat well, and 3 = very well. The second item used the same response scale and measured how well the stories applied to the participant’s life. The third item assessed how many of the magazines’ stories were about issues important to the participant; responses were 0 = none, 1 = only a few, 2 = some, and 3 = all. This resulted in a single relevance variable with scores ranging from 0 to 9.

### Attrition

At 1-month follow-up, 1,020 women (83.1% of baseline sample) completed a phone survey: BCT = 271 (87.1%), CRT = 259 (83.8%), BCT+CRT = 232 (80.6%), and CONTROL = 258 (80.9%). At 6-month follow-up, 948 women (77.3% of baseline sample)

completed a phone survey: BCT = 255 (82.0%), CRT = 236 (76.4%), BCT+CRT = 213 (74.0%), and CONTROL = 244 (76.5%).

### Statistical Analyses

The data were analyzed using the Statistical Analysis System (SAS Institute, Inc, version 8.2; Cary, North Carolina). Baseline data are reported for all participants enrolled in the study (n = 1,227). Descriptive statistics were calculated to determine the level of endorsement of each sociocultural item (ie, percentage that “strongly agreed” or rated each item as “very important”).

To determine whether scoring higher vs lower on each construct was associated with demographic characteristics, independent *t* tests were computed for continuous demographic variables and chi-square tests for categorical demographic variables.

To determine whether there was a study group main effect (ie, type of materials), sociocultural construct main effect (ie, personal cultural characteristics), or a group-by-construct interaction effect on 6-month follow-up reactions to the magazines, analysis of covariance (ANCOVA) or logistic regression were conducted, controlling for health focus of magazines (ie, mammography, diet) received between 1 and 6 months. Since responses to the liking, memory storage, and relevance variables were continuous but not normally distributed, ANCOVA was performed using ranks. Due to the limited range of possible values and the abnormal response distribution for attention and yielding, these variables were considered to be discretely distributed and were analyzed with logistic regression. Odds ratios (ORs) and 95% confidence intervals (CIs) for the ORs are reported for significant effects. None of the interaction terms were significant ( $P > .05$ ); they were eliminated from the statistical models to achieve parsimony. The unique effect of study group and construct status was examined separately. To be included in these analyses, participants had to have completed the 6-month follow-up assessment and could not be in the control group (resulting n = 704).

## Results

### Sample

Participants ranged in age from 18 to 65 years, with a mean age of 35.6 years (standard deviation [SD] = 11.6). The mean years of education was 12.3 (SD = 1.9) and ranged from 2 to 20 years. Most women were single (n = 756; 61.6%); 16.5% (n = 202) were married, 15.1% (n = 185) were separated or divorced,

3.6% (n = 44) were widowed, and 3.3% (n = 40) were missing data. A majority of women reported working: 45.5% (n = 558) full time and 15.6% (n = 191) part time. One third (n = 456; 37.2%) were not employed at the time of enrollment, and 1.8% (n = 22) were missing data. The median household income before taxes was in the \$10,001-20,000 bracket and ranged from "less than \$5,000" to "more than \$60,000" per year (1.5% were in this highest bracket).

### *Responses to Sociocultural Scale Items*

The distribution of responses to individual items on the sociocultural scales is shown in Table 1. Women were most likely to "strongly agree" with or rate as "very important" items on the collectivism and racial pride scales, and they were least likely to strongly endorse items on the present and future time orientation scales. On the religiosity scale, more women agreed with items assessing spiritual aspects of religiosity (eg, "I am often aware of the presence of God in my life," "I have a personal relationship with God") than agreed with items assessing behavioral aspects of religiosity (eg, "I often watch or listen to religious programs on TV or radio," "I often read religious books, magazines, or pamphlets").

On the collectivism scale, only one item ("How important is it that your family let relatives stay with you for a short time when they need some help?") was not endorsed as "very important" by at least 70% of women the study. Still, over half of women (58.7%) responded "very important" to this item. All but two of the racial pride items were endorsed by at least half of all women; these two items related to feelings of connectedness to other black women ("I feel a strong connection to other black women" and "The women I respect most in life are black").

### *Correlates of Sociocultural Variables*

Scores on each sociocultural scale were compared by age, education, income, employment, and marital status. Women scoring higher on the religiosity scale were on average 4 years older than those scoring lower on the scale (mean = 37.9 vs 33.6 years,  $P < .0001$ ) and had more years of education. For collectivism, the proportion of women scoring higher on the scale was greater among women who were not employed than among those working full or part time. Women scoring higher on the racial pride scale were older than women scoring lower (mean = 37.2 vs 33.4 years,  $P < .0001$ ) and had more years of education (12.4 vs 12.0,  $P < .0005$ ). Women reporting greater household incomes were also significantly more likely than those reporting lesser incomes to score higher on racial pride.

Women who scored higher on the present time orientation scale had on average fewer years of education (mean = 11.8 years) than any other group scoring higher or lower on any other sociocultural variable, and this mean was significantly lower than the mean for women scoring low on present time orientation (12.5 years,  $P < .0001$ ). Women scoring higher on present time orientation were significantly more likely to report lower household incomes than higher ones ( $P < .0001$ ), be unemployed rather than employed (41.2% vs 30.7%,  $P < .0005$ ), and be single rather than currently or previously married (37.4% vs 31.0% vs 29.5%,  $P < .05$ ). The proportion of women scoring higher on future time orientation did not vary by income, employment, or marital status, nor were age and years of education different between women who scored higher and lower on this construct.

### *Responses to the Tailored Magazines*

The proportion of women who scored high on each sociocultural construct did not vary significantly by study group. The range of proportions was as follows: religiosity (BCT = 46.4% vs CRT = 44.2% vs BCT+CRT = 46.4%), collectivism (55.4% vs 53.6% vs 54.0%), racial pride (57.1% vs 55.4% vs 55.2%), present time orientation (27.9% vs 37.2% vs 31.9%), and future time orientation (28.5% vs 30.2% vs 37.3%). Also, there were no significant study group-by-sociocultural construct interactions for any reactions to the tailored magazines. Findings from analyses of the main effects of study group and sociocultural constructs are presented in Table 3. Although study group was never a significant predictor of attention, liking, yielding, memory storage, or relevance, each of the five sociocultural constructs were significant predictors of one or more of these responses to the tailored magazines.

Women who scored high on the religiosity scale reported paying more attention to the tailored magazines, liking them more, and perceiving them as more personally relevant than did women who scored low on the religiosity scale (all  $ps < .001$ ). The same was found for women who scored high on the racial pride scale compared to women who did not score high (all  $P < .005$ ); memory storage scores were also marginally higher among women with higher vs lower racial pride scores ( $P = .06$ ). Women scoring high on collectivism liked the materials more and rated them as more personally relevant than did women who scored low on collectivism (both  $ps < .0005$ ). Although women who scored high on present time orientation paid less attention to the magazines than women scoring lower on present orientation ( $P < .01$ ), they reported liking the magazines more ( $P = .01$ ). Women scoring high on the future time orientation scale per-

ceived the materials as more personally relevant than women scoring low on this construct ( $P=.01$ ) and liked the magazines more ( $P<.05$ ).

## Discussion

The hypothesized outcome of more favorable responses to tailored magazines when concordance exists between a woman's cultural characteristics and the type of cancer education materials she receives was not supported in this study. Although this finding runs counter to expectations and logic, we must consider the possibility that the expected effect does not exist. This is especially true given the absence of published empirical studies addressing this important issue.<sup>5</sup> However, several alternative explanations should be considered. For example, given that this study marked the first attempt to tailor health messages to individuals based on cultural variables, it is possible that the cultural messages developed for use in the study (see previous excerpts) did not adequately translate the cultural constructs into effective cancer communication. Given the considerable improvement over the last decade in the quality of behaviorally tailored messages (ie, BCT in the current study), it seems plausible that this initial foray into tailoring cancer messages on cultural variables could be improved upon. That said, the absence of study group main effects in this paper's analyses (Table 3) would seem to challenge this explanation.

A second possibility is that the hypothesized effects of concordance would not necessarily be seen in this study's outcomes (ie, responses to the tailored cancer education materials) but might be evident when examining behavioral outcomes (ie, getting a mammogram or increasing fruit and vegetable consumption). Although possible, such a finding would be in conflict with theories of persuasion that suggest intermediate communication outcomes typically precede behavioral effects of interventions.<sup>41</sup> Finally, it is possible that our measures of the sociocultural constructs could not adequately distinguish between women who were genuinely different in the extent to which they endorsed each construct. This would affect both our classification of women's status on each construct and the determination of which culturally tailored messages they received. Measurement of cultural variables in diverse populations, especially using brief scales, is new and challenging and will benefit from additional research in the years ahead.

Other findings in the paper raise important questions about the appropriateness of using certain cultural constructs as tailoring variables in this population. The ideal constructs on which to tailor health messages are those that are closely associated

with the outcome of interest and highly variable among members of the intended audience.<sup>43</sup> The "association" part of these criteria appears to be met based on previous findings linking religiosity, racial pride, and present time orientation to cancer-related knowledge, beliefs, and behavior.<sup>3,44,45</sup> However, this study's findings call into question whether there is sufficient variability on some of the study's cultural constructs to justify their use as tailoring variables. As Table 1 shows, responses to items on the collectivism and racial pride scales (and to a somewhat lesser extent the religiosity scale) were highly skewed in our sample. Practitioners and communication planners examining such data would likely conclude that, because these constructs are nearly universally held in this population, they should be incorporated into messages for all women (ie, group-targeted communication<sup>46</sup>) not just some (ie, individually tailored communication).

Differences in cultural scale scores by women's demographic characteristics provide potentially useful information for developing future cancer communication interventions for populations similar to that enrolled in this study. For example, older age was associated with higher levels of religiosity and racial pride. Years of education was positively associated with racial pride but negatively associated with present time orientation. Income level was also negatively associated with present time orientation, as was being employed. From these data, possible attributes of broadly defined audience segments emerge. For example, for women in our sample who are older, are more educated, and have higher incomes, religiosity and racial pride appear to be important cultural constructs. For younger women with fewer years of education, lower incomes, and without jobs, having a present time orientation is more common. This kind of descriptive information is often valuable in distinguishing between different audience segments when developing targeted health communications.<sup>47,48</sup> Because these findings are based on a specific population of African American women from public health centers in urban St. Louis, Missouri, generalizing them to other African American women or different population subgroups would be inappropriate. A more appropriate step would be to test the applicability of these findings to a given population when conducting formative research prior to developing cancer communication programs or materials.

The main effects of women's personal cultural characteristics on responses to any type of cancer education materials (Table 3) were unexpected. In particular, women scoring higher on religiosity, collectivism, racial pride, and time orientation differed significantly on selected communication outcomes from women who scored lower on these constructs.

**Table 3. — Reactions to Tailored Magazines by Status on Sociocultural Variables and Study Group, 6-Month Follow-up**  
(Means ± Standard Deviations Are Reported)

Reactions to Magazines	Sociocultural Construct	Status	Study Group			P Value <sup>a</sup>
			BCT (n = 255)	CRT (n = 236)	BCT+CRT (n = 213)	
Attention	Religiosity	High	4.27 ± 1.13	4.02 ± 1.36	4.06 ± 1.37	Study Group = .78 Spirituality status = .0002 <sup>b</sup>
		Low	3.81 ± 1.31	3.84 ± 1.35	3.82 ± 1.30	
	Collectivism	High	4.10 ± 1.21	3.80 ± 1.46	3.93 ± 1.41	Study Group = .84 Collectivism status = .64
		Low	3.89 ± 1.29	4.06 ± 1.20	3.91 ± 1.26	
	Racial pride	High	4.15 ± 1.20	4.11 ± 1.27	4.03 ± 1.36	Study Group = .87 Racial pride status = .0002 <sup>c</sup>
		Low	3.82 ± 1.29	3.70 ± 1.43	3.81 ± 1.31	
	Present time orientation	High	3.73 ± 1.38	3.87 ± 1.42	3.66 ± 1.39	Study Group = .81 Present status = .008 <sup>d</sup>
		Low	4.12 ± 1.18	3.96 ± 1.31	4.02 ± 1.31	
	Future time orientation	High	4.21 ± 1.17	3.85 ± 1.49	3.79 ± 1.46	Study Group = .65 Future status = .60
		Low	3.96 ± 1.27	3.96 ± 1.29	3.97 ± 1.27	
Liking	Religiosity	High	14.1 ± 2.29	14.4 ± 1.80	14.3 ± 1.98	Study Group = .25 Spirituality status <.0001
		Low	13.7 ± 2.31	13.8 ± 2.41	13.2 ± 2.21	
	Collectivism	High	14.3 ± 1.94	14.5 ± 1.76	14.1 ± 1.99	Study Group = .21 Collectivism status <.0001
		Low	13.3 ± 2.58	13.7 ± 2.47	13.3 ± 2.32	
	Racial pride	High	14.3 ± 1.79	14.3 ± 1.76	14.1 ± 2.20	Study Group = .25 Racial pride status <.0001
		Low	13.3 ± 2.76	13.7 ± 2.61	13.2 ± 2.05	
	Present time orientation	High	13.9 ± 2.44	14.3 ± 1.94	14.2 ± 2.09	Study Group = .22 Present status = .01
		Low	13.8 ± 2.25	14.0 ± 2.28	13.5 ± 2.17	
	Future time orientation	High	14.1 ± 2.24	14.4 ± 1.63	13.7 ± 2.35	Study Group = .10 Future status = .02
		Low	13.7 ± 2.33	13.9 ± 2.35	13.6 ± 2.06	
Yielding	Religiosity	High	0.95 ± 0.99	0.84 ± 0.99	0.63 ± 0.93	Study Group = .26 Spirituality status = .31
		Low	0.80 ± 1.00	1.03 ± 1.00	0.91 ± 1.00	
	Collectivism	High	0.90 ± 1.00	1.00 ± 1.00	0.81 ± 0.99	Study Group = .23 Collectivism status = .28
		Low	0.84 ± 0.99	0.89 ± 1.00	0.73 ± 0.96	
	Racial pride	High	0.90 ± 1.01	0.85 ± 0.99	0.74 ± 0.96	Study Group = .19 Racial pride status = .36
		Low	0.81 ± 0.98	1.10 ± 0.99	0.83 ± 0.99	
	Present time orientation	High	0.97 ± 1.03	0.92 ± 1.00	0.75 ± 0.98	Study Group = .25 Present status = .93
		Low	0.83 ± 0.98	0.98 ± 1.00	0.80 ± 0.98	
	Future time orientation	High	0.88 ± 1.02	0.85 ± 1.00	0.70 ± 0.95	Study Group = .30 Future status = .29
		Low	0.86 ± 0.99	1.00 ± 1.00	0.84 ± 0.99	
Memory storage	Religiosity	High	1.64 ± 0.82	1.49 ± 0.86	1.44 ± 0.85	Study Group = .33 Spirituality status = .70
		Low	1.51 ± 0.84	1.46 ± 0.83	1.52 ± 0.81	
	Collectivism	High	1.59 ± 0.84	1.50 ± 0.80	1.44 ± 0.85	Study Group = .27 Collectivism status = .85
		Low	1.57 ± 0.81	1.46 ± 0.89	1.50 ± 0.79	
	Racial pride	High	1.66 ± 0.80	1.57 ± 0.87	1.46 ± 0.82	Study Group = .26 Racial pride status = .06
		Low	1.48 ± 0.88	1.38 ± 0.78	1.48 ± 0.83	
	Present time orientation	High	1.52 ± 0.85	1.51 ± 0.88	1.43 ± 0.84	Study Group = .32 Present status = .55
		Low	1.60 ± 0.82	1.48 ± 0.82	1.50 ± 0.83	
	Future time orientation	High	1.67 ± 0.83	1.49 ± 0.84	1.47 ± 0.87	Study Group = .28 Future status = .49
		Low	1.55 ± 0.83	1.50 ± 0.84	1.48 ± 0.82	
Relevance	Religiosity	High	8.07 ± 1.06	7.76 ± 1.22	7.85 ± 1.35	Study Group = .67 Spirituality status <.0001
		Low	7.39 ± 1.23	7.42 ± 1.43	7.56 ± 1.14	
	Collectivism	High	7.87 ± 1.18	7.81 ± 1.20	7.84 ± 1.16	Study Group = .65 Collectivism status = .0002
		Low	7.51 ± 1.18	7.31 ± 1.45	7.53 ± 1.34	
	Racial pride	High	7.95 ± 0.98	7.70 ± 1.16	7.79 ± 1.33	Study Group = .70 Racial pride status = .003
		Low	7.39 ± 1.38	7.47 ± 1.53	7.58 ± 1.14	
	Present time orientation	High	7.56 ± 1.35	7.59 ± 1.32	7.89 ± 1.11	Study Group = .67 Present status = .69
		Low	7.75 ± 1.14	7.57 ± 1.37	7.60 ± 1.31	
	Future time orientation	High	7.91 ± 1.06	7.79 ± 1.23	7.79 ± 1.38	Study Group = .77 Future status = .01
		Low	7.62 ± 1.25	7.51 ± 1.37	7.62 ± 1.17	

BCT = behavioral construct tailoring  
 CRT = culturally relevant tailoring  
<sup>a</sup> P values based on ANCOVA using ranks (liking, memory storage, and relevance) or logistic regression (attention and yielding).  
<sup>b</sup> Women who have high religiosity status are 1.70 times more likely to report paying more attention to the magazine than women that have low religiosity (95% CI = 1.28 – 2.26).  
<sup>c</sup> Women who have high racial pride status are 1.71 times more likely to report paying more attention to the magazines than women that have low racial pride (95% CI = 1.29 – 2.26).  
<sup>d</sup> Women who have low present time orientation status are 1.49 times more likely to report paying more attention to the magazines than women that have high present time orientation (95% CI = 1.11 – 2.00).

Although the analytic approach used in this paper can rule out “concordance with cultural materials” as an explanation for these effects, the study did not gather other data that might provide insight into this pattern of effects. It seems possible, for example, that women scoring higher on racial pride might have responded more favorably to the magazines because the magazines focused on African American women, regardless of whether they were tailored on behavioral or cultural variables. Likewise, given the evidence of a positive association between religiosity and health, women scoring higher on the religiosity scale may have paid more attention to the magazines and liked them more simply because the magazines were health-oriented. The finding that women who scored higher on present time orientation were less likely to pay attention to any magazines is intuitive; the fact that they also liked the magazines more than women scoring lower on present time orientation is less so. One possibility is that their ratings of “liking” were based in part on the short length of the magazines, which might be more consistent with expectations about a person with present time orientation. Future studies of culturally based cancer communication can build on these findings by providing empirical explanations for the effects described here.

The role, if any, of culture in enhancing the effectiveness of cancer communication interventions is not well understood. The aforementioned Institute of Medicine report on health communication in diverse populations warns against assuming that different approaches are necessarily needed for different groups but also acknowledges that it found no studies “that systematically compare the various approaches to addressing diversity or that compare those approaches with efforts that ignore diversity altogether.”<sup>5</sup> Although the current study is a first step toward filling this void in the research literature, much is left to learn.

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