The Interaction of Perceived Risk and Benefits and the Relationship to Predicting Mammography Adherence in African American Women

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Purpose/Objectives: To test the interaction of perceived risk and benefits and how they impact stage of mammography readiness and adherence.

Design: Cross-sectional study.

Setting: Community gathering centers and healthcare clinics across Indiana.

Sample: 299 African American women who had not had a mammogram in more than 18 months.

Methods: In-person interviews were used to collect data on sociodemographics, health belief variables, and stage of readiness to undertake mammography screening. Four categories were created to measure the combined magnitude of high or low levels of perceived risk and benefit, with health belief variables linked to modified mammography screening behavior.

Main Research Variables: Perceived risks and benefits, stage of readiness, and mammography adherence.

Findings: The lowest rate of mammography adherence was in women with a high perceived risk and low perceived benefit toward mammography adherence (26%). The highest rate of adherence was in women with a high perceived benefit and low perceived risk (46%). Differences in mammography adherence were statistically significant between the groups ($p = 0.009$).

Conclusions: The interaction of high perceived risk and low perceived benefits impacted readiness to undergo screening mammography.

Implications for Nursing: Reducing disparities in breast cancer diagnosis and survival requires timely and efficient mammography adherence. African American medically underserved women with high perceived risk and low perceived benefits exhibited a reluctance to move forward with mammography adherence. Interventions are needed to increase the perception of mammography benefit and to subsequently reduce breast cancer mortality rates in that population.

Breast cancer is the second-most fatal form of cancer among women in the United States. Studies show that African American women experience higher breast cancer mortality rates compared with Caucasian women (33 of 100,000 versus 22 of 100,000, respectively) (Ries, Melbert, & Kraphcho, 2009). African American women continue to have lower five-year survival rates (78%) compared to Caucasian women (91%), leading to the increased mortality from breast cancer seen in the African American population (American Cancer Society, 2011). Screening mammography has been associated with a 44% reduction in risk of late-stage disease for all populations (Harris, Miller, & Davis, 2003). Although one-time use of mammography has increased (Breen, Gentleman, & Schiller, 2011), some women do not adhere to mammography screening recommendations that would reduce breast cancer mortality (i.e., yearly mammograms recommended at age 40 and continuing for as long as a woman is healthy) (Menon et al., 2007). Researchers have described relationships between theoretic variables included in the Health Belief Model (HBM) and mammography screening outcomes; however, little research has addressed the interaction of those same theoretic variables and their ability to predict mammography adherence.

HBM constructs, including perceived barriers to and self-efficacy for mammography, have been shown to predict mammography use (Champion, Skinner, & Menon, 2005; Ronis, 1992). Cultural beliefs among African American women also have been related to mammography screening, including fear of cancer discovery and treatment (Adams, Becker, & Colbert, 2001; Allen, Sorensen, Stoddard, Colditz, & Peterson, 1998; Champion et al., 2004; Karliner, Patricia, Juarbe, Pasick, & Perez-Stable, 2005; Mayne & Earp, 2003) and a fatalistic view about the inevitability of death once diagnosed (Mayo, Ureda, & Parker, 2001; Powe, 1994, 1995; Powe, Hamilton, & Brooks, 2006). In addition, folk beliefs such as injury spreading cancer (Lannin et al., 1998) and that cancer may be caused by squeezing and touching the breasts (Russell, Monahan, Wagle, & Champion, 2007) also may be barriers. Religious beliefs have been associated with

theoretically specified variables and mammography use (Russell et al., 2007).

The two theoretic variables that have demonstrated the most conflicting results in predicting mammography adherence are perceived risk of breast cancer and perceived benefits of mammography. Those variables are essential constructs of the HBM and seem intuitively necessary for any action, such as mammography screening, to occur. If a woman does not perceive that she will get breast cancer or does not believe a benefit exists from mammography screening, she will not be motivated to act. Researchers, however, have not considered the possibility that the interaction of those variables is key to predicting mammography adherence. Four potential categories of the two constructs are in place: low risk and low benefits (category 1), low risk and high benefits (category 2), high risk and low benefits (category 3), and high risk and high benefits (category 4).

In reported research, risk and perceived benefits have been linked to mammography behavior, finding significant relationships between the two (Champion & Skinner, 2003; Farmer, Reddick, D'Agostino, & Jackson, 2007; Menon et al., 2007; Miller & Champion, 1997). However, other studies have reported conflicting results that find no association between perceived risk and benefit and mammography screening behavior (Russell, Perkins, Zollinger, & Champion, 2006; Zollinger, Champion, Monahan, Steele-Moses, & Zhao, 2010). One explanation for the difference in reported results is the lack of attention to the interactions identified earlier. That relationship may be particularly important in the case where the risk and benefits constructs are different (i.e., low risk and high benefit or high risk and low benefit). For the purpose of testing the relationship of combinations of perceived risk and benefits on mammography adherence, the constructs were combined into four distinct groups. The purpose of this article is to investigate the combined magnitude of high or low perceived risks and benefits on mammography screening adoption in low-income African American women.

The authors' measurement of mammography behavior was based on stages of change described in the Transtheoretical Model of Health Behavior Change (TTM) (Prochaska & Velicer, 1997). The model defines the stages of behavior change for mammography screening as lacking the intention to get a mammogram (precontemplation), thinking about a mammogram (contemplation), and actual screening (action) (see Figure 1).

In a study of predominately African American women in which participants classified in the precontemplation stage had the lowest perceived benefits and highest barrier scores, that population also perceived relatively fewer benefits of mammography screening than did women in the contemplation or action stages (Champion & Springston, 1999; Skinner, Arfken, & Sykes, 1998).

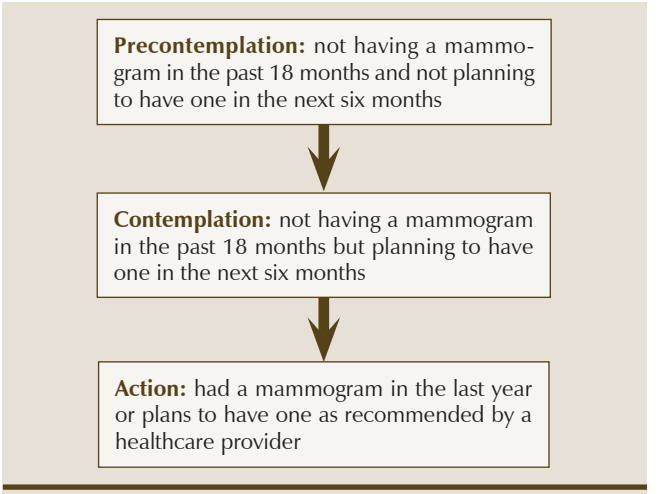

Figure 1. Stages of Mammography Adherence

Note. Based on information from Prochaska et al., 2002; Rakowski et al., 1992, 1993.

The conceptual model framing the current study includes a combination of the HBM (Janz & Becker, 1984; Rosenstock, 1966) and the TTM (Prochaska & Velicer, 1997). Fear and cancer fatalism were added to the framework to assess this affective dimension; cancer fatalism was defined as the predetermination, pessimism, and inevitability of death from cancer (Powe et al., 2006). In addition, cultural variables of preventive health orientation, mammography environment, and religious behaviors were identified and important constructs that had been demonstrated in previous work to have a significant relationship with mammography adherence were included. The model shown in Figure 2 was used as the underlying framework for predicting mammography adherence, including stages of change. The authors sought to understand how the combination of perceived risk and benefits related to demographic variables, theoretic predictors of mammography adherence, and actual mammography adherence. The authors' research questions were

- Are sociodemographic variables related to risk and benefit categories?
- What is the relationship of fear, fatalism, knowledge, self-efficacy, mammography environment, barriers, religious behavior, and preventive health orientation to the risk and benefit categories?
- Are the perceived risk and perceived benefit categories related to the stage of mammography adherence or compliance with mammography adherence?

Methods

Design

The current study is cross-sectional and uses secondary data from a previously conducted prospective study (Champion et al., 2006). African American

women were accrued into the study in three ways (differing only by initial contact): through multiservice centers, an African American convention, and a general medicine clinic serving low-income patients. In all locations, research assistants approached women and gauged if they met the project's eligibility criteria, which included not having a mammogram within the past 18 months, being 41–75 years of age, and being at 175% of the poverty level or lower. Women also were recruited from a low-income health center referral system. After screening for initial eligibility, the health center forwarded the names of eligible women to the project manager, who sent invitation letters on health center letterhead. Research assistants then contacted women via telephone to confirm eligibility and explain the study. If a woman verbally agreed to participate, an appointment was made for her to meet a research assistant, sign the informed consent, complete a baseline interview, and enroll in the study. Third, women were recruited through churches and public housing. Staff at the church or housing tenant council identified eligible women and arranged times when research assistants were available to meet with them. Eligibility then was established, the consent form was signed, the baseline interview was completed, and the women were enrolled in the study. The study was approved by the University of Indiana's institutional review board.

Measures

Prior to data collection, two focus groups populated by low-income African American women were convened and belief scales presented for feedback. The purpose of the focus groups was to adapt the scales that had been developed previously and extensively tested on perceived benefits and barriers in Champion and Skinner (2003) and to establish acceptability for a low-income African American group. Items were added to the perceived barriers scale based on comments of focus group participants. The reliability and validity statistics of the scales were reported in Champion et al. (2008). The predictor variables, perceived risks, and benefits are reported in detail of the frequency distribution properties in Champion et al. (2008). The remaining scales are presented by the number of items in each scale and the standardized Cronbach alpha coefficient.

Perceived benefits assessed the perceived effectiveness of behavior to decrease the risk of death from breast cancer (four items, alpha = 0.73). Perceived risk measured the risk women perceive of getting breast cancer compared to other women (four items, alpha = 0.79). Other health beliefs measured included perceived barriers (19 items, alpha = 0.89), self-efficacy, the perceived ability to obtain a mammogram (10 items, alpha = 0.88), fear, the emotional reaction to thinking about breast cancer (eight items, alpha = 0.94) (Champion et al., 2004), and cancer fatalism using the Powe Fatalism Inventory, which assesses the degree to which a person equates cancer with death (15 items, alpha = 0.87).

Several constructs represented African American cultural beliefs. Religiosity was measured by a scale addressing the degree to which religious beliefs (19 items, alpha = 0.94) and behaviors (four items, alpha = 0.72) played a role in the lives of individuals. The knowledge scale included items about breast cancer, treatment options, and mammography (eight items, alpha = 0.31) (Kreuter, Oswald, Bull, & Clark, 2000). The mammography environment scale measured the discomfort individuals have or think they would experience in their immediate environment during a mammography screening procedure (16 items, alpha = 0.91) (Russell et al., 2007). The preventive health orientation scale consisted of two subscales. The first subscale, active preventive health orientation, measured beliefs about the importance of actively engaging in early detection of health problems and doing things to stay healthy (eight items, alpha = 0.81). The second subscale, passive preventive health orientation, measured the belief that a person should seek health care only when he or she is ill and the belief that looking for health problems can cause them (four items, alpha = 0.63) (Russell et al., 2007).

All women were in precontemplation or contemplation stages when enrolled in the study. Time 3 data (six months after study enrollment) were used for the current analysis; therefore, a number of women who were nonadherent at baseline had a mammogram following study enrollment. Three items were used to create algorithms identifying women as being in the precontemplation, contemplation, or action stage of readiness to obtain a mammogram (Rakowski et al., 1992; Rakowski, Fulton, & Feldman, 1993): the participants' past mammogram

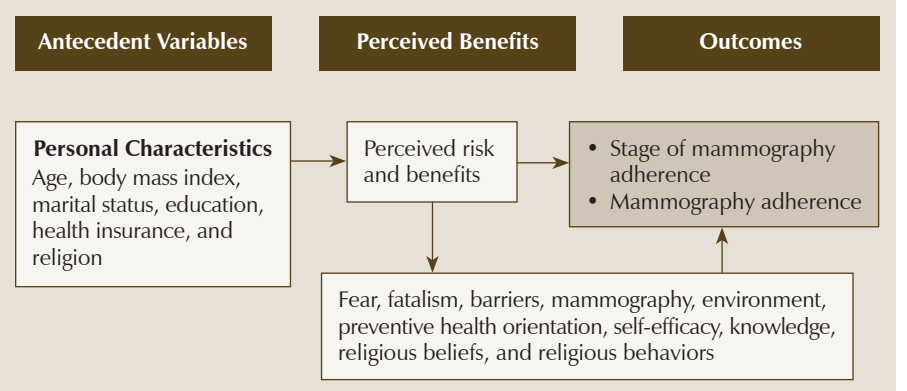

Figure 2. Proposed Conceptual Framework of the Theoretical Model

history, their intent to be screened in the next six months, and the date of their most recent mammogram. Mammography adherence was obtained via self-report.

Data Analysis

The four categories of risk and benefit were created based on the frequency distribution of each of the risk and benefit scale scores assessed at Time 3. The risk and benefit categories were compared on (a) categorical variables using the Pearson chi-square test, (b) the Cochran-Mantel-Haenszel chi-square test when controlling for other categorical covariates, and (c) continuous variables using analysis of variance (ANOVA) with the Tukey-Kramer test for post-hoc pair-wise comparisons.

Results

Demographics

Participant characteristics are shown in Table 1. A total of 299 women agreed to participate at both baseline and Time 3 assessments (492 were eligible, resulting in a response rate of 61%). Reasons for not participating included lack of interest (n = 38, 8%) or time (n = 43, 9%). The sample consisted of women who had completed survey data for Time 3, with the majority aged 41–50 years (61%), living alone (69%), having a high school education (76%), obese (54%), and in the contemplation stage of obtaining a mammogram (47%).

The frequency distribution of the perceived benefits and the risk scales were inspected for natural cut points. Both scales contained seven-point item responses and, therefore, had a possible and also observed score range of 4–28. Most participants displayed high perceived benefits and low perceived risk; scores became skewed below the natural cut point. Specifically, the benefits scale was dichotomized into low perceived benefits (score of 4–24) and high perceived benefits (score of 25–28). The perceived risk scale was dichotomized into low perceived risk (score of 4–9) and high perceived risk (score of 10–27). Those dichotomized (low or high) variables were crossed to form the four categories of risk and benefit. Category 1 had 34 participants, category 2 had 63 participants, category 3 had 86 participants, and category 4 had 116 participants.

Sociodemographic Variables and Risk and Benefit Categories

The risk and benefit categories differed significantly on level of education. The omnibus chi-square test for the 4 x 3 table was significant, and pair-wise differences revealed category 2 had significantly higher education (58% had more than a high school degree) compared to those in categories 3 (33%) or 4 (31%). None of the other demographic variables differed significantly between the four risk and benefit categories.

Table 1. Sample Characteristics

Characteristic	$\bar{X}$	SD
Age (years)	51	8.99
Characteristic	**n**	**%**
Marital status		
Living alone	206	69
Living with partner	93	31
Education		
Less than a high school diploma	74	25
High school diploma	109	37
More than a high school diploma	116	39
Body mass index (N = 297)		
Obese	159	54
Overweight	82	28
Underweight or normal	56	19
Health insurance		
Yes	213	71
No	86	29

N = 299 unless otherwise noted.
Note. Because of rounding, percentages may not total 100.

Relationship of Belief Variables and Risk and Benefit Categories

The summated mean scores of the other belief variables were compared for differences between the four categories. Post-hoc pair-wise comparisons were compared on continuous belief variables using ANOVA with the Tukey-Kramer post-hoc test. The categories differed significantly ($p < 0.05$) on all of the health belief scales.

For fear, post-hoc tests revealed women with high perceived risk, regardless of perceived benefit (category 3, $\bar{X} = 25.14$; category 4, $\bar{X} = 25.14$), reported greater levels of fear than women with low perceived risk and high perceived benefits (category 2, $\bar{X} = 21.44$) ($F = 3.12$, $p = 0.026$). For fatalism, category 3 ($\bar{X} = 42.55$) was significantly different than categories 2 ($\bar{X} = 36.05$) and 4 ($\bar{X} = 37.85$) ($F = 5.04$, $p = 0.002$). Category 3 has low perceived benefits and, therefore, is higher on the fatalism scale than categories 2 and 4, which have high perceived benefits.

For the knowledge construct, category 2 ($\bar{X} = 5.92$) was significantly different than categories 1 ($\bar{X} = 5.32$), 3 ($\bar{X} = 5.16$), or 4 ($\bar{X} = 5.24$) ($F = 4.49$, $p = 0.004$). Self-efficacy demonstrated the greatest overall difference of all belief scales and the categories of risk benefit. Categories 1 ($\bar{X} = 57.71$) and 3 ($\bar{X} = 54.26$) were significantly lower than categories 2 ($\bar{X} = 63.79$) and 4 ($\bar{X} = 62.46$). Women with low perceived benefits were less likely than women with high perceived benefits to have higher scores on self-efficacy. Women in category 3 had the lowest amount of self-efficacy ($F = 12.32$, $p < 0.0001$). Women in category 3 ($\bar{X} = 41.41$) had significantly higher scores on mammography environment than women in categories 1 ($\bar{X} = 36.09$), 2 ($\bar{X} = 32.93$), and 4 ($\bar{X} = 36.22$) ($F = 7.55$, $p < 0.0001$). For barriers, category 3 was significantly different than all

other categories (F = 8.89, p < 0.0001). Women in category 3 ($\bar{X}$ = 93.49) had significantly lower religious beliefs than women in all other categories (category 1, $\bar{X}$ = 102.63; category 2, $\bar{X}$ = 98.72; and category 4, $\bar{X}$ = 98.28) (F = 4.27, p = 0.006). In terms of engaging in religious behaviors, categories 3 ($\bar{X}$ = 14.16) and 4 ($\bar{X}$ = 13.77) reported a lower frequency of religious activity than category 1 ($\bar{X}$ = 16.09) (F = 3.65, p = 0.013). The active preventive health orientation subscale demonstrated that women in category 3 ($\bar{X}$ = 31.71) had lower scores than any of the other three categories (category 1, $\bar{X}$ = 34.71; category 2, $\bar{X}$ = 34.75; and category 4, $\bar{X}$ = 34.31) (F = 9.57, p < 0.0001) and higher scores in category 3 ($\bar{X}$ = 12.84) than categories 2 ($\bar{X}$ = 11.35) and 4 ($\bar{X}$ = 11.32) for the passive prevention health orientation subscale (F = 4.01, p < 0.008).

Risk and Benefit Categories Related to Mammography Compliance and Adherence

Stage of adherence to mammography by each of the four categories was compared in Table 2. Overall, 32% of the participants were adherent to mammography at six months. The greatest mammography adherence was for women in categories 1 and 2. The lowest rates of adherence were in categories 3 and 4, both of which had high perceived risk and either low or high perceived benefit. Results at the 0.05 level, for omnibus and pair-wise tests, were the same regardless when adjusted for education.

The relationship between categories by stage of mammography (precontemplation, contemplation, or action) was examined in Table 3. The omnibus comparison was significant in both the unadjusted and adjusted analyses. For subsequent pair-wise comparisons, three comparisons were possible: Women in the precontemplation stage were compared with women in contemplation, women in precontemplation were compared with women in action, and women in contemplation were compared with women in action (see Table 4).

Women with low perceived benefits and either low or high perceived risk (categories 1 and 3) were more likely to be in the precontemplation stage compared to women in category 4, who were more likely to be in the contemplation stage. Women in category 3 were less likely to be in the action stage and more likely to be in the precontemplation stage than women in categories 2 or 4. When comparing women in the contemplation stage to women in the action stage, women in categories 1 and 2 were more likely to be in action and less likely to be in contemplation than women in categories 3 and 4. The difference between categories 1 and 3 was significant only after adjusting for education. For this comparison, low perceived risk seemed to be related to having obtained a mammogram.

Discussion

The current study examined the relationship among categories of perceived risk and benefits, mammography adherence behavior, and stage of change in low-income African American women. A clear, consistent pattern exists when categories of risk and benefit are compared to mammography adherence, mammography stage, and beliefs that predict mammography adherence.

High perceived benefit was not associated with mammography adherence if accompanied by high risk. Adherence in category 1 was significantly higher than in category 3, indicating that when women identified low perceived benefits, higher perceived risk further decreased mammography adherence. Similarly, low perceived risk, regardless of whether the woman perceived low or high benefits, was associated with higher mammography adherence. When perceived risk was held constant (i.e., either low or high) higher perceived benefits were marginally associated with adherence. Category 1 showed marginally greater adherence than category 3 after adjusting for education (p = 0.056). The low- and high-risk categories may not have been sufficient to differentiate risk, and may need to be split into three categories. Low perceived risk may not be sufficient to encourage mammography and high perceived risk may induce enough fear that women are

Table 2. Relationship of Adherence to Mammography by Risk and Benefit Categories

	Category 1 (N = 34)		Category 2 (N = 63)		Category 3 (N = 86)		Category 4 (N = 116)				Post-Hoc Pair-Wise Comparisons		
Variable	n	%	n	%	n	%	n	%	p	p[a]	Category	p	p[b]
Not adherent	20	59	34	54	64	74	84	72	0.0224	0.0325	1 versus 3	0.093	0.0558
Adherent	14	41	29	46	22	26	32	28	–	–	2 versus 3	0.0093	0.0071
											2 versus 4	0.0129	0.0477

[a] From a 2 x 4 x 2 Cochran-Mantel-Haenszel chi-square test controlling for education

[b] From a 2 x 2 x 2 Cochran-Mantel-Haenszel chi-square test controlling for education

Category 1—low perceived risk and low perceived benefit; Category 2—low perceived risk and high perceived benefit; Category 3—high perceived risk and low perceived benefit; Category 4—high perceived risk and high perceived benefit

Table 3. Relationship Between Categories of Risk and Benefit by Stage of Mammography

	Category 1 (N = 34)		Category 2 (N = 63)		Category 3 (N = 86)		Category 4 (N = 116)	
Variable	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Precontemplation	8	24	8	13	19	22	9	8
Contemplation	12	35	26	41	45	52	75	65
Action	14	41	29	46	22	26	32	27

Category 1—low perceived risk and low perceived benefit; Category 2—low perceived risk and high perceived benefit; Category 3—high perceived risk and low perceived benefit; Category 4—high perceived risk and high perceived benefit

not inclined to make an appointment. That scenario is supported by the relationship of risk and benefit categories to fear. Other research (Champion et al., 2004) has demonstrated that a moderate risk level is most highly associated with mammography adherence.

In addition, the authors examined the relationship of fear, fatalism, knowledge, self-efficacy, mammography environment, barriers, religious beliefs, religious behaviors, and preventive health orientation to the four categories. The theoretic relationships between the risk and benefit categories and health belief variables demonstrated significance, with the most interesting results emerging for women in category 3. Women in category 3 had higher means on fear, fatalism, mammography, environment, barriers, and passive preventive health orientation, and lower means on knowledge, self-efficacy, religious beliefs, and active preventive health orientation. Those findings are revealing, as they test the as yet undefined interactions between perceived risk and benefits on health and cultural beliefs.

The combination of higher perceived risk and lower perceived benefits is striking because it reveals individuals with personal characteristics adverse to mammography screening adherence in a population of women more susceptible to a later-stage, more advanced breast cancer diagnosis. Perceived risk obscures the perceived benefits of screening mammography as an early detection modality. An individual's sense of confidence and knowledge to proactively engage in breast health care is attenuated and replaced with fear and fatalism of the inevitability of breast cancer death, regardless of diagnosis. Those results are not surprising. Lower perceived benefits and self-efficacy have been shown to work in tandem where lower self-efficacy and lower benefits have higher levels of fear (Russell et al., 2006). Religious beliefs, having been shown to be associated with adaptive breast cancer beliefs and mammography use among urban African American women (Holt, Clark, Kreuter, & Rubio, 2003), were lower in women in category 3.

Finally, the authors investigated whether the four categories were related to stage of mammography adherence or compliance with mammography adherence. Women with higher perceived benefits and higher perceived risk were more likely to be considering a mammogram. Perceived benefits, regardless of risk category, seemed to be the important variable for women considering a mammogram. Women in category 4 were more likely to be in the contemplation stage as opposed to the precontemplation stage compared to women in either categories 2 or 3. Women with high perceived benefits regardless of perceived risk (categories 2 and 4) were more likely to be in the action stage than the precontemplation stage. High perceived risk and low perceived benefit (category 3) increased the likelihood of women only being in the precontemplation stage compared to women with high perceived benefit regardless of perceived risk (categories 2 and 4).

It also is possible that, after having a mammogram, women's perception of risk decreased because results were negative. For those in the contemplation stage, higher risk possibly pushed women toward considering a mammogram. For women who had completed a mammogram, their perception of breast cancer risk was lower than those with higher risk perception who were only in the contemplation stage. Higher perceived benefits were associated with women considering a mammogram (contemplation) or actually having a mammogram (action). Women who had a mammogram were more likely to have lower risk, probably because they had just confirmed that breast cancer was not present.

In summary, it appears a new high-risk group of minority women has emerged that presents psychosocial health beliefs recalcitrant to customary educational

Table 4. Post-Hoc Pair-Wise Comparisons

Stage and Categories	p[a]	p[b]
Precontemplation versus contemplation		
Category 1 versus 4	0.0015	0.0048
Category 3 versus 4	0.0035	0.0038
Precontemplation versus action		
Category 2 versus 3	0.0219	0.0167
Category 3 versus 4	0.0199	0.0214
Contemplation versus action		
Category 1 versus 3	0.0619	0.0384
Category 1 versus 4	0.0213	0.0313
Category 2 versus 3	0.0267	0.0207
Category 2 versus 4	0.0045	0.0229

[a] Performed with a 2 x 2 Pearson chi-square test unadjusted.

[b] Performed with a 2 x 2 x 2 Cochran-Mantel-Haenszel chi-square test controlling for education.

Category 1—low perceived risk and low perceived benefit; Category 2—low perceived risk and high perceived benefit; Category 3—high perceived risk and low perceived benefit; Category 4—high perceived risk and high perceived benefit

intervention techniques. The combinations of health and cultural belief variables that predispose women in category 3 to nonadherence need to be disentangled and examined before additional interventions can be performed on the static mammography behaviors of that study population.

Limitations

The findings from this study are limited in generalization to women who participated in this study and are not representative of all African American women. Because other ethnic and racial groups were not included in this study, the authors cannot assert if study findings differ cross-culturally. Lastly, because the study is a cross-sectional analysis on self-reported behaviors and beliefs, the findings are tempered by known validity limitations.

Implications for Nursing Practice

African American medically underserved women in category 3 may exhibit immobilization toward mammography adherence when they experience higher perceived risk. The perception of high benefits possibly motivates women to progress through stages of readiness to mammography adherence. The findings suggest that future work is needed on the conceptualization, measurement, and communication of perceived risk and benefits conditioned on stages of mammography behavior. Additional psychometric analysis is warranted to develop a brief, reliable, valid, and user-friendly assessment of the combination of the four categories of perceived risk and perceived benefit to capture the interaction between the highly significant constructs. Reducing disparities in breast cancer diagnosis and survival requires timely and efficient mammography adherence. African American women with apprehension to use screening mammography may benefit from additional intervention regarding their health belief decisions to reduce disparities in breast cancer survival.

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