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Effects of Personal Characteristics on African-American Women's Beliefs about Breast Cancer

Terrell W. Zollinger, DrPH¹, Victoria L. Champion, DNS², Patrick O. Monahan, PhD², Susan K. Steele-Moses, DNS, APRN, AOCN³, Kim W. Ziner², Qianqian Zhao², Sara A. Hickey, MPH², Robert M. Saywell Jr., PhD, MPH¹, and Kathleen M. Russell, DNS²

¹Bowen Research Center and Department of Family Medicine Indiana University School of Medicine

² Center for Research and Scholarship Indiana University School of Nursing

³ Our Lady of the Lake Regional Medical Center Baton Rouge, LA

Abstract

Purpose—This study measured the effect of demographic and clinical characteristics on health and cultural beliefs related to mammography.

Design—Cross-sectional study.

Setting—Interviews were conducted during 2003 and 2004 in a Midwestern urban area.

Subjects—Subjects were 344 low-income African-American women aged 40 years and older who had not had a mammography within the previous 18 months.

Measures—The instrument measured personal characteristics, belief and knowledge scales and participants' mammography experience and plans.

Analysis—Multiple regression analysis assessed the effect of specific demographic and clinical characteristics on each of the scale values and on subjects' stage of readiness to change.

Results—The subjects' level of education significantly affected six of the 12 belief and knowledge scales. Higher educated women felt less susceptible to breast cancer, had higher self-efficacy, had less fear, had lower fatalism scores, were less likely to be present-time oriented, and were more knowledgeable about breast cancer. Older women felt they were less susceptible to breast cancer,

Address correspondence to: Terrell W. Zollinger, DrPH Indiana University School of Medicine Department of Family Medicine 1110 W. Michigan Street, Ste 200 Indianapolis, IN 46202 Ph: 317-278-0307 Fx: 317-274-4444 tzolling@iupui.edu.

Author Information Terrell W. Zollinger, DrPH Professor Department of Family Medicine Indiana University School of Medicine 1110 W. Michigan Street, Ste 200 Indianapolis, IN 46202 Phone:317-278-0307 tzolling@iupui.edu

Victoria L. Champion, DNS Associate Dean for Research Edward W. and Sarah Stam Cullipher Endowed Chair Mary Margaret Warner Distinguished Professor Indiana University School of Nursing 1111 Middle Drive Indianapolis, IN 46202 Phone:317-274-4187 vchampion@iupui.edu

Patrick O. Monahan, PhD Assistant Professor Indiana University School of Medicine Department of Medicine Cancer Center Pavilion, 380G RT Indianapolis, IN 46202 Phone:317-278-8086 pmonahan@iupui.edu

Susan K. Steele-Moses, DNS, APRN, AOCN Our Lady of the Lake Regional Medical Center 5000 Hennessey Boulevard Baton Rouge, LA 70808 Phone: 225-765-6565 susan.steele-moses@ololmc.com

Kim W. Ziner, RN PhD Candidate Indiana University School of Nursing, NU 338 1111 Middle Dr. Indianapolis, IN 46171 Phone: 317-274-4342 kwagler@iupui.edu

Qianqian Zhao, MS Biostatistician Department of Medicine, Division of Biostatistics Indiana University 410 W. 10th Street Suite 3000 Indianapolis, IN 46202 Phone:317-278-2605 qizhaofgdupui.edu

Sara A. Hickey, MPH Research Associate Indiana University School of Nursing 1111 Middle Drive NU 338 Indianapolis, IN 46202 Phone:317-278-6080 sahickey@iupui.edu

Robert M. Saywell, Jr., PhD, MPH Professor Department of Family Medicine Indiana University School of Medicine 1110 W. Michigan Street, Ste 200 Indianapolis, IN 46202 Phone:317-278-0352 rsaywell@iupui.edu

Kathleen M. Russell, DNS Associate Professor Indiana University School of Nursing 1111 Middle Drive, NU 471 Indianapolis, IN 46202 Phone:317-274-4079 katrusse@iupui.edu

had higher fatalism scores, were more present-time oriented, and were less knowledgeable about breast cancer.

Conclusions—The findings suggest that mammography promotion programs for African-Americans should consider the education level and age of the target women to be most effective.

Keywords

Mammography; Breast Cancer Screening; African-American; Health and Cultural Beliefs

Purpose

Breast cancer is the most common cause of cancer incidence and the second most common cause of cancer death among women in the United States. In 2007, approximately 178,480 new cases of invasive breast cancer were expected to be diagnosed with approximately 40,460 deaths anticipated from the disease.¹ African-American women, especially those who are older, less educated, and of lower socioeconomic status, are more likely to present with advanced stages of breast cancer and have a significantly lower 5-year survival rate than their Caucasian counterparts.²

Breast cancer mortality is inversely correlated with mammography adherence.³ Consequently, the Healthy People 2010 Objective 3-13 is to increase the proportion of women aged 40 years and older who have received a mammogram within the preceding 2 years. In order to meet the objective's target of 70% adherence as well as to reduce the mortality gap, the most efficacious methods of promoting routine screening among underserved populations must be identified and implemented. To improve the effectiveness of interventions, research aimed at identifying beliefs about and barriers to mammography should assess the effect of demographic and clinical characteristics on those mediators.

A variety of health and cultural beliefs affect mammography decision making.⁴⁻¹¹ Socioeconomic status, level of education, and income are the strongest predictors of mammography adherence.^{3, 12-20} African-American women with low educational attainment, decreased cancer knowledge, and without a usual source of care are less likely to be mammogram screening adherent.^{14,20-22} When information is readily available,^{19,23} individualized,^{19,24,25} and culturally sensitive,^{24,26} mammography adherence increased.

Fatalism,²⁷ personal identification with breast cancer,²⁸ fear of breast cancer,²⁸ and a willingness to change²⁹⁻³¹ all affect mammography screening. Cultural beliefs are associated with health practices,^{32,33} including mammography screening behavior.³⁴ Spirituality and religious beliefs affect screening intentions and practices, including holding religious beliefs about breast cancer causes and treatment³⁴ and being responsible to God for staying healthy.³⁵ Racial pride or taking part in traditional practices and holding positive racial attitudes is an important cultural construct for African-American women.³⁶ Targeted interventions using written educational materials that include health and cultural beliefs significantly increase mammography screening rates among non-adherent African-American women.³⁷ Time orientation or the tendency to think and act according to present or future consequences is predictive of mammography screening and showed that future-oriented women were more likely to obtain mammograms than present-oriented women.^{38,39} Collectivism or group identity is an important cultural norm in African-American women⁴⁰ and is reflected by their beliefs in the importance of sharing breast cancer screening information with other African-American women.^{25,35} Bailey⁴¹ found that African-American women reported being more likely to participate in learning about screening when they receive support from their family and particularly their daughters. Fowler⁴² identified social support and sisterhood as interrelated factors that increase mammography screening.

Even though a variety of health and cultural beliefs are known to affect mammography decision making, less known about the effects of demographic and clinical characteristics on an individual's health and cultural beliefs. Many interventions targeted beliefs and knowledge directly without considering the mediating role of demographic and clinical characteristics on these beliefs.^{4,43-45} The purpose of this study was to examine the effect of demographic and clinical characteristics on beliefs, knowledge, and stage of readiness to change, since it has been shown that health beliefs, knowledge and stage of readiness predict compliance among African-American women with mammography screening guidelines by the American Cancer Society.⁴⁶

Methods

Design

The data analyzed for this study were derived from face-to-face interviews of older, low-income, African-American women using a standard instrument conducted by trained research staff. The study received approval from the Indiana University-Purdue University, Indianapolis - Clarian Institutional Review Board.

For this study, the Extended Parallel Process Model (EPPM), the Health Belief Model (HBM), and the Transtheoretical Model (TTM) were employed to identify constructs relevant to mammography screening in low-income African-American women. Both the EPPM and the HBM focus on the direct effect of personal characteristics such as demographic and healthcare characteristics on mammography adherence.⁴⁷⁻⁵⁰ The TTM was used to classify the subjects' stage of readiness to change (that is, readiness to become adherent to the ACS mammography guidelines). The instrument used for this study was specifically designed for a face-to-face interview. Interview items included demographic variables, personal characteristics, beliefs, knowledge, and mammography experiences. The survey was conducted in 2003 and 2004. These study subjects formed a cohort of individuals participating in a trial designed to compare the effect of interventions on mammography adherence. The study intervention is described elsewhere.⁵¹

Sample

A total of 344 women agreed to participate out of 492 eligible women who were invited, yielding a participation rate of 69.9%. Women were accrued directly into the study at multiple locations in a Midwestern city and included residents in apartments and those visiting health centers and community events. Project staff approached African-American women and asked questions to establish whether they met the eligibility criteria, which included not having a mammogram within the last 18 months, being 41 to 75 years of age, and being at 175% of the federal poverty level or lower. Those who verbally agreed to participate were asked to sign an informed consent form and complete a baseline interview.

Measures

The demographic variables included age and education of the subject, whether she was living with a spouse or partner, if she had children, and her self-reported height and weight, from which the body mass index (BMI, kg/m²) was calculated. The BMI values were used to categorize individuals as being underweight/normal (BMI < 25.0), overweight (BMI between 25.0 and 29.9) and obese (BMI ≥ 30.0). Clinical characteristics included whether she had health insurance coverage, her usual source of medical care, if she had a family history of breast cancer, and whether she ever had a mammogram. A modified Gail risk score, which compares 5-year risk of breast cancer to the risk of an average 60 year old woman, was calculated for each woman and included in the study database. The Gail Risk Model is a computer program

that uses a woman's family history and medical history to estimate her chances of developing breast cancer in the next 5 years.⁵²

Belief scales were revised and tested for reliability and validity as part of the overall project. Prior to any data collection, two focus groups of low-income African-American women were convened and belief scales presented for feedback. Items were added or reworded based on the comments of focus group participants. A description of the reliability and validity of these scales is reported elsewhere.⁵³ The number of items in each scale and the standardized Cronbach α coefficient are presented here. The perceived susceptibility scale measured perceived likelihood of getting breast cancer using four items ($\alpha=.802$). An example of a question for this scale is, "How likely or unlikely are you to get breast cancer during your lifetime?" Respondents were asked to give a numeric answer in the range from 1 for "Very Unlikely" to 7 for "Very Likely." The perceived benefits component assessed the perceived effectiveness of behavior to decrease the risk of death from breast cancer using four items ($\alpha=.646$). The barriers scale included 19 items that hindered the ability to obtain a mammogram ($\alpha=.866$). The self-efficacy scale measured the women's perceived ability to obtain a mammogram using 10 items ($\alpha=.819$). The fear scale measured emotional reaction to thinking about breast cancer using eight items ($\alpha=.938$).⁵⁴ Cancer fatalism was measured using the Powe Fatalism Inventory, which assesses the degree to which a person equates cancer with death (15 items, $\alpha=.835$).⁵⁵⁻⁵⁷

The scales of family collectivism, time orientation, and racial pride were developed by Lukwago, et al.³⁶ to measure cultural beliefs in the African-American community. Family collectivism was defined as the degree of family cohesiveness using six items ($\alpha=.805$). Other items measured the degree to which participants were future time oriented (five items, $\alpha=.518$) as opposed to present time oriented (five items, $\alpha=.627$). Racial pride items asked about the degree to which the participant felt connected to the African-American community (seven items, $\alpha=.853$). Religiosity was measured by a scale that addressed the degree to which religion played a role in the lives of individuals using nine items ($\alpha=.863$).³⁷ The knowledge scale included eight items about breast cancer, treatment options, and mammography ($\alpha=.310$).

Since all women were non-adherent when enrolled, two items were used to identify stage of readiness to obtain a mammogram, consistent with other research.^{58,59} Pre-contemplation stage included those women who never had a mammogram or had one 18 months ago or longer, and did not plan to have one within the next 6 months. Women who were in the contemplation stage included those women who never had a mammogram or had one 18 months ago or longer, but did plan to have another within the next 6 months.

Analysis

The first stage of the data analysis consisted of a series of simple comparisons of each demographic and clinical characteristic with each belief scale. For beliefs, the two-sided Wilcoxon Rank Sum test was used to compare two demographic groups and the Kruskal – Wallis test was used to compare three or more groups. The Pearson chi-square test was used to compare stage of readiness to change with the categorical demographic and clinical characteristics. Multiple linear regression analysis was then used to assess the effect of the demographic and clinical characteristics on each of the scale values to adjust for covariates, except stage of readiness, which used the multiple logistic regression technique. For the 12 multiple linear regression analyses, the dependent variables were the subject's 12 belief scores. For the multiple logistic regression analysis, the dependent variable was the subject's stage of readiness to change; being in contemplation stage was coded "1", while being in pre-contemplation stage was coded "0." The independent variables were the demographic and clinical characteristics, for which dummy variables were created for entry into the analysis. For ordinal scale variables, the lowest value was used as the base value. For those variables

with “yes” or “no” response options, the “no” response was used as the base value. For the source of regular medical care variable, the emergency room option was used as the base value. All of the demographic and clinical characteristics were forced into each of the multiple regression analyses. Assessments of the equations as a whole, using R^2 , along with the resultant semi-partial regression coefficients for each independent variable, controlling for the other independent variables, for the multiple linear regression analyses were examined and reported. The multiple logistic regression analysis reported the max-rescaled generalized R^2 and the odds ratios for each independent variable, controlling for the other independent variables in the equation. A p value less than .05 was considered significant. SAS/STAT® software (SAS Institute Inc., Cary, NC, USA) was used to perform the statistical analyses for this study.

Results

Demographic and clinical characteristics

Over half (57.9%) of the African-American women participants were between 41 and 50 years of age. One-fourth of the participants (25.6%) had less than a high school education, while over one-third (37.5%) had more than 12 years of education. One-third (32.6%) were living with a spouse or partner, and most (90.1 %) indicated that they had children. Over two-thirds (70.6%) of the participants reported that they had health insurance, and about one in ten (9.9%) indicated that an emergency department was their “regular source of medical care.” Over half (59.9%) received their regular medical care in a hospital or community based clinic, and almost one-third (30.2%) responded that they received their regular medical care from a personal physician.

Most of the participants (81.0%) were either in the overweight (26.9%) or obese (54.1%) category. One-fourth (26.7%) indicated that a close relative had been diagnosed with breast cancer. Most reported that they had received a mammogram in the past (73.0%). Only a few (2.3%) were classified as being at high risk for developing invasive breast cancer in the next 5 years, based on their Gail risk score.

Bivariate results comparing belief scale values to demographic and clinical characteristics

The results of the bivariate analysis found that the subjects' level of education significantly affected seven of the belief and knowledge scales—more than any other demographic or clinical characteristic. Having a history of a mammogram affected three belief scales. Subjects' age, having children, and source of regular medical care significantly affected two belief scales each. Having health insurance, being in the overweight (BMI = 25.0 to 29.9) category, a family history of breast cancer, and being at increased risk based on the Gail risk score (≥ 1.7) were significantly related to one belief scale each. Living with a spouse or partner was not significantly related to any of the belief scales.

Perceived susceptibility scale values were significantly higher for those with less education and those with a family history of breast cancer. Perceived benefits scale values were significantly higher for those classified as being at increased risk using the Gail risk score. Perceived barriers scale values were higher for participants who never had a mammogram. Self-efficacy scale values were significantly higher for those with more education, those who used a personal physician or clinic for their regular medical care, and those who had a mammogram in the past. A significant inverse relationship existed between fear scale values and level of education as well as between fatalism scale values and the level of education of the subjects. Those in the underweight or normal weight BMI category had significantly higher fatalism scale values compared to those in the overweight category. The fatalism scale values for obese subjects were between the scale values for the other two BMI categories.

Family collectivism scale values were significantly higher for participants without health insurance and those who never had a mammogram. Women with children were more often future time oriented. Participants in the oldest age group were more often present time oriented as were those with less education, those without children, and those who indicated that emergency departments were their source of regular medical care. Racial pride scale values were directly related to the education level of the subjects. Knowledge scale values were significantly lower for the oldest subjects and those with less education. None of the other demographic or clinical characteristics affected the subjects' knowledge scale values. Religiosity and stage of readiness were not significantly related to any of the demographic or clinical characteristics in the bivariate analysis.

Multiple regression results

The multiple regression models shown in Table 1, using demographic and clinical characteristics as predictors, explained a significant amount of the variation in six of the 12 belief and knowledge scales: perceived susceptibility ($p=.0069$), self-efficacy ($p=.0004$), fatalism ($p=.0015$), present time orientation ($p<.0001$), racial pride ($p=.0278$), and subjects' knowledge ($p<.0001$). As a group, the demographic and clinical characteristics of the African-American women did not have a significant effect on perceived benefits, perceived barriers to obtaining mammography screening, fear, family collectivism, future time orientation, or religiosity. In addition, the demographic and clinical characteristics as a group did not significantly predict which patients were in the contemplation stage.

Subject's age and level of education were the two most consistent predictors of the belief and knowledge scales (six of the 12 belief and knowledge scales). Having children was statistically significant in three of the models. Living with a spouse or partner, having a source of regular medical care, and having a history of a mammogram were statistically significant in two belief models, while having health insurance, BMI between 25.0 and 29.9, having a family history of breast cancer, and being at risk based on the Gail risk score (≥ 1.7) were statistically significant predictors in only one of the belief models each.

Discussion

Other research has focused on the relationship between personal characteristics and mammography adherence as well as the relationship between health beliefs and mammography adherence. What is not well understood is the effect of personal characteristics on health and cultural beliefs, particularly for populations at highest risk of not obtaining mammograms. This study directly addresses that gap in knowledge.

The subjects' level of education significantly affected six of the 12 belief and knowledge scales - more than any other demographic or clinical characteristic. African-American women with more formal education were more knowledgeable about breast cancer and had higher self-efficacy scores. The more highly educated women had lower fear, susceptibility and fatalism scores and were less likely to be present time oriented. The results of this study help explain the findings previously reported^{3, 12-19} that higher education levels predicted mammography adherence and re-screening.

A woman's age was also found to be related to many of the belief scales, when holding the other demographic and clinical characteristics constant. The older women tended to be less knowledgeable, more present time oriented, and to have higher fatalism scores. The younger women tended to believe they were less susceptible to breast cancer and had higher racial pride scores. However, a woman's age was not as strong a predictor of beliefs and knowledge as her education level in the models.

This study included a selected sample of African-American women who agreed to be included in the intervention and may not be representative of all African-American women. Although all of the subjects were in the low-income category, their level of education was relatively high, indicating that these study subjects may have had a better understanding of the relationship between specific risk factors and development of breast cancer than those of lower education level. Nonetheless the study group did include women with a wide range of health and cultural beliefs as well as demographic characteristics; thus, the relationships identified here should be somewhat indicative of patterns that exist in similar groups of women. In addition, this study is subject to the well known validity limitations of self-reported behaviors and beliefs. Being a cross-sectional survey, the temporal arrangements of some of the personal characteristics to the belief scores cannot be established. Since a number of statistical tests were conducted, it is expected some results may have been significant by chance alone. Thus, conclusions must be drawn with caution where strong and consistent relationships did not exist.

Future studies should include women of other racial groups and in other income categories. Further research is also needed to provide a better understanding of the effects of a wide range of factors affecting prevention behaviors in specific populations. Understanding these relationships will assist in more accurately targeting the intervention messages to increase mammography utilization.⁶⁰ These specific, targeted interventions are key to achieving the Healthy People 2010 objective of 70% adherence with mammography recommendations.

So What?

Those developing interventions to increase mammography screening should consider women's demographic and clinical characteristics that appear to affect their compliance. For example, the findings of this study suggest that when targeting mammography promotion programs for African-Americans, the education level and age of the targeted women may relate to their beliefs, while other demographic and clinical characteristics appear to be of little consequence. Interventions for more educated African-American women should include awareness of their personal susceptibility and put less emphasis on self-efficacy, fear, fatalism, present time orientation, and knowledge. In addition, the age group of the targeted group appears to be a valuable consideration when designing interventions to increase mammography adherence among African-American women. If the target population is between 50 and 69 years of age, the program should emphasize awareness of participants' personal susceptibility. Programs that target women age 60 and older should include efforts to increase the participants' general knowledge of breast cancer to be more effective. Since those in the 50 to 59 age group are likely to be more religious, programs should consider including this component. As the results of further research become available, more carefully targeted interventions should increase mammography compliance of African-American women in different demographic groups.

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Table 1

Coefficients of Determination and Odds Ratios from Multiple Regression Analysis of Demographic and Health Characteristics in Explaining Variation in Belief Scores and Stage of Readiness to Change[†]

Characteristic	Belief Scales					Cultural Beliefs							
	Susceptibility	Benefits	Barriers	Self Efficacy	Fear	Fatalism	Family Collectivism	Future Time Orientation	Present Time Orientation	Racial Pride	Religiosity	Knowledge	Stage
Model													
Multiple R ²	.09	.04	.05	.11	.05	.10	.04	.06	.19	.08	.02	.13	.09
F Value	2.18	0.89	1.08	2.8	1.11	2.52	0.98	1.34	5.11	1.85	0.46	3.13	20.83
P Value	.0069	.5810	.3749	.0004	.3472	.0015	.4730	.1769	<.0001	.0278	.9581	<.0001	.1424
Age (years)													
<50	base	base	base	base	base	base	base	base	base	base	base	base	base
50-59	-.11*	.03	.04	-.03	.05	.04	.05	.04	.08	.12*	.11*	-.05	0.63
60-69	-.13*	-.05	-.01	.04	-.09	.05	.01	.01	.04	-.04	.04	-.13**	0.53
70+	-.05	-.09	.06	-.06	-.06	.13*	-.08	-.06	.13**	.02	.05	-.20***	2.49
Education level													
Less than High School	base	base	base	base	base	base	base	base	base	base	base	base	base
High School or Equivalent	-.05	.03	-.07	.12*	-.10	-.09	.04	.03	-.09	.06	-.03	.08	0.90
More than High School	-.15**	-.01	-.06	.18***	-.14*	-.18***	.07	.03	-.25***	.08	-.03	.017***	0.96
Living with spouse/partner													
Yes	-.06	.06	-.02	.12*	-.03	-.06	.04	-.07	-.12*	.01	.01	.05	0.77
No	base	base	base	base	base	base	base	base	base	base	base	base	base
Children													
Yes	-.11*	.00	.00	.02	.02	-.06	-.04	.11*	-.11*	-.07	-.03	-.01	0.49
No	base	base	base	base	base	base	base	base	base	base	base	base	base
Health insurance													
Yes	.07	-.04	-.05	.06	-.04	.01	-.01	-.11*	.06	-.09	.02	.07	0.83
No	base	base	base	base	base	base	base	base	base	base	base	base	base
Body Mass Index (BMI)													
Underweight/normal	base	base	base	base	base	base	base	base	base	base	base	base	base

Characteristic	Belief Scales					Cultural Beliefs							
	Susceptibility	Benefits	Barriers	Self Efficacy	Fear	Fatalism	Family Collectivism	Future Time Orientation	Present Time Orientation	Racial Pride	Religiosity	Knowledge	Stage
Overweight	-.04	-.05	.01	.03	-.03	-.15**	-.04	.00	.07	.02	-.03	-.03	1.65
Obese	-.09	-.06	-.03	.02	.00	-.08	-.01	-.02	.09	.09	-.02	-.05	0.83
Source of regular medical care													
Family doctor	.07	.02	-.05	.02	-.02	-.02	-.02	.08	-.11*	.05	.03	.00	1.06
Emergency room	base	base	base	base	base	base	base	base	base	base	base	base	base
Other	.09	-.01	-.08	.10*	-.02	.01	-.03	.06	-.04	-.01	.03	-.03	0.70
Family history of breast cancer													
Yes	.13*	-.06	.01	-.04	.06	.01	.09	-.02	-.02	-.05	.00	-.03	1.12
No	base	base	base	base	base	base	base	base	base	base	base	base	base
History of mammogram													
Yes	.06	.02	-.11*	.13*	-.01	-.04	-.07	.06	-.06	-.01	.01	.06	0.99
No	base	base	base	base	base	base	base	base	base	base	base	base	base
Gail risk score (5 year risk)													
Average or below risk	base	base	base	base	base	base	base	base	base	base	base	base	base
Increase Risk (≥ 1.7)	.05	.12*	-.05	.00	-.01	.03	.02	-.05	.06	.06	.01	-.04	0.25

[†] For beliefs, linear regression was used, the overall model has 15 and 325 *df* for all belief models, and values for independent variables (demographic and health characteristics) are semi-partial correlation coefficients adjusted for other independent variables in the model. For stage, logistic regression was used, and the event modeled is contemplation, the overall model was tested with a likelihood ratio chi-square (not F) test with 15 *df* for the overall model is the max-rescaled generalized R², and values for independent variables (demographic and health characteristics) are odds ratios adjusted for other independent variables in the model.

Significance of the semi-partial correlation coefficients and odds ratios:

* p < .05,

** p < .01,

*** p < .001,

**** p < .0001.