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Predicting intentions to engage in cancer prevention and detection behaviors: Examining differences between Black and White adults

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Reducing cancer-related mortality rates can be achieved by increasing cancer screening rates and by increasing the number of people who engage in healthy lifestyle behaviors. This study uses the Integrative Model of Behavioral Prediction (IM; Fishbein, 2000) to examine differences between Blacks and Whites in the US in the degree to which attitudes, perceived behavioral control (PBC) and normative pressure contribute to predicting intentions to engage in three cancer screening behaviors (mammogram, colonoscopy and PSA test) and three healthy lifestyle behaviors (controlling ones diet to lose weight, eating fruits and vegetables and exercising regularly). Prior research has demonstrated that these behaviors are effective at reducing incidence and mortality rates for some cancers. Results indicated that for Blacks intentions to engage in all behaviors were driven by PBC. Patterns were more varied for Whites and indicated that normative pressure was a particularly important determinant of screening intentions whereas attitudes were most strongly associated with dieting intentions. Results suggest that interventions targeting these behaviors should be tailored by behavior and by ethnicity.

Keywords: neoplasm; behavior; health promotion; psychology; social; ethnic

Introduction

Cancer is the second leading cause of death among Americans. According to a report by the American Cancer Society (2007a), reducing cancer deaths and increasing survival can be achieved by appropriate screening and detection tests, and by engaging in healthy lifestyle behaviors, such as eating fruits and vegetables, exercising regularly and controlling ones weight. In fact, according to the report, one-third, or 186,550 of the estimated 559,650 cancer deaths in 2007 'will be related to overweight or obesity, physical inactivity, and nutrition and thus could also be prevented' (p. 1). A key component to reducing cancer incidence and mortality and to increasing the overall health of the American population is to better understand the factors that are most strongly associated with performing behaviors that lead to more positive health outcomes, and to develop interventions that address the psychosocial factors that are most strongly associated with these behaviors. Some research indicates that the relative importance of the factors associated with

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intentions to perform these behaviors differ by behavior (Smith-McLallen & Fishbein, 2008). However, it is also possible that these factors also differ by population.

Ethnic differences in cancer screening and healthy lifestyle behaviors

Each of the six behaviors we examine in this study—getting a mammogram, getting a colonoscopy, getting a PSA test, eating five or more servings of fruits and vegetables, exercising regularly and controlling ones diet to lose weight—contribute to decreased cancer incidence or cancer-related mortality. Yet, significant portions of Blacks and Whites alike do not adhere to the recommended guidelines for cancer screening and healthy lifestyle behaviors.

Cancer screening

Although breast screening detects more than 80% of breast cancers present in asymptomatic women and reduces mortality due to breast cancer (American Cancer Society, 2007b), data indicate that 13.7% of non-Hispanic Black (Black) and 17.7% of non-Hispanic White (White) women over 40 have not had a mammogram in the past 2 years (Behavioral Risk Factor Surveillance System; BRFSS, 2007). Similarly, colorectal cancer screening, particularly colonoscopy, can reduce deaths due to colon cancer by detecting cancer at early stages and by removing precancerous polyps, yet 34.8% of Whites and 44.2% of Blacks over 50 have never had an endoscopy (colonoscopy or sigmoidoscopy) (BRFSS, 2007). Although the current evidence regarding the efficacy of the prostate-specific antigen test (PSA test) for reducing mortality due to prostate cancer is inconclusive, the current recommendation is that beginning at age 50 men with a life expectancy of at least 10 years should discuss taking a PSA with a physician annually (Smith, Cokkinides, & Eyre, 2007). One of the stated goals of the American Cancer Society (2007c) is to increase to 90% the proportion of men who adhere to age-appropriate prostate cancer detection guidelines. Recent data indicate that 16.6% of Whites and 19.9% of Blacks over 50 have never had a PSA test (BRFSS, 2007).

Lifestyle behaviors

Research indicates that regular exercise reduces risk of breast and colon cancer (McTiernan et al., 2007; Vainio, Kaaks, & Bianchini, 2002), adequate fruit and vegetable consumption is associated with lower risk of colon cancer (Park et al., 2005), and obesity and weight gain throughout adulthood is associated with increased risk for breast, colon and prostate cancer (Carmichael, 2006; Murphy, Calle, Rodriguez, Kahn, & Thun, 2000; Porter & Stanford, 2005). Nevertheless, for adults over the age of 40, current estimates are that 65.8% of Whites and 79.4% of Blacks are either overweight or obese (Body Mass Index $\geq$25), 57% of Whites and 70.3% of Blacks report insufficient levels of physical activity in the past 30 days, and 72.3% of Whites and 74.2% of Blacks do not consume the recommended five or more servings of fruits and vegetables per day (BRFSS, 2007).

One goal of the U.S. Department of Health and Human Services (2000) *Healthy People 2010* initiative is to ''eliminate health disparities,'' with particular emphasis on the need to reduce the higher cancer incidence and mortality rates among Blacks

as compared to Whites. These incidence and mortality rates are directly linked to the cancer disparities in screening rates and proportions of people who are overweight or obese and who engage in other healthy lifestyle behaviors. One model that may be particularly useful for understanding the psychosocial factors that contribute to decisions to get screened for cancer or to engage in healthy lifestyle behaviors that may help prevent cancer is the Integrative Model of Behavioral Prediction (IM; Fishbein, 2000).

According to the IM, the most proximal predictor of behavior is the intention to perform the behavior. Behavioral intentions, in turn, are a function of attitudes toward performing the behavior in question, perceptions of normative pressure to engage in (or not engage in) the behavior, and perceived control or self-efficacy with respect to performing the behavior. More specifically, attitudes toward the behavior refer to the degree to which one is in favor of or opposed to performing the behavior; is my performance of the behavior good or bad? Is it harmful or beneficial, pleasant or unpleasant? Normative pressure refers to a person's perception of the degree to which important others think he or she should or should not perform the behavior (the injunctive norm), as well as perceptions of whether peers or other 'important others' are themselves performing or not performing the behavior (the descriptive norm). The perceived behavioral control (PBC) component measures a person's belief that they do, or do not, have the ability to perform the particular behavior under a number of challenging circumstances; that performing the behavior is, or is not, under the person's control.

In this study, we use the IM as a framework for understanding how the factors that predict intentions to engage in three screening and three lifestyle behaviors differ between Whites and Blacks. More specifically, we examine the similarities and differences between Black and White adults in terms of the relative importance of the IM predictors—attitudes, perceived normative pressure and perceived behavioral control—as determinants of intentions to perform each of these behaviors within each group. Ultimately, the purpose of this research is to demonstrate how theory can inform the design of population-specific interventions aimed at increasing screening rates and the proportion of people that engage healthy lifestyle behaviors in both Black and White populations.

Method

Participants and procedure

Participants were 2489 adults (1273 female, 1216 male) between the ages of 40 and 70 with an average age of 52.85 (SD = 8.40). The sample was selected from a national panel of adult participants compiled by Knowledge Networks, an independent survey research company. Panel members were recruited using random digit dialing procedures. If a panel member did not have internet access the survey company provided internet access for them. Once the sample was selected from the panel, data were collected using online questionnaires. With respect to the ethnicity of our sample, 76.46% were non-Hispanic White, 10.77% were non-Hispanic Black, 7.15% were Hispanic, 2.93% identified as more than two races and 2.69% indicated 'other'. Although our sample contained 178 Hispanic respondents, our analyses focus on comparisons between 268 Black (158 female, 110 male) and 1903 White (954 female, 949 male) participants ($n = 2171$) primarily because the available sample of Hispanics was quite low for several of the behaviors (e.g., $n = 58$ for PSA tests,

and $n = 83$ for mammograms) limiting our ability to make useful comparisons across behaviors and between groups.

Participants responded to a questionnaire assessing behavioral intentions, attitudes, perceived behavioral control and normative pressure regarding cancer screening and healthy lifestyle behaviors. Specifically, all participants responded to questions regarding getting a colonoscopy in the next year or when it is next recommended, eating five or more servings of fruits and vegetables most days in the next year, controlling ones diet to lose weight and exercising at least three times in most weeks over the next year. Male participants also responded to questions regarding getting a PSA test for prostate cancer in the next year, and female participants responded to additional questions about getting a mammogram in the next year. These items were imbedded in a larger survey examining cancer-related information seeking and scanning (see Niederdeppe et al., 2007) that took place between October 2005 and June 2006. The median time to complete the survey was 23.23 min.

Measures

For all behaviors, we measured behavioral intentions (BI), perceived behavioral control (PBC), perceived normative pressure (PNP) and attitudes (ATT). BI was assessed with a single item reading, for example 'How likely is it that you will exercise at least three times in most weeks over the next year?' (1 = very unlikely, to 5 = very likely). A single item was also used to assess PBC. For example, 'If you wanted to, how sure are you that you can exercise at least three times in most weeks over the next year?' (1 = very unsure, to 5 = very sure). Consistent with the IM, and with Smith-McLallen and Fishbein (in press), PNP was computed as an average of one item assessing injunctive norms (e.g., 'Do most people who are important to you think you should or should not exercise at least three times in most weeks over the next year?' 1 = definitely should not, to 5 = definitely should) and one assessing descriptive norms (e.g., 'How many of the people most important to you exercised at least three times a week most weeks in the past year?' 1 = none or very few to 4 = all or almost all). ATT toward each of the behaviors were assessed by averaging responses to two semantic differential scales. Items read, for example, 'My exercising at least three times in most weeks over the next year is (extremely bad, extremely good; extremely unpleasant, extremely pleasant). Both items were scored -3 to $+3$. See Smith-McLallen and Fishbein (in press) for a detailed description of all measures.

Analyses

We used MANOVA to examine mean differences in the IM variables between Blacks and Whites within each behavior. Effect sizes (Cohen's *d*) are computed for these differences. Chi-square tests were used to compare the proportions of Black and White intenders (those scoring 4 or 5 on the intention measure) and non-intenders (those scoring 1, 2 or 3 on the intention measure) for each behavior. For each of the six behaviors, we use multiple regression to predict BI separately for Blacks and Whites by entering ATT, PNP and PBC simultaneously into the model.[1] To determine which of the IM predictors was most closely associated with intentions within each group we followed the procedures described in Cohen, Cohen, West, and

Aiken (2003, pp. 640–642) for testing differences between each pair of standardized regression coefficients within a single model (e.g., the difference between the coefficients for PBC and ATT within the model predicting intentions for Blacks). The test is a *t*-test with $df = n - k - 1$, where k is the number of predictors in the model; $k = 3$ for all models presented here.

Results

Mean between-group differences

As Table 1 illustrates, compared to Whites, Blacks in our sample had significantly stronger intentions and expressed more positive attitudes to engage in each of the six behaviors. Blacks and Whites did not differ in their perceptions of normative pressure (PNP) for getting a PSA, but Blacks reported significantly stronger PNP for the other five behaviors. Whites indicated that they had significantly more control over getting a colonoscopy and a PSA test than Blacks, and Blacks indicated they had significantly more control over eating fruits and vegetables than did Whites.

Table 1. Tests of differences between blacks and whites on IM variables.

	Whites		Blacks				
Behavior	*M*	*SD*	*M*	*SD*	*F*	*p*	*d*
Mammogram	$n = 939$		$n = 156$				
Intentions	4.06	1.37	4.28	1.29	3.62	0.057	0.16
ATT	0.86	1.42	1.53	1.43	29.81	0.000	0.47
PNP	3.19	0.73	3.35	0.65	6.85	0.009	0.22
PBC	4.59	0.97	4.56	1.05	0.12	0.732	−0.03
Colonoscopy	$n = 1646$		$n = 215$				
Intentions	3.03	1.61	3.33	1.65	6.76	0.009	0.19
ATT	−0.23	1.62	0.43	1.67	31.34	0.000	0.41
PNP	2.51	0.82	2.64	0.86	4.37	0.037	0.16
PBC	4.19	1.20	3.79	1.49	19.62	0.000	−0.32
PSA test	$n = 690$		$n = 76$				
Intentions	3.60	1.39	4.01	1.42	6.10	0.014	0.29
ATT	1.15	1.34	1.47	1.52	3.82	0.051	0.24
PNP	2.68	0.69	2.76	0.77	0.92	0.337	0.11
PBC	4.52	0.91	4.21	1.30	7.16	0.008	−0.32
Exercise	$n = 1858$		$n = 264$				
Intentions	3.56	1.23	3.88	1.13	15.89	0.000	0.26
ATT	1.29	1.48	1.65	1.37	14.31	0.000	0.25
PNP	2.70	0.54	2.82	0.64	11.61	0.001	0.22
PBC	3.97	1.12	4.06	1.09	1.44	0.230	0.08
Eating F & V	$n = 1887$		$n = 267$				
Intentions	3.18	1.29	3.79	1.11	52.63	0.000	0.48
ATT	1.61	1.32	1.96	1.22	16.42	0.000	0.27
PNP	2.69	0.58	2.87	0.66	22.74	0.000	0.30
PBC	3.88	1.16	4.09	1.08	8.22	0.004	0.18
Dieting	$n = 1867$		$n = 260$				
Intentions	3.39	1.22	3.67	1.22	12.01	0.001	0.23
ATT	0.82	1.49	1.25	1.60	18.50	0.000	0.29
PNP	2.52	0.62	2.62	0.72	5.50	0.019	0.16
PBC	3.80	1.10	3.90	1.13	1.60	0.206	0.09

Positive effect sizes (*d*) indicate that the mean for Blacks was higher than the mean for Whites.

Blacks and Whites did not differ in mean levels of PBC for the other behaviors. As seen in Table 2, proportionally more Blacks than Whites intended to engage in each of the six behaviors.

Regression analyses

Screening behaviors

Table 3 displays regression coefficients for models predicting screening intentions. For Blacks, the PBC coefficient was largest for all three screening behaviors. Tests of the differences between the pairs of coefficients showed that the PBC coefficients were significantly larger than the ATT and PNP coefficients in the mammogram and colonoscopy models, ps < 0.02. Although in the model predicting intentions to get a PSA test the PBC coefficient ($\beta = 0.48$), was more than twice as large as the coefficients for PNP ($\beta = 0.22$) and ATT ($\beta = 0.23$), tests of the differences between the PBC coefficient and the PNP and ATT coefficients failed to reach conventional levels of statistical significance, ps $= 0.08$ and 0.10, respectively.

Although PBC was the component most strongly related to Blacks' intentions to perform all screening behaviors, a different pattern emerged for Whites. The PNP coefficient was largest in the models predicting colonoscopy and PSA intentions. Tests indicated that the PNP coefficient was larger than the ATT and PBC coefficients in both models, ps < 0.005. In the model predicting Whites' intentions to get a mammogram, the PBC coefficient was largest ($\beta = 0.35$) and was

Table 2. Chi-square analyses of percentages of non-intenders by ethnicity.

Behavior	% White non-intenders	% Black non-intenders	χ^2	p	d
Mammogram	25.8	18.4	3.40	0.046	0.17
Colonoscopy	54.7	46.3	5.41	0.020	0.17
PSA test	40.9	27.3	5.40	0.020	0.28
Exercise	40.6	28.8	13.66	0.000	0.24
Eating F&V	54.1	30.6	51.73	0.000	0.47
Dieting	46.3	39.7	4.14	0.042	0.13

Non-intenders are those who scored 1, 2 or 3 on the behavioral intention measure.

Table 3. Standardized regression coefficients for screening behaviors.

	Mammogram		Colonoscopy		PSA test	
Predictor	White	Black	White	Black	White	Black
ATT	0.26	0.16	0.25	0.12	0.27	0.23
PNP	0.32	0.07 *ns*	0.46[a]	0.30	0.42[a]	0.22
PBC	0.35[b]	0.63[a]	0.18	0.50[a]	0.20	0.48
Model R^2	0.50	0.52	0.51	0.56	0.49	0.62

All coefficients are significant at $p < 0.05$ except where noted.

[a]Tests indicated that the coefficient was significantly larger than the other two components in the model.

[b]Tests indicated the coefficient was significantly larger than the smallest coefficient in the model. Ns for each behavior can be found in Table 1.

significantly larger than the ATT coefficient ($\beta = 0.26$), $t(935) = 2.15$, $p = 0.032$, but was no different than the PNP coefficient ($\beta = 0.32$), $t(935) = 0.68$, $p = 0.500$.

Lifestyle behaviors

Like the pattern observed for intentions to undergo cancer screenings, Black's intentions to engage in all three healthy lifestyle behaviors were primarily driven by PBC (Table 4). Specifically, in models predicting intentions to exercise and diet the PBC coefficients were significantly larger than the ATT and PNP coefficients ($ps < 0.009$). Although the PBC coefficient ($\beta = 0.30$) in the model predicting intentions to eat fruits and vegetables was also the largest it was not significantly larger than the coefficient for ATT ($\beta = 0.27$), $t(263) = 0.44$, $p = 0.663$, or PNP ($\beta = 0.23$), $t(263) = 0.87$, $p = 0.389$.

No consistent pattern of results emerged across the three lifestyle behaviors for Whites. Exercise intentions were predicted by both PBC ($\beta = 0.41$) and ATT ($\beta = 0.40$), and although statistically significant, PNP contributed relatively little to the prediction of exercise intentions ($\beta = 0.08$), and both the PBC and ATT coefficients were significantly larger than the PNP coefficient, p's < 0.001. Intentions to eat fruits and vegetables were predicted equally from all factors. Dieting intentions were predicted equally from ATT ($\beta = 0.35$) and PBC ($\beta = 0.33$), and the coefficients for both ATT and PBC were significantly larger than the coefficient for PNP ($\beta = 0.23$), $ps < 0.001$.

Discussion

Our analyses showed that although significant portions of both populations still do not intend to perform the cancer screening and healthy lifestyle behaviors examined here, Blacks had stronger intentions to perform these behaviors than did Whites. Regression analyses and tests of differences between coefficients showed that (a) the patterns of associations between the IM predictors and intentions varied by ethnicity, and; (b) in 6 of the 12 models tested a single factor emerged as significantly more predictive of intentions than either of the other two factors. These findings have practical implications for designing interventions aimed at increasing screening rates and participation in healthy lifestyle behaviors in both populations. Specifically, for behaviors where a single factor emerged as

Table 4. Standardized regression coefficients for healthy lifestyle behaviors.

	Exercise		Eating F & V		Dieting	
Predictor	White	Black	White	Black	White	Black
ATT	0.40	0.11	0.29	0.27	0.35[a]	0.24
PNP	0.08	0.12	0.28	0.23	0.23	0.24
PBC	0.41[a]	0.59[b]	0.28	0.30	0.33	0.45[b]
Model R^2	0.55	0.50	0.45	0.38	0.51	0.55

All coefficients are significant at $p < 0.05$ except where noted.

[a]Tests indicated the coefficient was significantly larger than the smallest coefficient in the model. Ns for each behavior can be found in Table 1.

[b]Tests indicated that the coefficient was significantly larger than the other two components in the model.

more predictive of intentions than the others, it may be possible to develop efficient and effective interventions by targeting that component.

The finding that perceptions of behavioral control were particularly important predictors of Blacks' intentions to perform these behaviors suggests that addressing issues of behavioral control is vital to improving health outcomes, and particularly cancer-related health outcomes among Blacks in the US. Interventions aimed at increasing rates of these behaviors in the Black population in the US should specifically address issues of perceived behavioral control. However, changing perceptions of behavioral control may be a complex matter.

Although in some instances, changing perceptions of behavioral control may be accomplished via informational (e.g., message-based) interventions, policy and social-structural changes may also be needed to increase perceptions of control as well as actual control over performing these behaviors. For example, system-level factors such as lower levels of health insurance for minorities (Smedley, Stith & Nelson, 2003), lack of transportation and child care and long waiting lists at medical facilities frequented by minorities (Copland, 2005) likely contribute to perceptions that getting screened for cancer is not under ones control. Similarly, limited access to healthy food choices in minority neighborhoods may also reduce perceptions of control over eating a healthy diet (Moore & Diez-Roux, 2006). Also, Blacks receive less counseling and instruction from their physicians about many health maintenance issues such as diet, exercise, weight loss and tobacco use/exposure than do Whites (Friedman, Brownson, Peterson, & Wilkerson, 1994; Rand, Auinger, Klein, & Weitzman, 2005). Although our data do not speak directly to this issue, barriers such as the ones discussed here may inhibit some Blacks from developing intentions to get screened for cancer and engage in certain healthy lifestyle behaviors, and may also interrupt the intention – behavior relation for those who form intentions to perform the behavior.

For Whites, the pattern of associations between the IM predictors and intentions was quite varied across behaviors. Interventions targeting White's intentions to get a colonoscopy or a PSA test should pay particular attention to normative influences on these behaviors. In contrast, norms were only weakly associated with exercise intentions, indicating that normative messages contained in interventions aimed at increasing exercise intentions are unlikely to be effective; rather they should focus on changing attitudes and behavioral control.

Conclusion

This research provides valuable insight into the specific factors that should be addressed in different populations and for different behaviors in order to get those who do not intend to perform the behavior to develop intentions (and to strengthen the intentions of intenders). Future research should (a) identify the specific beliefs that distinguish intenders from non-intenders on the dimension(s) that are most strongly associated with intentions to perform that behavior, and; (b) develop and test targeted interventions aimed at changing those distinguishing beliefs that underlie the component most strongly associated with the intention.

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Note

1. Controlling for education, household income and having internet access in the home before becoming a member of the Knowledge Networks panel did not change the pattern of regression coefficients or significance tests of the comparisons between coefficients. We thank an anonymous reviewer for suggesting this analysis.

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