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Sociodemographic Characteristics, Health Beliefs, and the Accuracy of Cancer Knowledge

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Abstract

Background—Recent studies have found that knowledge about cancer prevention and treatment differs across ethnic and socioeconomic status (SES) backgrounds, which could directly impact our decisions to engage in protective health behaviors. In this study, we examined sociodemographic-based differences in cancer knowledge and health beliefs and examined differences in the accuracy of the cancer knowledge based on health beliefs.

Methods—Cross-sectional surveys were conducted between July 1995 and March 2004 on adult, healthy, cancer-free control participants (N = 2074; 50% male) enrolled into a molecular epidemiological case-control study. Most were non-Hispanic white, 14% were African American, and 8% were Hispanic. Participants were personally interviewed on 6 items assessing health beliefs and 10 items assessing cancer knowledge.

Results—Unadjusted differences in cancer knowledge were observed by gender, age, ethnicity, household income, educational attainment, and smoking status. After adjusting for the other sociodemographic characteristics, women had more accurate knowledge than men, the accuracy of knowledge increased with higher educational attainment and annual household income, and never smokers had more accurate knowledge than ever smokers ($P < .01$ for all). Moreover, accurate cancer knowledge was associated with protective health beliefs; eg, the belief that changing health habits was worthwhile was associated with more accurate knowledge.

Conclusions—Results emphasize the need to develop health education programs that enhance cancer knowledge among individuals of low SES and foster protective health beliefs.

According to the American Cancer Society, more than 1500 US residents will die of cancer every day this year, or 1 in every 4 deaths.[1] Among both men and women, racial and ethnic minorities are more likely to die from cancer.[2] Research completed over the past several decades has increased our understanding of the causes and available therapies for cancer, and advances in information dissemination make this information available to ever-widening audiences. However, this increase in information has not necessarily translated into an increase in protective health behaviors. This could be due to inaccuracies in some of the information available. Gansler et al[3] found that myths and misconceptions derived from inaccurate information shape health behaviors. Therefore, identifying and dispelling these myths and misconceptions about cancer is critical to the development of health education programs designed to promote protective health behaviors.

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Studies have found that knowledge about cancer prevention and treatment differs across ethnic and socioeconomic status (SES) backgrounds. Specifically, racial and ethnic minorities demonstrate less accurate knowledge and related health-promoting behaviors,[3,4] as do people from low SES backgrounds, compared to their more affluent peers.[4,5] These differences may directly impact our decisions to engage in protective behaviors and partially account for the disparate cancer incidence observed among people of different ethnic and SES backgrounds.[2]

Health beliefs are considered strong determinants of health behaviors leading to the development of several theories to explain health behaviors. According to 1 of the earliest theories, the Health Belief Model, people engage in protective health behaviors if they perceive themselves as susceptible to a health condition that they believe is severe and if they perceive that the benefits of taking action outweigh the barriers.[6,7] In contrast, Bandura[8] suggested that the type of health behavior people adopt is related to beliefs about self-efficacy and the expectations associated with the health behavior. Self-efficacy refers to a person's belief that he or she can change a behavior in the desired direction, whereas outcome expectations are perceived incentives to engage in a specific behavior (the benefits must outweigh the negatives).[9] Another theoretical perspective, the Theory of Reasoned Action[10] (TRA), states that behavioral intentions, which are primarily influenced by attitudes and subjective norms, are the most important determinants of behavior. Attitudes result from a person's beliefs about the consequences of engaging in a behavior, and subjective norms are based on a person's normative beliefs about how significant others think a person should behave and the person's motivation to comply with those beliefs. The Theory of Planned Behavior[11] extended the TRA to include the notion that behavioral intentions are influenced by control beliefs about the presence of factors that may facilitate or impede performance of the health behavior and the perceived power of these factors.

These theories underscore the importance of beliefs about a given health condition (perceived susceptibility and severity), our ability to perform behavior that will mitigate the health condition (self-efficacy), that there are advantages to be gained from the behavior (outcome expectations), and our perception of how others think we should behave (normative beliefs). Several studies have demonstrated that knowledge alone does not directly translate into protective behaviors.[12-14] However, the theories described here assume that knowledge is crucial because it influences and shapes our self-efficacy beliefs, outcome expectations, normative beliefs, and how severe we perceive the health condition to be. In turn, it is these health beliefs that influence our decision to engage in protective behaviors.[7,8,10] Although some studies have operationalized the different theories,[15] few have investigated the relationship between beliefs and cancer knowledge.

In this study, we had 2 objectives: to examine sociodemographic-based differences in the accuracy of knowledge about cancer and to examine differences in the accuracy of cancer knowledge based on the different types of health beliefs. We hypothesized that accurate knowledge would be associated with protective health beliefs.

METHODS

Study Participants

Participants were enrolled from July 1995 to March 2004 as healthy controls from a previously described molecular epidemiological case-control study designed to evaluate genetic susceptibility for lung cancer risk.[16] The control group was composed of people without a previous or current diagnosis of cancer (except nonmelanoma skin cancer), and controls were matched to cases by age, sex, ethnicity, and smoking status (never, former, or current smoker). They were recruited from the Kelsey-Seybold Clinics, Houston's largest,

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privately operated, multispecialty physician group. All subjects spoke English. To date, the overall response rate for the control participants has been approximately 75%, and the design is cross-sectional.

Prior to initiation, the Institutional Review Boards of The University of Texas M. D. Anderson Cancer Center and Kelsey-Seybold Clinics approved the research, and participants gave informed consent. Trained interviewers conducted a structured 45-minute personal interview with each participant to elicit demographic information, data on personal smoking history, and responses to items that probed cancer knowledge and beliefs. Examples of cancer knowledge items include "Pollution and chemicals cause more cancer than cigarettes," and "Once cancer is cured it won't come back." Examples of health beliefs include "Do your family and friends think you should take better care of yourself?," and ""Do you feel that changing your health habits is worth the effort?"

Measures

The main variable of interest in this study was a cancer knowledge index. Participants answered "true," "false," or "don't know" to 10 items that probed cancer knowledge. Responses on 3 of these items were uniformly high, with over 90% of the respondents answering them correctly. Therefore, these items were excluded. Thus, participants who did not respond correctly to any of the items about cancer knowledge received a score of 0, and those who responded correctly to all received a score of 7. These 10 items, and the 6 described following, were derived from the Patient Risk Evaluation Survey[17,18] and were modified for inclusion in the molecular epidemiological lung cancer case-control study on which this analysis is based.[16]

We also assessed 6 health beliefs: (1) normative beliefs, (2) self-efficacy or perceived ability to change health behaviors, (3) beliefs about the relative importance of health-social norms, (4) perceived need for social support from family and friends in changing health habits, (5) outcome expectations, and (6) perceived severity of cancer. All 6 were answered on a 3-point scale with response options of "yes," "no," and "not sure." The research interviewers utilized specific probing techniques to minimize socially desirable responses.

Sociodemographic data obtained during the interview included sex, ethnicity, age, academic attainment, and household income. Participants were divided into groups based on self-reported ethnicity: African American, Hispanic, and non-Hispanic white; 5 age groups (less than 40 years, 41 to 50 years, 51 to 60 years, 61 to 70 years, and more than 71 years); 4 categories of academic attainment (less than high school, completed high school or GED, some college, and college graduate); and 4 categories of annual household income (less than $25,000, $25,000 to $49,999, $50,000 to $74,999, and more than $75,000).

Statistical Analyses

We used Pearson's chi-square test to examine the associations between the demographic characteristics and ethnicity and Student's *t* tests and analyses of variance to assess crude mean differences as well as general linear models to assess adjusted mean differences in knowledge by the demographic characteristics. Because the data was collected over 9 years, we adjusted for the date of interview as well as the other demographic variables. Finally, we conducted general linear models to assess adjusted mean differences in knowledge based on each of the 6 health beliefs. Because we had observed gender differences, we stratified these analyses by gender and adjusted for all the demographic variables as well as the date of interview. In all analyses, responses of "false" and "don't know" were grouped together and compared to responses of "true." Similarly, responses of "no" and "not sure" were grouped

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together and compared to responses of “yes.” Statistical significance was assessed at an alpha of .05.

RESULTS

Responses from 2227 participants were available for this analysis. Of the 2227 participants, 135 were excluded due to missing data on the demographic variables; another 15 were excluded due to missing data on the cancer knowledge items; and 3 were excluded due to missing data on 1 of the health belief items. Thus, the final sample was 2074. Table 1 presents the demographic characteristics of the participants by ethnicity.

Most (77.7%) were non-Hispanic whites, whereas 14.5% were African American, and 7.8% were Hispanics. Our study included slightly more men than women (50.5% vs 49.5%), and the mean age was 60.39 years. Typical of most case-control studies, most of the healthy control participants had a college degree or had completed at least some college education (72.9%). Approximately 77% of the non-Hispanic white participants, 66% of the African Americans, and 48% of the Hispanics had at least some college education or a college degree. A majority (51.1%) reported household incomes of $50,000 per year or more. Approximately 58% of the non-Hispanic white participants, 40% of the African Americans, and 44% of the Hispanics had a yearly household income of $50,000 or more. On average, most were former smokers (45%). Within each ethnic group, about 47% of the non-Hispanic white participants, 38% of the African Americans, and 43% of the Hispanics were former smokers.

In Table 2, we present the unadjusted and adjusted mean level of cancer knowledge by the demographic variables. The unadjusted results showed differences in levels of cancer knowledge by sex, ethnicity, educational attainment, annual household income, and smoking status. However, the adjusted results demonstrated that the accuracy of cancer knowledge differed for sex, educational attainment, household income, and smoking status but not ethnicity. These results indicate that women had more accurate knowledge about cancer then men ($P < .01$); that as the years of educational attainment and the annual household income increased, so did the accuracy of knowledge ($P < .01$ for both); and that never smokers had more accurate knowledge than former smokers, and former smokers had more accurate knowledge than current smokers ($P < .01$). Because of the observed gender difference, we stratified by sex and reran the analysis adjusting for age, educational attainment, annual household income, and date of interview and obtained the same pattern of results.

Table 3 presents the adjusted mean level of knowledge stratified by gender for each of the 6 health beliefs. The overall adjusted means indicated that those who answered “yes” for each of the health beliefs significantly differed from those who answered “no” ($P < .05$ for all) except for perceived severity—cancer is not always as bad as people think. Which did not indicate a significant difference ($P = .07$; data not shown).

Among men, we found that those who reported that their friends and family think they take adequate care of themselves had more accurate knowledge of cancer than those who did not share these beliefs (normative beliefs, $P < .01$). Men who were confident that they could give up foods they liked if scientists said they were bad had more accurate cancer knowledge than those who believed they could not give up foods they liked (self-efficacy; $P < .01$). Compared to men who did not believe that health was one of the most important aspects of their life, men who did believe in the importance of health had more accurate knowledge (social norms; $P < .01$). Men who reported that they did not need their family and friends to remind them to improve their health habits had more accurate knowledge than those who do need to be reminded (need for social support; $P = .04$). Similarly, men who

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believed that changing their health habits was worth the effort had more accurate knowledge than those who believed otherwise (outcome expectations; $P < .01$). Finally, the only belief for which we did not observe statistically significant differences was perceived severity—cancer is as bad as people think (perceived severity; $P = .07$). In contrast, among the women, significant differences were observed for outcome expectations ($P = .05$) and perceived severity ($P = .03$) only.

DISCUSSION

In this study, we found women had more accurate knowledge about cancer than men, that the accuracy increased with increasing levels of educational attainment and annual household income, and that never smokers had more accurate knowledge than current or former smokers. In addition, we found significant differences in the accuracy based on the participants' health beliefs, indicating that accurate knowledge about cancer is associated with different types of health beliefs. Specifically, more accurate knowledge was associated with protective health beliefs.

Consistent with the literature, we found that women had more accurate knowledge than men.[4,19] This finding might reflect sex-specific societal norms and definitions of masculine and feminine attributes. According to Courtenay,[20] societal expectations of men and women affect their health behaviors. For example, masculinity is characterized by being strong, tough, and invulnerable to diseases, suggesting that men need not be concerned about their health, which is usually considered a feminine attribute; whereas women's roles in caregiving and child rearing are more associated with health concerns. Therefore, such sex-related distinctions in social expectations may account for the differences in intentions to acquire accurate knowledge.

We also found that as educational attainment and household income increased, so did the accuracy of cancer knowledge, consistent with previous studies.[3,4] For example, Gansler et al[3] found that higher educational attainment and higher annual household incomes were associated with more accurate knowledge about cancer treatment, whereas Viswanath et al[21] found that higher levels of education and income significantly predicted a better understanding of the association between smoking and cancer. Viswanath et al[21] underscored the important role the media (particularly print media) can play in attenuating these gaps in knowledge. However, although the media plays a crucial role in the dissemination of cancer information, people with low levels of education may not realize these benefits because they rely heavily on the media for entertainment rather than for education.[22]

The relationship we observed between smoking status and accuracy of knowledge was not surprising. As expected, and consistent with previous research,[23] never smokers demonstrated more accurate knowledge than current smokers. Interestingly, the level of knowledge we observed among former smokers was similar to that among the never smokers. Perhaps this higher level of knowledge contributed to the former smokers' decisions and ability to successfully quit.

In contrast to the literature, we did not find a significant link between race/ethnicity and the accuracy of their knowledge. Previous studies have drawn attention to the fact that different racial/ethnic groups report different levels of cancer,[23] but our study did not support this conclusion. However, in some of these previous studies, the analyses did not control for other demographic characteristics such as educational attainment and household income.[24] Because ethnicity and SES are confounded, it is not clear from the previous studies which factor is more strongly associated with more accurate knowledge. We found that after

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controlling for SES, an important determinant of health,[25] the racial/ethnic-based differences in accuracy disappeared ($P = .90$). This suggests that the unadjusted racial/ethnic-based variation was attributable to underlying differences in SES status. Therefore, our result is consistent with a finding from a study conducted by Price, Sherry, and Everett,[3] which examined cancer knowledge in an economically disadvantaged yet ethnically diverse population and found that higher levels of education were associated with fewer misconceptions about cancer than lower levels of education.

With regard to the influence of health beliefs on health behaviors, the overall results supported our hypothesis that accurate knowledge is associated with protective health beliefs. In particular, among men, accurate knowledge was associated with normative beliefs, social norms, self-efficacy, need for social support, and outcome expectations but not perceived severity. Our findings support the links between knowledge and health beliefs because we found that men who endorse protective health beliefs hold more accurate knowledge. Surprisingly, among women, accurate knowledge was associated with only outcome expectations and perceived severity. As suggested by Courtenay,[20] women are inclined to be concerned about their health as a result of their caregiving roles in society and therefore are probably less influenced by these specific health beliefs. However, because ours was a cross-sectional study, we were unable to determine the causal direction of the relationships between accurate knowledge and health beliefs. Future research using a longitudinal design will be necessary to assess whether changes in knowledge influence changes in beliefs or vice a versa to ultimately influence changes in behavior.

This study has certain limitations. Our study examined knowledge about cancer among English-speaking African American, Hispanic, and non-Hispanic white participants; therefore, the results may not generalize to members of other minority groups. However, although most of our participants were non-Hispanic white, our results did not indicate any ethnic differences in cancer knowledge, indicating that these results could be generalized to other populations. In addition, the health beliefs we examined did not focus on a specific behavior, such as smoking, which prevented us from examining the relationships between knowledge, beliefs, and behavior. Although we examined certain health beliefs that, in theory, influence protective behaviors, it was beyond the scope of this study to complete a comprehensive analysis of all the theoretical constructs such as attitudes and perceived susceptibility. Furthermore, the constructs assessed were based on a single item rather than a cluster of items. However, some studies have demonstrated that a single item can be as reliable and valid an assessment as a cluster.[26] Finally, the cross-sectional design of the study limited our ability to draw conclusions about causality.

In conclusion, we found differences in accuracy of cancer knowledge by gender, SES, and smoking status but not ethnicity or age. Therefore, the results of our study can be used to inform the development of health promotion programs. They underscore the continued need for health education messages to target people from low SES groups and current smokers. In addition, because it is widely known that men have less-accurate health knowledge than women, our results emphasize the need to develop health education messages that target men to increase their knowledge and awareness about male cancers. Finally, our results also suggest that addressing the links between knowledge and health beliefs would provide valuable resources when implementing health promotion programs to facilitate the adoption of protective health behaviors. This study underscores the continued need for health education messages designed to increase cancer knowledge among men, people from low SES groups, and current smokers. The results further suggest that addressing health beliefs as well as knowledge could facilitate the adoption of protective health behaviors.

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Table 1

Demographic Characteristics by Ethnicity*

Characteristics	Non-Hispanic Whiten n (%)	African American n (%)	Hispanicn (%)	*P*
Total	1730 (77.7)	323(14.5)	174 (7.8)	
Sex				<.01
Female	838 (48.4)	190 (58.8)	75 (43.1)	
Male	892 (51.6)	133 (41.2)	99 (56.9)	
Mean age (SD)	61.35 (9.3)	56.88 (10.4)	57.38 (10.8)	<.01
Educational Attainment				<.01
< High school	91 (5.3)	45 (13.9)	53 (30.5)	
High school	312 (18.0)	63 (19.5)	37 (21.3)	
Some college	632 (36.6)	131 (40.6)	56 (32.2)	
≥ College degree	694 (40.1)	84 (26.0)	28 (16.1)	
Missing values	1 (0.05)	0 (0.0)	0 (0.0)	
Annual Household Income ($)				<.01
< 25,000	234 (14.5)	81 (26.1)	42 (24.6)	
25,000-49,999	440 (27.3)	102 (32.9)	53 (31.0)	
50,000-74,999	367 (22.8)	77 (24.8)	38 (22.2)	
≥ 75,000	571 (35.4)	50 (16.1)	38 (22.2)	
Missing values	118 (6.8)	13 (4.0)	3 (1.7)	
Smoking Status				<.01
Never	272 (15.7)	81 (25.1)	45 (25.9)	
Former	808 (46.7)	122 (37.8)	75 (43.1)	
Current	650 (37.6)	120 (37.2)	54 (31.0)	

*N = 2227.

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Table 2

Unadjusted and Adjusted Means: Correct Responses to the 7 Cancer Knowledge Items by Demographic Characteristics*

	Unadjusted			Adjusted†		
	Mean	**SD**	***P***	**Mean**	**SD**	***P***
Gender			<.01			<.01
Female	5.5	1.3		5.6	1.2	
Male	5.3	1.4		5.3	1.2	
Ethnicity			.02			.73
African aAmerican	5.3	1.4		5.4	1.3	
Hispanic	5.3	1.4		5.4	1.3	
Non-Hispanic white	5.5	1.3		5.5	1.3	
Age (y)			.19			.72
≤ 55	5.5	1.3		5.4	1.3	
56-65	5.4	1.3		5.5	1.2	
≥ 66	5.4	1.3		5.4	1.3	
Educational attainment			<.01			<.01
< High school	4.9	1.5		5.0	1.3	
High school	5.2	1.3		5.3	1.2	
Some college	5.5	1.3		5.5	1.2	
≥ College degree	5.7	1.2		5.6	1.3	
Annual Household Income ($)			<.01			<.01
< 25,000	5.1	1.3		5.2	1.3	
25,000-49,999	5.3	1.3		5.3	1.2	
50,000-74,999	5.5	1.2		5.5	1.2	
≥ 75,000	5.7	1.2		5.7	1.3	
Smoking Status			<.01			<.01
Never	5.6	1.2		5.6	1.3	
Former	5.6	1.2		5.5	1.3	
Current	5.2	1.3		5.3	1.3	

*N = 2074.

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† Adjusted for the other demographic characteristics in the table and date of interview.

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Table 3

Adjusted Mean Differences on the 7 Cancer Knowledge Items by Each Health Belief *

Health Belief	Males (N = 1033)			Females (N = 1041)		
	Adjusted Mean †	SD	*P*	Adjusted Mean †	SD	*P*
Normative beliefs						
Do your family and friends think you should take better care of your self?			<.01			.23
Yes	5.2	1.3		5.5	1.2	
No	5.5	1.4		5.6	1.2	
Self-efficacy						.11
Are you confident that you could give up foods you like if scientists said they were not good for you?			<.01		1.1	
Yes	5.4	1.3		5.6	1.2	
No	5.1	1.3		5.4		
Social norms						
Generally, in your life, has health been something that has always been one of the most important things to you?			<.01			.67
Yes	5.5	1.4		5.6	1.3	
No	5.2	1.4		5.5	1.3	
Need for social support						
Do you need your family and friends to remind you to improve your health habits, such as, keeping fit, losing weight, eating better and other things like that?			.05	5.4		.13
Yes	5.2	1.3		5.6		
No	5.4	1.3				
Outcome expectations						
Do you feel that changing your health habits is worth the effort?			<.01			.05
Yes	5.4	1.3		5.6	1.1	
No	4.8	1.3		5.3	1.2	
Perceived severity						
Some people say that “Cancer is not always as bad as people think.” Do you agree with this?			.74			.03
Yes	5.3	1.3		5.3	1.3	

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Health Belief	Males (N = 1033)			Females (N = 1041)		
	Adjusted Mean†	SD	*P*	Adjusted Mean†	SD	*P*
No	5.4	1.4		5.6	1.3	

*N = 2074.

†Adjusted for the demographic characteristics in Table 1 and date of interview.