Comparing Perceived and Test-Based Knowledge of Cancer Risk and Prevention among Hispanic and African Americans: An Example of Community Participatory Research

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Background: Most theoretical formulations acknowledge that knowledge and awareness of cancer screening and prevention recommendations significantly influence health behaviors. This study compares perceived knowledge of cancer prevention and screening with test-based knowledge in a community sample. We also examine demographic variables and self-reported cancer screening and prevention behaviors as correlates of both knowledge scores, and consider whether cancer related knowledge can be accurately assessed using just a few, simple questions in a short and easy-to-complete survey.

Methods: We used a community-partnered participatory research approach to develop our study aims and a survey. The study sample was composed of 180 predominantly African American and Hispanic community individuals who participated in a full-day cancer prevention and screening promotion conference in South Los Angeles, California, on July 2011. Participants completed a self-administered survey in English or Spanish at the beginning of the conference.

Results: Our data indicate that perceived and test-based knowledge scores are only moderately correlated. Perceived knowledge score shows a stronger association with demographic characteristics and other cancer related variables than the test-based score. Thirteen out of twenty variables that are examined in our study showed a statistically significant correlation with the perceived knowledge score, however, only four variables demonstrated a statistically significant correlation with the test-based knowledge score.

Conclusion: Perceived knowledge of cancer prevention and screening was assessed with fewer items than test-based knowledge. Thus, using this assessment could potentially reduce respondent burden. However, our data demonstrate that perceived and test-based knowledge are separate constructs. (*Ethn Dis.* 2013;23[2]:210–216)

Key Words: Cancer, Knowledge, Minority, Prevention, Screening

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Introduction

Most theoretical formulations acknowledge that knowledge and awareness of cancer screening and prevention recommendations significantly influence health behaviors.[1] Cross-sectional studies have shown that knowledge is associated with health promotion behaviors.[2–7] Longitudinal studies have also identified knowledge as a mediator of health behavior.[8–9] However, other studies have documented only marginal or no association between cancer-related knowledge and cancer screening behaviors.[10–19] Several methodological issues, particularly how knowledge is measured, may contribute to these inconsistent findings. In a vast majority of studies, knowledge has been measured using a battery of objective knowledge questions. This test-based assessment can be lengthy and place a considerable burden on respondents.

Our community partners suggested assessing perceived knowledge as an alternative, shorter assessment. The purpose of this article is to compare responses from a community sample to items assessing both perceived and test-based knowledge. We also examine the relationships of these two measures to demographic variables, access to medical care, and self-reported adherence to cancer screening guidelines. The goal of this analysis is to explore whether cancer-related knowledge can be accurately assessed using just a few, simple questions in a short and easy-to-complete survey.

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Methods

Community Engagement

The Division of Cancer Research and Training of Charles R. Drew University of Medicine and Science (CDU) and UCLA's Jonsson Comprehensive Cancer Center Partnership was funded by the National Cancer Institute to address cancer disparities within the ethnically diverse, low-resource community of South Los Angeles, California. Specifically, the Cancer Community Outreach, Prevention and Control Program utilizes a community-partnered participatory research strategy.[20–21] Engaged community member stakeholders, cancer survivors, faith-based institutions, other community-based organizations, as well as academic researchers formed a community-academic council (CAC), which serves as a forum for bi-directional knowledge exchange, community engagement, capacity and relationship building, and knowledge transfer activities. The council

also serves as a research resource and representative voice of this community for academic capacity building. Perhaps most importantly, it provides a mechanism for building mutual respect between researchers and participants, and facilitates learning exchanges between the community and scientists. The council meets every other month and is charged with providing community-grounded insight into appropriate methodologies and communication to increase community awareness in regards to cancer prevention.

An early charge of the CAC members was to collaborate in the planning and implementation for the Kick-off Community Awareness Conference. Council members suggested topics, referred and recommended speakers, helped in organizing the event, and publicized the venue in several culturally relevant ways, such as through invitations to agencies that serve the African American and Hispanic community in Los Angeles County. The community-partnered participatory approach was further employed with the development of a conference survey instrument. Members of the CAC worked collaboratively to identify key constructs, framing of questions, and measurement of items appropriate for the community.

Survey Development

The two-part survey is a collection of internally developed questions and instruments from various sources. The self-assessment items were based entirely on feedback and concerns from members of the council who suggested that questions cover topics such as the respondent's knowledge of cancer prevention and screening, emotional reaction to cancer and treatment, the impact of being diagnosed with cancer, including its effect on one's marriage, and that the instrument include other open-ended questions. Specifically, community members suggested assessing perceived knowledge of cancer screening and prevention.

The survey was pilot tested using a small number of community volunteers. Appropriate modifications were made based on these results and through cognitive interviews and expert reviews by several CAC community members. These included a medical sociologist, a health service researcher and an oncologist.

Test-based cancer knowledge was measured using 33 true-false items. Items were selected from web pages of UCLA's Jonsson Comprehensive Cancer Center (Cancer Fact Sheet),[22] Women's Health (Women and Cancer),[23] the American Cancer Society (Learn about Cancer)[24] and the Cancer Fact Sheet.[25] Twenty-one items were asked of all respondents, five items on breast and cervical cancer were only asked of females, and 7 items on prostate cancer were only asked of males. Sample true-false questions included the following: certain types of cancer are genetic; ethnicity is a factor in the development of certain types of cancer; some cancers are contagious; human papillomavirus (HPV), a virus that can cause cancer, is contagious; men cannot develop breast cancer; those who smoked for many years are at increased risk of developing colorectal cancer; piercing nipples may cause breast cancer; and cancer survivors can develop another cancer. A knowledge score was created by counting correct responses to 28 and 26 items for men and women, respectively.

Perceived cancer knowledge was assessed using a fourteen-item measure that included seven questions on self-perceived knowledge of cancer prevention and seven questions on self-perceived knowledge of cancer screening. Sample questions included the following: ''On a scale from 1 to 10 where 1 means you don't know anything and 10 means you know everything, how much would you say you know about cancer prevention for the following:'' cervical cancer; breast cancer; colon and rectal cancer; skin cancer; prostate cancer; lung; and oral and throat cancer.

Separate scales for men and women were calculated by taking the average of total self-rating for all items, however, items for breast and cervical cancer counted only for women and prostate only for men.

In addition, specific and general adherence to cancer screening was measured for men and women separately. Adherence for breast, cervix, colorectal, and prostate cancer screening were measured based on the following criteria: having a Pap smear test within last 2 years for women aged $\geq$18; mammography within last 2 years for women aged $\geq$40; prostate-specific antigen testing within last 2 years for men aged $\geq$50 years, and FOBT within last year, sigmoidoscopy within last 5 years or colonoscopy within last 10 years for all participants who were $\geq$50 years.

The general adherence for breast, cervical, prostate and colorectal cancer screenings for men and women aged $\geq$50 years were measured separately using the above criteria. The indices ranged from 0–2 for men, and 0–3 for female, 0 meaning no compliance and 2 (for men), and 3 (for women) indicating full compliance with recommended screenings.

Other measures collected include demographic data (eg, particularly age, education, immigration status, years living in United States, living arrangement); enabling factors (eg, health insurance, income, access to medical care and having a regular or primary care provider); need for care characteristics (eg, perceived health status, personal and family history of cancer, and perceived personal risk of cancer) and screening behaviors.

Sample and Recruitment

The study sample was composed of individuals who participated in a free one-day cancer prevention and screening promotion conference in South Los Angeles, California, in June 2011. In comparison to neighboring regions of Los Angeles County, national statistics and Healthy People 2010 goals, this region has had persistently higher

mortality rates from preventable and treatable cancers.[26] The conference included plenary and small group educational sessions and provided simultaneous translations into Spanish via headphones. Prior to the didactic portion of the conference, participants were given approximately 15 minutes to complete an anonymous survey in English or Spanish. Those who completed the survey were entered into a raffle for several prizes. Our study was reviewed and approved by the Institutional Review Board of Charles R. Drew University of Medicine and Science.

Statistical Analysis

Statistical analysis was performed with the SPSS® program (SPSS 19.0 for Windows, SPSS Inc., Chicago, IL, USA). In addition to a descriptive analysis of all variables, bivariate analyses of variance were conducted to determine the association between each of the knowledge scores and the independent variables. In addition, multiple linear regressions were applied to examine the effect of independent variables on perceived and test-based measures of knowledge. We utilized a $P<.05$ to identify statistically significant differences. To avoid multicollinearity, a diagnostic test was performed in multivariate analysis to examine intercorrelation among independent variables.

RESULTS

Of the 355 people who attended the conference, 181 completed the survey (51% response rate). Table 1 reports demographic and other characteristics of the sample. Overall, in the sample of 181 participants, 80% were women, 48% were African Americans, 34% Hispanic and 18% were members of other ethnic groups. The mean age of the sample was 48 years (SD ± 16), with a range of 19 to 97 years of age. Seventy-five percent of participants used English as their primary language and 23% used Spanish as their primary language. Seventy-two percent of our participants were overweight (35%) or obese (37%) with a body mass index ≥25 and ≥30, respectively. While 77% of participants reported that they had never smoked cigarettes regularly, 24% reported that they had smoked previously or they are current smokers (Table 1).

Approximately 21% of our participants had no health insurance. One out of five participants reported fair or poor health. While 30% of our sample reported poor or fair access to medical care, 70% indicated they had excellent (51%) or good (19%) access to medical care. Three out of four participants indicated that they have a regular or primary care physician, but surprisingly 57% of them never discussed risk of cancer with their doctors. Taking into account age and sex, self-reported compliance with cancer screening guidelines was 58% for breast cancer screening, 69% for colorectal cancer screening, and 66% for cervical cancer screening. Due to the small number of men aged ≥50 years who completed the survey, we do not report history of prostate-specific antigen (PSA) testing.

The average total test-based knowledge score (scale of 0–1) was .638 ± .190, with higher scores represented a higher level of knowledge. The average total perceived knowledge score (scale of 1–10) was 4.99 ± 2.3, with higher scores represented a higher level of perceived knowledge. Because both knowledge scores were assessed using different scales, they cannot be directly compared.

Bivariate and Multivariate Analysis

Table 1 also reports bivariate correlates of perceived and test-based cancer-related knowledge scores with all other variables. Both scores are moderately correlated ($r=.470$; $P<.001$). Four out of nineteen variables that are reported in Table 1 were significantly associated with test-based cancer knowledge, however, 13 variables were significantly associated with perceived cancer knowledge. Perceived cancer knowledge was significantly higher among those who: were older, non-Hispanic, primarily English speaking and had higher levels of education, a normal body weight, health insurance, a primary care physician, as well as those who reported having excellent to good health, or excellent access to medical care or had discussed their personal risk of cancer with a physician, and who believed strongly in the efficacy of early cancer detection. Additionally, high perceived cancer knowledge was associated with adherence to mammography screening and fecal occult blood test. Four variables that showed a significant correlation with test-based knowledge are: education, self-rated health status, belief in the efficacy of early cancer detection, and self-reported adherence with mammography screening guidelines.

Table 2 reports regression estimates of the effects of the independent variables on the perceived and test-based knowledge scores. Three models were tested. Only demographic characteristics and other related enabling variables that logically could be assumed as predictors of the level of knowledge were included in the multivariate analysis. Model 1 reports significant independent correlates of the test-based knowledge. At the multivariate level, only education ($\beta=.275$; $P<.001$) and self-rated health status ($\beta=-.213$; $P<.001$) were significantly associated with the test-based knowledge. Model 2 reports independent correlates of the perceived knowledge score. In addition to education and self-rated health, age ($\beta=.162$; $P<.05$) and access to medical care ($\beta=.174$; $P<.05$) are among the independent variables that showed statistically a significant correlation with the perceived knowledge score. The adjusted R^2 increased from 10% in the first model to 18% in the second model.

Table 1. Correlates of the perceived and test-based knowledge of cancer prevention and screening

Variables	*n* (%)	Perceived (Scale 1–10)	Test-Based (Scale 0–1)
Age		*P*=.008	*P*=.648
<50 years	92 (51)	4.5 ± 2.1	.63 ± .19
≥50 years	88 (49)	5.5 ± 2.4	.65 ± .19
Ethnicity		*P*<.01	*P*=.122
African Americans	84 (48)	5.1 ± 2.4	.65 ± .18
Hispanic	60 (34)	3.9 ± 2.2	.60 ± .21
Others	31 (18)	5.6 ± 2.0	.69 ± .18
Sex		*P*=.311	*P*=.314
Male	36 (20)	4.6 ± 2.4	.61 ± .17
Female	144 (80)	5.1 ± 2.3	65 ± .19
Primary language		*P*<.01	*P*=.289
English	135 (75)	5.2 ± 2.3	.65 ± .23
Spanish	41 (23)	3.8 ± 2.1	.60 ± .21
Education		*P*<.01	*P*<.01
<12th grades	30 (17)	3.9 ± 2.5	.56 ± .25
Some college	52 (29)	4.4 ± 2.2	.59 ± .20
College degree	96 (53)	5.6 ± 2.1	.69 ± .15
Body mass index (BMI)		*P*<.05	*P*=.22
<25	50 (28)	5.4 ± 2.0	.66 ± .18
≥25	130 (72)	4.5 ± 2.5	.62 ± .20
Marital status		*P*=.179	*P*=.999
Married or living with parents	82 (46)	4.8 ± 2.2	.64 ± .17
Not married	57 (32)	5.3 ± 2.4	.64 ± .21
Health insurance		*P*<.01	*P*=.23
No	38 (21)	3.9 ± 2.3	.60 ± .22
Yes	143 (79)	5.3 ± 2.2	.65 ± .18
Self-report of health		*P*<.01	*P*<.01
Excellent/very good	72 (40)	5.4 ± 2.3	.67 ± .18
Good	75 (42)	5.2 ± 2.2	.65 ± .17
Fair/ poor	33 (19)	3.5 ± 2.1	.52 ± .20
Access to medical care		*P*<.01	*P*=.34
Poor	26 (14)	4.1 ± 2.6	.60 ± .23
Fair	28 (16)	4.2 ± 2.0	.60 ± .17
Good	35 (19)	4.3 ± 2.4	.63 ± .22
Excellent	92 (51)	5.7 ± 2.1	.66 ± .17
Have a primary care physician		*P*<.01	*P*=.18
No	46 (25)	4.0 ± 2.2	.60 ± .21
Yes	135 (75)	5.3 ± 2.3	.65 ± .18
Ever discussed personal risk of cancer with doctor		*P*<.01	*P*=.20
No	103 (57)	4.5 ± 2.3	.62 ± .20
Yes	77 (43)	5.6 ± 2.2	.66 ± .17
Person's chance to survive if cancer detected early		*P*<.01	*P*<.05
Fair or poor	65 (36)	4.1 ± 2.3	.58 ± .19
Good	57 (31)	5.4 ± 2.3	.67 ± .17
Excellent or very good	59 (33)	5.4 ± 2.1	.67 ± .19

Model 3 reexamines the independent correlates of the perceived knowledge score, while adding the test-based knowledge score as an independent variable. Results indicate that the level of education no longer remains a significant independent variable; however, the test-based knowledge score showed a strong independent relationship with perceived knowledge score (β=.375; P<.001) and the adjusted R^2 increased to 31% (Table 2).

DISCUSSION

Our findings suggest that our efforts to engage community members in the process of cancer prevention and control research are successful. Community members participated in planning a conference in South Los Angeles and contributed to survey development. Specifically, they suggested assessing perceived cancer knowledge as an alternative, shorter way to assess knowledge using the traditional test-based assessment approach. By comparing responses to perceived and test-based knowledge items, we determined that both assess different constructs. Although perceived knowledge can be assessed using fewer items, thus reducing burden to respondents, it cannot substitute for test-based knowledge.

The disconnect between perceived and test-based knowledge may be due to several scenarios: Respondents with access to medical care, who have a primary care physician and who have discussed their personal risk of cancer with a physician have a significantly higher perceived knowledge score than respondents without a primary care physician who lack access to medical care. However, both groups of respondents have similar test-based knowledge scores. Given that many patient-physician encounters are short and may not allow for much conversation about cancer prevention and control, respondents who have physician encounters

Table 1. Continued

Variables	*n* (%)	Perceived (Scale 1–10)	Test-Based (Scale 0–1)
Perceived personal risk of cancer		*P*=.43	*P*=.24
Same as others	83 (47)	4.7 ± 2.2	.62 ± .18
Higher than others	42 (23)	5.3 ± 2.4	.68 ± .18
Lower than others	55 (30)	5.1 ± 2.4	.63 ± .20
Smoking status		*P*=.16	*P*=.80
Ex-smoker	28 (16)	5.2 ± 2.2	.63 ± .19
Current smoker	14 (8)	4.7 ± 2.5	.66 ± .18
Never smoked	138 (77)	3.9 ± 2.4	.63 ± .18
FOBT within last 2 years (age≥50)		*P*<.01	*P*=.84
No	58 (66)	4.8 ± 2.4	.64 ± .19
Yes	30 (34)	5.8 ± 1.9	.63 ± .18
Mammography within last 2 years (age≥40)		*P*<.01	*P*<.05
No	35 (42)	4.5 ± 2.3	.60 ± .21
Yes	49 (58)	6.0 ± 2.3	.72 ± .17
Sigmoidoscopy within last 5 years or colonoscopy within last 10 years (age ≥50)		*P*=.13	*P*=.76
No	27 (31)	4.7 ± 3.1	.66 ± .13
Yes	61 (69)	5.6 ± 2.1	.64 ± .21
Pap smear test within last 2 years (age≥18)		*P*=.73	*P*=.83
No	45 (34)	5.2 ± 2.4	.66 ± .18
Yes	88 (66)	5.0 ± 2.2	.66 ± .19

may have a false perception of increased knowledge that is not reflected in their test-based knowledge score. In addition, our data suggest that perceived knowledge is significantly higher among respondents who report being adherent to several (but not all) cancer screening tests than among respondents who are not adherent. Given the cross-sectional study design, the direction of this relationship is unclear. It is possible that respondents' high perceived knowledge is influencing their screening behavior. Alternatively, being up to date with screening may lead to increased perceived knowledge. A third possibility is that the same demographic subgroup that is more likely to be adherent to cancer screening is also more likely to have higher perceived cancer knowledge.

Our findings suggest that our efforts to engage community members in the process of cancer prevention and control research are successful.

Our data also suggest that respondents who are aged ≥50 years, who are non-Hispanic (predominantly African American in our sample), and who use English as primary language may have an exaggerated perception of their cancer knowledge and/or that individuals younger than 50 years, who are Hispanic and use Spanish as primary language may underestimate their cancer knowledge, since test-based knowl-

Table 2. Multiple regressions (correlates of perceived and test-based knowledge of cancer prevention and screening)

Independent variables	Model 1 Test-Based Knowledge[c]			Model 2 Perceived Knowledge[d]			Model 3 Perceived Knowledge[e]		
	B	Std. Error	Beta	B	Std. Error	Beta	B	Std. Error	Beta
(Constant)	−4.72	1.19	–	−1.39	1.33	–	−.297	1.39	–
Access to medical care	.050	.145	.029	.347	.165	.162[a]	.344	.156	.164[a]
Primary language	.554	.414	.119	.280	.464	.049	.165	.450	.029
Age	.132	.282	.035	.826	.329	.174[a]	.032	.010	.218[b]
Self-rated health (excellent to poor)	−.558	.201	−.213[b]	−.582	.233	−.179[b]	−.344	.166	−.144[a]
Education	.688	.210	.275[b]	.776	.235	.251[b]	.101	.147	.056
Test-based knowledge	–	–	–	–	–	–	.454	.084	.375[b]

[a] *P*<.05.
[b] *P*<.01.
[c] Adjusted R^2 for Model 1 = .10 (*F*=4.866; *P*<.001).
[d] Adjusted R^2 for Model 2 =.18 (*F*=8.631; *P*<.001).
[e] Adjusted R^2 for Model 3 = .31(*F*=13.64; *P*<.001).

edge scores in these two groups are not significantly different. This suggests that an assessment of perceived cancer knowledge may be more biased than test-based knowledge. However, despite this potential for bias, perceived cancer knowledge may be an important construct to measure, because, as described in the social-cognitive model[27], a person's belief in their own competence can be an important predictor, mediator, or moderator of health behavior change.[28] The underlying principle is that people will adopt healthy behaviors to the extent that they perceive themselves to be competent at those activities.[29] Responses such as ''I know a lot about diet and exercise'' demonstrate high self-efficacy, regardless of how much factual knowledge the individual may possess on the subject.

It may be worthwhile to explore the relationships between test-based and perceived knowledge of specific cancer screening and prevention behaviors and adherence to these cancer screening and prevention guidelines in future studies in our quest to find strategies to reduce cancer disparities. However, these factors need to be considered as part of a more comprehensive theoretical framework that also includes important other individual-level, physician-level and system-level factors that influence health behaviors.

ACKNOWLEDGMENTS

This study was supported by the CDU/UCLA Cancer Center Partnership to Eliminate Cancer Health Disparities, NIH/NCI Grant # U54-CA-143931 and the Accelerating Excellence in Translational Science Program (AXIS), NIH-NIMHD grant U54MD007598 (formerly U54RR026138).

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