Effect of Health Care System Distrust on Breast and Cervical Cancer Screening in Philadelphia, Pennsylvania

Tse-Chuan Yang, PhD, Stephen A. Matthews, PhD, and Marianne M. Hillemeier, PhD, MPH

Objectives. We investigated whether health care system distrust is a barrier to breast and cervical cancer screening and whether different dimensions of distrust—values and competence—have different impacts on cancer screening.

Methods. We utilized data on 5268 women aged 18 years and older living in Philadelphia, Pennsylvania, and analyzed their use of screening services via logistic and multinomial logistic regression.

Results. High levels of health care system distrust were associated with lower utilization of breast and cervical cancer screening services. The associations differed by dimensions of distrust. Specifically, a high level of competence distrust was associated with a reduced likelihood of having Papanicolaou tests, and women with high levels of values distrust were less likely to have breast examinations within the recommended time period. Independent of other covariates, individual health care resources and health status were associated with utilization of cancer screening.

Conclusions. Health care system distrust is a barrier to breast and cervical cancer screening even after control for demographic and socioeconomic determinants. Rebuilding confidence in the health care system may improve personal and public health by increasing the utilization of preventive health services. (*Am J Public Health.* 2011;101:1297–1305. doi:10.2105/AJPH.2010.300061)

Cancer is a leading cause of death in the United States. Approximately 1.5 million Americans are diagnosed with cancer per year and 1 in 4 deaths are attributed to cancer.[1] Among women, an estimated 192 000 breast and 11 000 cervical cancer cases are detected each year, and in 2009 more than 40 000 women died of breast cancer and approximately 4000 of cervical cancer.[1] To effectively reduce the morbidity and mortality resulting from breast and cervical cancer, efforts need to be made to increase the proportion of women who comply with screening recommendations[2]; according to a recent report, a third of women are not in compliance with screening guidelines for breast cancer, and more than a fifth are not in compliance for cervical cancer.[3] Our goal was to investigate whether health care system distrust (hereafter referred to as distrust) is a barrier to breast and cervical cancer screening.

The late 20th century saw many changes in the theoretical underpinnings of research on health in general and women's health in particular. The prevailing biomedical model was criticized for ignoring social determinants of health, such as social class, gender roles, and poverty,[4] and health determinants models that incorporated multiple social, economic, and demographic dimensions were embraced.[5–7] The multiple determinants of health perspective emphasizes the relationships between socioeconomic factors and health outcomes,[4] but the role of psychological factors (i.e., depression and distrust) in cancer screening has only recently been recognized.[8–11] Relatively little is known about whether distrust affects health outcomes, and specifically whether it influences cancer screening behaviors among women.[11]

Americans' overall confidence in their health care system has declined markedly in recent decades. In 2010, only 34% of adults reported "a great deal" of confidence in the health system, down from over 70% in 1966.[12] More than 80% of Americans, however, held high levels of trust in their personal physicians or providers,[13] a paradox that has been widely documented in the literature.[14–17] Previous studies suggest that trust in physicians is associated with seeking timely medical care, maintaining appropriate health care, and adhering to medical advice,[18–20] but it is unclear whether trust or its converse, distrust, affects the adoption of preventive health services among women.[11]

The emerging distrust research in health care shows that distrust is a multidimensional concept.[21–23] For example, Shea et al. used focus groups, pilot testing, and a telephone survey to develop a highly reliable 9-item distrust scale that includes 2 subscales: competence distrust and values distrust.[22] Competence distrust is expected to be high when the quality of service fails to meet patient expectations and does not improve health. Values distrust is expected to be high when the integrity of the health care system is questioned (e.g., ethical issues, financial priorities, transparency of care). Although dimensions of distrust may influence the use of preventive health services in different ways, little research has addressed this issue explicitly.

A range of individual characteristics has been found to be associated with the use of breast and cervical cancer screening, including age,[5,24] race/ethnicity,[11,25] socioeconomic factors,[5,24] marital status,[5,11,24] and availability and utilization of health care resources.[11,24] Access to insurance and health care providers is associated with higher likelihood of interaction with the health care system and has been hypothesized to be related to levels of distrust and to individuals' health-related behaviors.[26] Personal health status has been found to be related to levels of distrust,[27] although the underlying causal mechanisms have not been well documented. Evidence concerning the association of health status with use of preventive health services is inconclusive.[11] An important contribution of our study is the investigation of the association of distinct aspects of distrust—values distrust and competence distrust—with receipt of 2 preventive health services for adult women: the

Papanicolaou (Pap) test for cervical cancer and clinical breast examination to screen for breast cancer. We tested the following 2 hypotheses: after we controlled for individual socioeconomic and demographic characteristics, (1) high levels of distrust are associated with low utilization of cancer screening services and (2) the negative relationship between distrust and cancer screening utilization holds for the values and competence dimensions of distrust.

METHODS

We based our study on data collected on all women aged 18 years and older (n=5268) in the Philadelphia Health Management Corporation's (PHMC's) 2008 Southeastern Pennsylvania Household Health Survey—a survey covering 5 counties in southeastern Pennsylvania: Bucks, Chester, Delaware, Montgomery, and Philadelphia counties. The interviews were conducted between June and October 2008 via computerized telephone random-digit dialing based on a stratified sampling frame to ensure representation from the 5 counties.[28] The response rate for the PHMC 2008 was 25% according to criterion 3 of the American Association for Public Opinion Research.[29] Although the response rate appears low, it is important to note that this in and of itself is not an indicator of survey quality. Recent research finds no significant biases as a result of response rate.[30,31] Moreover, the PHMC 2008 sample closely matches the demographic and socioeconomic structure of the study counties as reported in the US Census Bureau in its 3-year 2006 to 2008 release of the American Community Survey,[32] and health screening rates in the PHMC 2008 mirror those in the Behavioral Risk Factor Surveillance System (BRFSS) 2008 data for Philadelphia. For example, 81% of women aged 50 years and older have had a mammogram within the past year according to the BRFSS, versus 82% in PHMC.[33] We used a balancing weight in the statistical analysis.

Measures

We were interested in 3 outcomes. The first was whether a woman had received a Pap test within the past 2 years (coded 1=yes; 0=no). The PHMC asked women "How long has it been since your last Pap test?" and the response categories were "1 year or less," "1–2 years," "2–5 years," "5–10 years," "more than 10 years," and "never." At the time of the study, the American College of Obstetricians and Gynecologists recommended Pap testing every 2 to 3 years.[34] Because the 2- to 5-year interval choice would include many women who were not screened within the recommended interval, we chose to code only those reporting 1 year or less or 1 to 2 years as having received recommended screening. The second outcome of interest was whether a woman had received a breast examination by a doctor or health professional within the past year as recommended (coded 1=yes; 0=no).[34] The correlation between Pap testing and breast examination in the PHMC sample was 0.45 ($P<.001$). The third outcome included in the analyses was a trichotomized variable measuring whether a woman had received both tests (coded 2), had only 1 of the 2 tests (coded 1), or no test (coded 0, reference group) according to the recommended schedule. These 3 outcomes allowed us to construct a more complete picture of cancer screening behaviors among women and the role, if any, of health care system distrust.

We had 5 groups of independent variables. The primary predictor of interest was distrust, which was measured by a 9-item scale developed by Shea et al.[22] The 9 questions were rated on a 5-level Likert scale (strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree), producing a possible distrust score range between 9 and 45. The reliability of the distrust scale and subscales has been tested and reported elsewhere.[22] Using the 2008 PHMC data and factor analysis with the varimax rotation method, we generated 2 standardized factor scores based on the regression method capturing 2 different dimensions of distrust of the health care system: values distrust and competence distrust (the eigenvalues were 3.86 and 1.10, respectively, and the total variance explained was 55%). The regression method applies factor weights to create the distrust scores centered on zero with a standard deviation of 1 (Table 1). We categorized each item into 1 of the 2 dimensions when the factor loading for that assigned dimension was 0.5 or higher and the other factor loading was lower than 0.5. Table 1 includes the 9 questions and their factor loadings on each subscale, as well as the distributions of the factor scores. Factor analysis not only takes into account the interdependency among the questions but also gives weights to each question to yield scales that are based on the empirical data. Our grouping is similar to the original Shea et al. article.[22] We imputed missing values according to an expectation–maximization algorithm for continuous variables,[35] and the imputed scores were rounded to the nearest whole number to reflect the Likert scales.

A second group of variables was demographic predictors. Age was reported by the women and treated as a continuous variable. Race/ethnicity was based on 4 categories (3 dummy variables in analysis): White (reference group), Black, Hispanic, and other race/ethnicity. Marital status was based on 3 categories (2 dummy variables): single (reference group), married or cohabiting, and widowed, divorced, or separated.

Socioeconomic status factors formed our third group of variables. Poverty status was based on the 2008 federal poverty guideline in which those women in households with incomes below the poverty line were classified as poor (coded 1); women in households with incomes above the poverty line were classified as "others," and coded as zero. Employment status was trichotomized into employed, unemployed, and others (i.e., disabled or retired; reference group). Educational attainment was measured by 4 dummy variables that are based on a 5-category variable: did not graduate high school (reference group), high-school diploma, some college, an associate's or bachelor's degree, and postcollege degree.

The fourth group of predictors related to health care resources and insurance status. First, the women were asked about their primary source of care and were sorted into the following categories: no regular health care provider, private doctor's office, public and community health center, and other source of care (e.g., outpatient clinic). Three dummy variables were created with no regular health care provider serving as the reference group. Health insurance status was dichotomized into insured (coded 1) and uninsured (coded 0).

The final group of variables concerned the woman's health status. Self-rated health was based on a question with 4 choices: excellent (reference group), good, fair, or poor. We also included self-rated stress; in the PHMC this is

TABLE 1—Questions Regarding Health Care System Distrust Among Women in the 2008 Philadelphia Health Management Corporation Household Health Survey: Factor Loadings With Varimax Rotation

Actual Questions	Component	
	Competence[a]	Values[b]
Health care system makes patients' health better[c]	0.733	0.190
Health care system covers up its mistakes	0.027	0.698
Patients receive high-quality care from health care system[c]	0.799	0.204
Health care system makes too many mistakes	0.295	0.634
Health care system puts making money above patients' needs	0.297	0.693
Health care system gives excellent medical care[c]	0.796	0.201
Patients get same medical treatment regardless of race[c]	0.564	0.283
Health care system lies to make money	0.294	0.712
Health care system experiments on patients without them knowing	0.241	0.636

[a]The range of the competence factor scores is 7.47 (-4.316~3.154), with a mean of 0 and a standard deviation of 1.
[b]The range of the values factor scores is 6.98 (-3.180~3.800), with a mean of 0 and a standard deviation of 1.
[c]Item is reverse-coded.

a single scale from 1 to 10 to assess the experience of day-to-day stress, where 1 indicated "no stress" and 10 indicated "extreme amount of stress." This measure has been used in the absence of a complete inventory of stressful events.[36,37] Including these measures in the analyses captures aspects of both mental and physical health.

Analytical Strategy

Our analysis was based on the use of both logistic and multinomial logistic regression models. For the binary dependent variables (whether the women had received a Pap test, whether the women had received a clinical breast exam), we modeled the likelihood that the response was equal to 1 given a set of explanatory covariates. For the trichomized dependent variable (the women had received both tests, 1 test, or no test), we use a multinomial logistic regression, comparing those women who reported both tests or just 1 test with the comparison category (no test), respectively.

RESULTS

Eighty percent of PHMC women aged 18 years and older had received a Pap test within 2 years and more than 70% had received a breast examination by a doctor or health professional within a year (results not shown). Table 2 presents descriptive statistics for all variables used by the number of screening services used. We provided data on the mean value of each variable for the overall sample and compared mean values among 3 subsamples: those women who had received neither the Pap test nor breast examination within the recommended time, those women who had received 1 screening test, and those women who had received both. Several patterns are worth noting. First, both values and competence distrust scores were lower among women with greater utilization of screening services. Specifically, the values distrust of the women who reported having had 1 or both tests was significantly lower than that of the group of women who did not have either a Pap test or a breast examination (both tests=−0.083 vs. 1 test=−0.020 vs. neither test=0.103). Second, women of higher socioeconomic status utilized preventive health services more than did other women. For example, almost 17% of women who reported having received both a Pap test and a breast examination had a postcollege degree, compared with 9% of women who had received no screening test, a statistically significant difference. Third, respondents whose usual source of care was a private physician's office were more likely to have received both Pap and breast cancer screening tests than were those with other types of sources of care. Finally, women with less stress or better self-rated health also reported more utilization of cancer screening tests.

Table 3 presents the logistic regression results for utilization of Pap tests and clinical breast examination. Competence distrust was associated with the odds of having received a Pap test. Specifically, a unit increase in competence distrust was associated with an 8% decrease in the likelihood of having received a Pap test (odds ratio [OR]=0.916; 95% confidence interval [CI]=0.851, 0.986). The odds of having received a Pap test also was related to age, race/ethnicity, marital status, employment status, education, health care resources, and personal health. For instance, having a regular source of care (regardless of type) was associated with a 68% to 77% increase in the odds of having received a Pap test. When we controlled for other covariates, each 10-year increase in age was related to a 24% decrease in the odds of having received a Pap test in the recommended time interval ($0.973^{10}=0.761$).

With respect to breast cancer screening, only higher levels of values distrust were associated with lower odds of having received a clinical breast examination. Other things equal, the odds of having received a breast cancer screening decreased by roughly 8% with each 1-unit increase in values distrust (OR=0.923; 95% CI=0.864, 0.986). The determinants of having received a clinical breast examination are similar to those of having received a cervical cancer test (i.e., demographic features and health care resources). One of the potentially modifiable factors was insurance status. The odds of having received a breast examination among insured women were almost triple those of women without insurance (OR=2.757; 95% CI=2.179, 3.489).

Next, we used multinomial logistic regression to investigate whether distrust was related to the number of preventive screening tests (Table 4). Compared with women without any screening tests, values distrust was related to the likelihood of having received 1 of these 2 tests, and both values and competence distrust scores were negatively associated with the odds of having received both services. Specifically, a 1-unit increase in values distrust would result in a 12.5% decrease (OR=0.875; 95%

TABLE 2—Descriptive Statistics Overall and by Number of Breast and Cervical Cancer Screening Services Obtained in Recommended Time Interval Among Women (n = 5268) in the 2008 Philadelphia Health Management Corporation Household Health Survey

Variables	Overall Sample (N = 5268), Mean or %[a]	Neither Screening (n = 694), Mean or %[a]	One Screening (n = 1062), Mean or %[a]	Both Screenings (n = 3512), Mean or %[a]	Comparisons Between Groups
Health care system distrust					
Values	0.000	0.103	−0.020	−0.083	b,c
Competence	0.000	0.039	−0.005	−0.011	
Demographics					
Age	48.441	52.215	50.157	46.756	b,c,d
Race/ethnicity					
White (Ref)	0.671	0.722	0.629	0.676	b,c,d
Black	0.220	0.152	0.235	0.227	b,c
Hispanic	0.062	0.066	0.077	0.055	d
Others	0.047	0.059	0.058	0.041	
Marital status					
Married or cohabiting	0.584	0.466	0.522	0.631	b,c,d
Widowed, divorced, or separated	0.188	0.274	0.218	0.155	b,c,d
Single (Ref)	0.228	0.260	0.260	0.213	c,d
Socioeconomic status					
Poverty level					
Poverty	0.129	0.162	0.158	0.111	c,d
Nonpoverty (Ref)	0.871	0.838	0.842	0.889	c,d
Employment status					
Employed	0.587	0.480	0.492	0.650	c,d
Unemployed	0.067	0.085	0.098	0.054	c,d
Others (Ref)	0.346	0.435	0.410	0.297	c,d
Education					
Not high-school graduate (Ref)	0.080	0.115	0.110	0.063	c,d
High-school diploma	0.322	0.396	0.368	0.289	c,d
Some college	0.206	0.212	0.212	0.202	
College degree	0.248	0.184	0.195	0.281	c,d
Postcollege	0.144	0.092	0.115	0.166	c,d
Health care resources					
Insurance status					
Insured	0.928	0.840	0.905	0.955	b,c,d
Not insured (Ref)	0.072	0.160	0.095	0.045	b,c,d
Regular source of care					
No regular health care (Ref)	0.086	0.147	0.085	0.073	b,c
Private doctor's office	0.793	0.723	0.778	0.815	b,c,d
Public health center	0.061	0.067	0.068	0.057	
Others	0.059	0.064	0.068	0.055	
Personal health					
Self-rated health					
Excellent (Ref)	0.330	0.273	0.260	0.368	c,d
Good	0.467	0.433	0.479	0.469	
Fair	0.158	0.220	0.204	0.128	c,d
Poor	0.045	0.074	0.057	0.035	c,d
Stress	5.643	5.758	5.631	5.635	

Note. The comparisons between groups already accounted for standard deviation so we did not report standard deviation.
[a]For binary variables, mean values can be interpreted as the proportions of those coded 1.
[b]Significant difference between neither screening and 1 screening at least at .05 level.
[c]Significant difference between neither screening and 2 screenings at least at .05 level.
[d]Significant difference between 1 and 2 screenings at least at .05 level.

TABLE 3—Logistic Regression Results Modeling Receipt of Screenings Within the Recommended Time Interval Among Women (n = 5268) in the 2008 Philadelphia Health Management Corporation Household Health Survey

Variables	Papanicolaou Test, OR (95% CI)	Clinical Breast Examination, OR (95% CI)
Health care system distrust		
Values	0.928 (0.860, 1.000)	0.923* (0.864, 0.986)
Competence	0.916* (0.851, 0.986)	0.959 (0.899, 1.023)
Demographics		
Age	0.973*** (0.967, 0.978)	0.998 (0.993, 1.003)
Race/ethnicity		
White (Ref)	1.000	1.000
Black	2.094*** (1.692, 2.592)	1.597*** (1.334, 1.910)
Hispanic	1.569* (1.109, 2.219)	0.911 (0.694, 1.196)
Others	1.088 (0.770, 1.535)	0.886 (0.661, 1.187)
Marital status		
Married or cohabiting	1.806*** (1.483, 2.199)	1.404*** (1.188, 1.659)
Widowed, divorced, or separated	1.214 (0.960, 1.536)	1.060 (0.857, 1.312)
Single (Ref)	1.000	1.000
Socioeconomic status		
Poverty level		
Nonpoverty (Ref)	1.000	1.000
Poverty	1.122 (0.886, 1.419)	0.955 (0.779, 1.171)
Employment status		
Employed	1.449*** (1.215, 1.728)	1.141 (0.977, 1.333)
Unemployed	1.054 (0.777, 1.430)	0.665** (0.513, 0.861)
Others (Ref)	1.000	1.000
Education		
Not high-school graduate (Ref)	1.000	1.000
High-school diploma	1.044 (0.795, 1.371)	1.026 (0.802, 1.312)
Some college	1.174 (0.873, 1.577)	1.178 (0.903, 1.535)
College degree	1.600*** (1.173, 2.183)	1.414* (1.075, 1.860)
Postcollege	1.835*** (1.296, 2.597)	1.537** (1.136, 2.078)
Health care resources		
Insurance status		
Not insured (Ref)	1.000	1.000
Insured	3.152*** (2.425, 4.098)	2.757*** (2.179, 3.489)
Regular source of care		
No regular health care (Ref)	1.000	1.000
Private doctor's office	1.678*** (1.304, 2.159)	1.631*** (1.311, 2.028)
Public health center	1.697** (1.159, 2.483)	1.885*** (1.353, 2.627)
Others	1.768** (1.202, 2.601)	1.385* (1.004, 1.911)
Personal health		
Self-rated health		
Excellent (Ref)	1.000	1.000
Good	1.005 (0.841, 1.201)	0.829* (0.713, 0.965)
Fair	0.737** (0.585, 0.928)	0.639*** (0.522, 0.784)
Poor	0.638** (0.454, 0.896)	0.677* (0.492, 0.932)
Stress	1.006 (0.977, 1.036)	0.986 (0.961, 1.011)
AIC	4694.727	5901.623
Pseudo-R^{2a}	0.155	0.086

Notes. AIC = Akaike Information Criterion; CI = confidence interval; OR = odds ratio.
[a]Pseudo-R^2 is a measure of goodness of fit commonly used in generalized linear modeling (e.g., logistic regression).
*$P < .05$; **$P < .01$; ***$P < .001$.

TABLE 4—Multinomial Regression Results Modeling the Number of Screening Tests Received in the Recommended Time Interval Versus None Among Women (n = 5268) in the 2008 Philadelphia Health Management Corporation Household Health Survey

Variables	1 (n = 1062) vs None (n = 694), OR (95% CI)		2 (n = 3512) vs None (n = 694), OR (95% CI)
	Health care system distrust		
Values	0.875* (0.790, 0.970)		0.875** (0.800, 0.958)
Competence	0.955 (0.864, 1.054)		0.914* (0.838, 0.997)
	Demographics		
Age	0.993 (0.985, 1.000)		0.982*** (0.976, 0.989)
Race/ethnicity			
White (Ref)	1.000		1.000
Black	2.291*** (1.712, 3.065)		2.671*** (2.053, 3.475)
Hispanic	1.710* (1.112, 2.628)		1.406 (0.950, 2.079)
Others	1.429 (0.921, 2.218)		1.047 (0.703, 1.560)
Marital status			
Married or cohabiting	1.303* (1.005, 1.690)		1.835*** (1.459, 2.307)
Widowed, divorced, or separated	0.977 (0.713, 1.339)		1.122 (0.849, 1.483)
Single (Ref)	1.000		1.000
	Socioeconomic status		
Poverty status	1.000		1.000
Nonpoverty (Ref)			
Poverty	0.941 (0.693, 1.277)		1.002 (0.761, 1.320)
Employment status			
Employed	0.945 (0.743, 1.203)		1.292* (1.047, 1.595)
Unemployed	1.220 (0.830, 1.795)		0.836 (0.584, 1.197)
Others (Ref)	1.000		1.000
Education			
Not high-school graduate (Ref)	1.000		1.000
High-school diploma	1.043 (0.730, 1.490)		1.060 (0.767, 1.465)
Some college	1.136 (0.769, 1.677)		1.278 (0.900, 1.816)
College degree	1.143 (0.757, 1.725)		1.668** (1.156, 2.408)
Postcollege	1.362 (0.854, 2.171)		1.994** (1.318, 3.016)
	Health care resources		
Insurance status			
Not insured (Ref)	1.000		1.000
Insured	1.983*** (1.429, 2.753)		4.198*** (3.115, 5.657)
Regular source of care			
No regular health care (Ref)	1.000		1.000
Private doctor's office	1.862*** (1.342, 2.583)		2.096*** (1.586, 2.771)
Public health center	1.526 (0.930, 2.505)		2.127*** (1.372, 3.299)
Others	1.600 (0.980, 2.615)		1.772** (1.150, 2.731)
	Personal health		
Self-rated health			
Excellent (Ref)	1.000		1.000
Good	1.236 (0.969, 1.577)		0.963 (0.781, 1.187)
Fair	1.077 (0.791, 1.468)		0.663** (0.505, 0.870)
Poor	0.955 (0.605, 1.506)		0.609* (0.407, 0.912)
Stress	0.989 (0.951, 1.028)		0.994 (0.960, 1.029)
AIC		8511.314	
Pseudo-R^{2a}		0.118	

Notes. AIC = Akaike Information Criterion; CI = confidence interval; OR = odds ratio.
[a]Pseudo-R^2 is a measure of goodness of fit commonly used in generalized linear modeling.
*P < .05; **P < .01; ***P < .001.

CI=0.790, 0.970) in the likelihood of having received only 1 of the 2 preventive tests. This association remained when we compared women who had received both tests (OR=0.875; 95% CI=0.800, 0.958). We found an association for competence distrust among those who had utilized both services; specifically, the odds of having taken 2 tests would be reduced by almost 10% (OR=0.914; 95% CI=0.838, 0.997) if competence distrust increased by 1 unit.

Several noteworthy additional findings exist. Socioeconomic factors and health status did not appear to be associated with differences between having received no screening test and having received 1 test; in other words, poverty, employment status, educational attainment, self-rated health, and stress level were not significant. Marital status, race/ethnicity, health insurance, and source of care, however, were associated with the difference between having received no test and 1 test. When we compared those women who had received both tests with those who had received none, we found that socioeconomic and health conditions were important. Employed women and those with a college degree were more likely to have received both recent breast and cervical cancer screenings than were their counterparts. Self-rated health was also associated with having received both tests. Women who rated their health as fair or poor were about 35% to 40% less likely to have received breast and cervical cancer screening. Moreover, employment status, having at least a college education, and reporting fair or poor health were the main factors that accounted for the differences between the 2 models in Table 4.

DISCUSSION

Our findings support the first hypothesis, that high levels of health care system distrust among women are associated with low utilization of cancer screening services, specifically Pap tests and clinical breast examinations. However, our second hypothesis, that both the values and competence distrust scores were negatively associated with cancer screening utilization, was not fully supported. Results suggest that different dimensions of distrust play a unique role in understanding cancer screening usage; that is, high competence distrust was associated with low odds of having received Pap test screening, and values distrust was negatively associated with the likelihood of having received a clinical breast examination. This difference warrants further investigation. Because women can be screened for breast cancer by both clinical breast examination and mammogram, it could be the case that those who distrust their health care providers' integrity or ethics are more likely to opt to rely on the objective screening provided by mammography. On the other hand, women who have doubts about the technical competence of their health care provider may be reluctant to submit to an office-based laboratory test such as a Pap test.

Independent of other covariates, health care resources and personal health were associated with women's utilization of cancer screening. If women have a regular source of care they are more likely to receive and act on the recommendation to have a regular Pap test and clinical breast examination.[38] Women with a regular source of care may have frequent interactions with the health care system (including insurance companies and health care providers) and these interactions may promote the trustworthiness of the health care environment and, hence, lessen competence distrust.[26]

As mentioned previously, the differences between the 2 models in Table 4 indicate that employment status, education, and self-rated health were important factors associated with the utilization of cancer screening. Consistent with other research, we found that higher educational attainment is associated with the dissemination and adoption of information on the importance of preventive health services[39,40]; respondents with at least a college education were more likely to have received both tests, rather than 1, than were their counterparts. Similarly, perhaps women with fair or poor self-rated health may not seek screening because of concerns about the discovery of cancers.

We documented a significant association between distrust and utilization of breast and cervical cancer screening tests, net of other factors. Although it used different measures of distrust, this study corroborates a recent article that concluded that different dimensions of trust in the health care system had unique relationships with the use of preventive health services among older Black and White adults in Pittsburgh.[11] Our findings are consistent with studies exploring determinants of cancer screening. For example, we found that Black women were 1.5 to 2 times and 50% more likely than were White women to have received Pap tests or breast examinations, respectively. Hispanic women were also 50% more likely to have received a Pap test (Table 3) than were White women. These findings echo those of a recent study.[25] Being married or living with a partner facilitated the use of cancer screening services. Again, similar findings have been documented elsewhere.[5,11,41,42]

This study has several limitations. First, the survey data came from women in the Philadelphia metropolitan area, and the findings may not be generalizable to women in other areas, although the findings are in line with research conducted in similar settings. Second, the PHMC does not provide specific information on levels of respondents' trust in their primary health providers, and thus, the intertwined association between trust in physicians and health care system distrust cannot be separated. Third, as noted earlier the wording and classification of time intervals for the Pap test question do not permit a direct comparison with recommended screening guidelines. Fourth, this study was cross-sectional, which precludes looking at cause-and-effect relationships over time. Fifth, although the balancing weights were constructed accounting for phone type and sociodemographic features,[43] nonresponse bias is another possible source of errors. Finally, the data were self-reported and, therefore, subject to recall bias and other measurement errors.[44,45]

Several policy implications emerge from this study. Because distrust plays an important role in the utilization of cancer screening tests, rebuilding trust in the health care system among the American public should be a priority. The values and competence distrust in the health care system has been a barrier to public health research.[46] Maintaining a high level of service quality and responsiveness (i.e., reducing medical errors, providing transparency to patients) may reduce both competence and values distrust[47] and, in turn, may increase the utilization of cancer screening tests. This could be an example of how macrolevel changes can influence individual behaviors.

We found that having a regular source of care, regardless of type, may increase the opportunity for advice and compliance with cancer screening test recommendations. Even though there is an increased vulnerability to cancer with age, older women are less likely to receive screening tests. Promoting earlier and regular screening can lead to early detection and will reduce cancer morbidity and mortality within American women.

We used a recently developed health care system distrust scale to investigate the effects of different dimensions of distrust on breast and cervical cancer screening. The results indicate that competence and values distrust are associated with the likelihood of recommended use of screening tests, even after we controlled for other competing covariates. We found health care system distrust to be a barrier in the utilization of preventive health services. In addition to traditional demographic and socioeconomic determinants, future research should include measures of distrust so as to better understand patterns and determinants of cancer screening. ■

About the Authors

All authors are with the Population Research Institute at the Pennsylvania State University, University Park. Tse-Chuan Yang is with the Geographic Information Analysis Core; Stephen A. Matthews is with the Department of Sociology, Anthropology, and Demography (courtesy in Geography); and Marianne M. Hillemeier is with the Department of Health Policy and Administration.

Correspondence should be sent to Tse-Chuan Yang, 803 Oswald Tower, University Park, PA 16802 (e-mail: tuy111@psu.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints/Eprints" link.

This article was accepted November 1, 2010.

Contributors

T.-C. Yang originated the study, led the writing, and synthesized the analyses. S. A. Matthews procured funding, participated in the writing of the article, and interpreted results. M.M. Hillemeier interpreted results, provided substantive expertise in cancer screening, and participated in article preparation.

Acknowledgments

We acknowledge the support of Penn State's Social Science Research Institute, which provided funding to S.A. Matthews to secure the data licensing agreement with the Philadelphia Health Management and for their continued support of T.-C. Yang's position. Additional support has been provided by the Population Research Institute at Penn State, which receives core funding from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (R24-HD41025).

We thank the anonymous reviewers' for their insights and suggestions. Any errors remain the responsibility of the authors.

Human Participant Protection

This study did not need institutional review board approval because it is secondary data analysis and did not reveal any individual information.

References

1. Jemal A, Siegel R, Ward E, Hao YP, Xu JQ, Thun MJ. Cancer statistics, 2009. *CA Cancer J Clin.* 2009;59(4):225–249.

2. *Healthy People 2010: Understanding and Improving Health.* 2nd ed. Washington, DC: US Department of Health and Human Services; 2000.

3. *Cancer Prevention and Early Detection Facts & Figures 2010.* Atlanta, GA: American Cancer Society; 2010.

4. Ruzek SB. Towards a more inclusive model of women's health. *Am J Public Health.* 1993;83(1):6–8.

5. Sherman JJ, Abel E, Tavakoli A. Demographic predictors of clinical breast examination, mammography, and Pap test screening among older women. *J Am Acad Nurse Pract.* 1996;8(5):231–236.

6. Evans RG, Stoddart GL. Producing health, consuming healthcare. *Soc Sci Med.* 1990;31:1347–1363.

7. Institute of Medicine. *Promoting Health: Intervention Strategies From Social and Behavioral Research.* Washington, DC: National Academies Press; 2000.

8. Burton MV, Warren R, Price D, Earl H. Psychological predictors of attendance at annual breast screening examinations. *Br J Cancer.* 1998;77(11):2014–2019.

9. Pirraglia PA, Sanyal P, Singer DE, Ferris TG. Depressive symptom burden as a barrier to screening for breast and cervical cancers. *J Womens Health (Larchmt).* 2004;13(6):731–738.

10. Carney CP, Jones LE. The influence of type and severity of mental illness on receipt of screening mammography. *J Gen Intern Med.* 2006;21(10):1097–1104.

11. Musa D, Schulz R, Harris R, Silverman M, Thomas SB. Trust in the health care system and the use of preventive health services by older Black and White adults. *Am J Public Health.* 2009;99(7):1293–1299.

12. Virtually no change in annual Harris Poll Confidence Index from last year. 2010. Available at: http://www.harrisinteractive.com/Insights/HarrisVault8482.aspx?PID=447. Accessed August 10, 2010.

13. National Survey on Health Care. 2002. Available at: http://www.kff.org/kaiserpolls/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=14064. Accessed May 23, 2010.

14. LaVeist TA, Nickerson KJ, Bowie JV. Attitudes about racism, medical mistrust, and satisfaction with care among African American and White cardiac patients. *Med Care Res Rev.* 2000;57(suppl 1):146–161.

15. Hall MA, Dugan E, Zheng BY, Mishra AK. Trust in physicians and medical institutions: what is it, can it be measured, and does it matter? *Milbank Q.* 2001;79(4):613–639.

16. Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. *Public Health Rep.* 2003;118(4):358–365.

17. Cunningham CO, Sohler NL, Korin L, Gao W, Anastos K. HIV status, trust in health care providers, and distrust in the health care system among Bronx women. *AIDS Care.* 2007;19(2):226–234.

18. Thom DH, Hall MA, Pawlson LG. Measuring patients' trust in physicians when assessing quality of care. *Health Aff (Millwood).* 2004;23(4):124–132.

19. Mollborn S, Stepanikova I, Cook KS. Delayed care and unmet needs among health care system users: when does fiduciary trust in a physician matter? *Health Serv Res.* 2005;40(6):1898–1917.

20. Whetten K, Leserman J, Whetten R, et al. Exploring lack of trust in care providers and the government as a barrier to health service use. *Am J Public Health.* 2006;96(4):716–721.

21. Rose A, Peters N, Shea JA, Armstrong K. Development and testing of the health care system distrust scale. *J Gen Intern Med.* 2004;19(1):57–63.

22. Shea JA, Micco E, Dean LT, McMurphy S, Schwartz JS, Armstrong K. Development of a revised health care system distrust scale. *J Gen Intern Med.* 2008;23(6):727–732.

23. Egede LE, Ellis C. Development and testing of the multidimensional trust in health care systems scale. *J Gen Intern Med.* 2008;23(6):808–815.

24. Kaida A, Colman I, Janssen PA. Recent Pap tests among Canadian women: is depression a barrier to cervical cancer screening? *J Womens Health (Larchmt).* 2008;17(7):1175–1181.

25. Smith RA, Cokkinides V, Brauley OW. Cancer screening in the United States, 2008: a review of current American Cancer Society guidelines and cancer screening issues. *CA Cancer J Clin. 2008*;58(3):161–179.

26. Corbie-Smith G, Ford CL. Distrust and poor self-reported health: canaries in the coal mine? *J Gen Intern Med.* 2006;21(4):395–397.

27. Armstrong K, Rose A, Peters N, Long JA, McMurphy S, Shea JA. Distrust of the health care system and self-reported health in the United States. *J Gen Intern Med.* 2006;21(4):292–297.

28. Philadelphia Health Management Corporation. The 2008 Household Health Survey. Available at: http://www.chdbdata.org. Accessed March 10, 2011.

29. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys.* 3rd ed. Lenexa, KS: American Association for Public Opinion Research; 2004.

30. Keeter S, Kennedy C, Dimock M, Best J, Craighill P. Gauging the impact of growing nonresponse on estimates from a national RDD telephone survey. *Public Opin Q.* 2006;70:759–779.

31. Holbrook AL, Krosnick JA, Pfent A. Response rates in surveys by the news media and government contractor survey research firms. In: Lepkowski J, Harris-Kojetin B, Lavrakas PJ, eds. *Advances in Telephone Survey Methodology.* New York, NY: Wiley; 2007:499–528.

32. US Census Bureau. American Community Survey 2006–2008. Available at: http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS. Accessed March 10, 2011.

33. Behavioral Risk Factor Surveillance System Survey Data. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2008. Available at: http://www.cdc.gov/brfss/index.htm. Accessed March 10, 2011.

34. American College of Obstetricians and Gynecologists Committee on Gynecologic Practice. ACOG Committee Opinion Number 357: Primary and preventive care: periodic assessments. *Obstet Gynecol.* 2006;108(6): 1615–1621.

35. Hill M. *SPSS Missing Value Analysis 7.5.* Chicago, IL: SPSS; 1997.

36. Lazarus R. Theory-based stress measurement. *Psychol Inq.* 1990;1:3–13.

37. Yang T-C, Matthews SA. The role of social and built environments in predicting self-rated stress: a multilevel analysis in Philadelphia. *Health Place.* 2010;16(5): 803–810.

38. Breen N, Cronin KA, Meissner HI, et al. Reported drop in mammography: is this cause for concern? *Cancer.* 2007;109(12):2405–2409.

39. Smith RA, Cokkinides V, Brawley OW. Cancer screening in the United States, 2009: a review of current American Cancer Society guidelines and issues in cancer screening. *CA Cancer J Clin. 2009*;59(1):27–41.

40. Coughlin SS, Leadbetter S, Richards T, Sabatino SA. Contextual analysis of breast and cervical cancer screening and factors associated with health care access among United States women, 2002.*Soc Sci Med. 2008*;66(2):260–275.

41. Makuc DM, Freid VM, Kleinman JC. National trends in the use of preventive health care by women. *Am J Public Health.* 1989;79(1):21–26.

42. Lane DS, Polednak AP, Burg MA. Breast cancer screening practices among users of county-funded health centers vs. women in the entire community. *Am J Public Health.* 1992;82(2):199–203.

43. Weingartner RM. Community health data in a wireless world: inclusion of cell phone sampling in a regional population health survey. 2009. Available at: http://www.chdbdata.org/uploads/datareports/APHA%2009%20slides%20for%20submission.pdf. Accessed March 8, 2011.

44. McGovern PG, Lurie N, Margolis KL, Slater JS. Accuracy of self-report of mammography and Pap smear in a low-income urban population. *Am J Prev Med.* 1998;14(3):201–208.

45. Newell SA, Girgis A, Sanson-Fisher RW, Savolainen NJ. The accuracy of self-reported health behaviors and risk factors relating to cancer and cardiovascular disease in the general population: a critical review. *Am J Prev Med.* 1999;17(3):211–229.

46. Corbie-Smith G, Thomas SB, St George DMM. Distrust, race, and research. *Arch Intern Med.* 2002; 162(21):2458–2463.

47. Shore DA. The (sorry) state of trust in the American health care enterprise. In: Shore DA, ed. *The Trust Crisis in Healthcare: Causes, Consequences, and Cures.* New York, NY: Oxford University Press; 2007:3–20.