An Object Lesson: Source Determines the Relations That Trait Anxiety, Prostate Cancer Worry, and Screening Fear Hold with Prostate Screening Frequency

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Abstract

Fears regarding prostate cancer and the associated screening are widespread. However, the relations between anxiety, cancer worry, and screening fear and screening behavior are complex, because anxieties stemming from different sources have different effects on behavior. In differentiating among anxieties from different sources (trait anxiety, cancer worry, and screening fear), we expected that cancer worry would be associated with more frequent screening, whereas fear of screening would be associated with less frequent screening. Hypotheses were tested in a sample of 533 men (ages 45-70 years) recruited using a stratified cluster-sampling plan. Men provided information on demographic and structural variables (age, education, income, marital status, physician discussion of risk and screening, access, and insurance) and completed a set of anxiety measures (trait anxiety, cancer worry, and screening fear). As expected, two-step multiple regressions controlling for demographics, health insurance status, physician discussion, and health-care system barriers showed that prostate-specific antigen and digital rectal examination frequencies had unique associations with cancer worry and screening fear. Specifically, whereas cancer worry was associated with more frequent screening, fear of screening was associated with less frequent screening at least for digital rectal examination; trait anxiety was inconsistently related to screening. Data are discussed in terms of their implications for male screening and the understanding of how anxiety motivates health behaviors. It is suggested that understanding the source of anxiety and the manner in which health behaviors such as cancer screenings may enhance or reduce felt anxiety is a likely key to understanding the associations between anxiety and behavioral outcomes. (Cancer Epidemiol Biomarkers Prev 2008;17(7):1631–9)

Introduction

Anxiety, worry, and fear are among the most common emotional responses to the threat of disease. In particular, they have been implicated in preventive and detection behaviors albeit in a complex fashion. The current report extends the literature examining the role of anxiety in health behavior by considering how the source of anxiety relates to prostate screening behavior. Moving from the assertion that a key function of anxiety is to motivate escape and the avoidance of threatening situations and that the relation of anxiety to behavior is thus dependent on the source of anxiety, we operationalized three anxiety components—trait anxiety, cancer worry, and screening fear—and evaluated their relation to digital rectal examination (DRE) and prostate-specific antigen (PSA) frequency in a diverse sample of community dwelling older men.

Prostate cancer is the most common cancer in men and remains the second leading cause of cancer-related deaths in America (1). African Americans (258.3/100,000) are more likely to be diagnosed than Whites (163.4/100,000), with recent data suggesting particularly high rates among other men of African descent such as those from the Caribbean (2-6). In addition, African Americans have 2.4 times the mortality of Whites (7). Poorer survival may reflect stage-at-diagnosis issues (8, 9), disease biology (10, 11), or other environmental or social factors (12) and African American men are more likely to be detected with advanced (7, 13, 14) or metastatic cancers (9); disparities are more pronounced for more advanced tumors (15, 16).

The high incidence and mortality rates for prostate cancer among African American and other men of African descent may be expected to be reflected in elevated anxieties surrounding prostate cancer and the associated screening in these men. African Americans report greater fear of prostate cancer and screening, particularly for DRE (17, 18), although there are exceptions (19). One study of 180 men found that both African American and Jamaican men reported greater screening fear than European Americans (20). In total, these studies suggest that minority men should report greater cancer worry and screening fear than U.S.-born European Americans.

Highlighting the need for the continued study of anxiety is the ongoing debate regarding the efficacy of the two screening tests for prostate cancer—PSA testing and DRE. Researchers are currently debating the recommended age of screening, the PSA levels requiring biopsy, and the age to stop screening (21, 22). Some
work implies advantages to screening (e.g., ref. 23), although case-control studies have not unambiguously supported its use (24), and a recent meta-analysis was inconclusive (25). The American Cancer Society guidelines suggest that men ages >50 years be offered annual DRE and PSA screening (45 years where men have a family history or are African American), as long as men are informed of the benefits and limitations of screening (26) and have a life expectancy of at least 10 years (7).

National data suggest that African Americans (50.0%) report somewhat fewer PSA tests than Whites (55.4%) as well as fewer DRE (47.4% versus 52.2%; ref. 7). Studies of other groups of Black men are few, but these too generally suggest a low rate of screening among men of African descent (20, 27). Demographically, lower screening has been associated with lower education and socioeconomic status (28, 29), a lack of insurance (30-32), lower age (33-35), being single (30), reports of time, access, and awareness problems (36-38), and low levels of physician recommendation (29, 32, 39).

However, although such characteristics identify men at risk for infrequent screening, significant portions of screening variance remain; in any case, such factors are difficult to directly intervene with (20). Of the psychosocial variables considered, fears related to prostate cancer and the screening process may be among the most promising. Breast screening studies suggest that worry generally predicts greater screening (40-42). However, prostate data are less convincing (43), perhaps because the source of men’s anxieties remains poorly understood. Indeed, work to date reveals considerable heterogeneity in the source of men’s fears (see, for example, ref. 44). Prostate-related anxiety may be caused by screening itself (45), men may avoid screening tests for fear of discovering prostate cancer (46, 47), and concerns regarding discomfort or embarrassment may also be important (47, 48). Men with greater state anxiety have been found to be more likely to drop out of a screening program (45), greater worry and concern about screening predicted self-care versus no care, although it was not related to conventional care (49), and screening fear predicted lower screening even when age, income, and education were controlled (20). Conversely, concern regarding prostate cancer has been associated with use of prostate-related complementary and alternative medicines (50) and greater trait anxiety predicted more frequent screening in a diverse group of men (27). That men are afraid seems clear. Exactly what they are afraid of and how the source of their fears influences the relation between anxiety and the two available types of screening behavior less so.

In the emotions theory view, understanding the role of fear in health behavior is predicated on understanding the object or source of the fear (51, 52); it has been argued that knowing exactly what frightens a person is critical to predicting behavior (53). This approach emphasizes the functions of fear/anxiety, notably its role in motivating avoidance and/or escape behaviors with respect to the eliciting stimulus (52, 54), and is consistent with work assessing distinct sources of anxiety in prostate cancer patients (55, 56). Fears pertaining to the screening context (e.g., fear of pain or the medical establishment) seem likely to produce avoidance of the fear-inducing situation and should thus be associated with less frequent screening. Conversely, where fears relate to the disease itself, greater fear should predict more frequent screening. Finally, although care-seeking research suggests a generally positive relation (e.g., ref. 57), the link between dispositional anxiety and screening remains unclear (40).

This view also attends to the fact that DRE and PSA tests have distinct physical and psychologic requirements (20). Specifically, although discomfort is minimal, DRE tests require that a man bend forward and allow a doctor to insert a lubricated finger into his anus. Thus, DRE screening is likely associated with anxieties regarding embarrassment, vulnerability, sexuality, and humiliation (18), whereas PSA testing involves a blood test and is less overtly fear-inducing. Thus, it was expected that whereas cancer worry should be associated with a greater frequency of both DRE and PSA frequency, screening fear would be associated with reduced DRE frequency only.

Materials and Methods

Participants. The participants of this study were 533 community-dwelling men, ranging in age from 45 to 70 years, living in Brooklyn, NY. Respondents were recruited based on a stratified cluster-sampling plan. At the initial stage, tract blocks containing ≥25% of either Black or White males were identified using the year 2000 Census files. Tracts were stratified based on household income (‘‘high,’’ ‘‘middle,’’ and ‘‘low’’ categories) and within these categories ordered by the percentage of Black and White residents (25-50%, 51-75%, and ≥75%). Geographically representative numbers of Black and White males in each tract were derived and trained interviewers were sent to recruit men meeting the study criteria. Although we originally recruited among subpopulations of men of African descent (U.S.-born African Americans, immigrant Jamaicans, and immigrant men from Trinidad and Tobago), the subgroups did not differ in screening frequency and there were few differences in anxiety constructs at this level of stratification. Thus, to conserve power, we characterize our sample in terms of a broad Black-White racial classification.

Procedures. Permission to conduct the study was obtained from Long Island University and Columbia University institutional review boards; data were collected for ~21 months from 2004 to 2006. A team of ~10 community-based recruiters used a diverse range of methods to fill the sampling plan. Men were recruited for a ‘‘Men’s Health Questionnaire Study.’’ Most initial contacts were made through door-knocking (15.0%) and ‘‘stop and ask’’ (45.0%) with a significant number of flow-on ‘‘referral’’ contacts (37.1%); smaller numbers were recruited in response to local advertising (1.5%) and flyer postings (1.3%). In each case, once an individual satisfying the demographic criteria (age, ethnicity, and residential location) was contacted, the interviewer called the study coordinator who then verified that the individual’s address met the sampling plan requirements. After permission to conduct the interview was secured, a meeting time was scheduled. Following written consent, data were collected during interviewer-race matched, face-to-face interviews that lasted ~1.5 h and were conducted in the respondent’s home or another location of their choice such as a senior center.
or church. Measures were administered in a standard order for all respondents and participants were paid $50 for their involvement.

Measures

Background Questionnaire. A questionnaire elicited information regarding race (Black/White), age, household income, education, and marital status (legally married versus other arrangement). However, although age is a key predictor of prostate screening (33, 35, 58), screening guidelines suggest that although tests should be offered to men at age 50 years, those at higher risk, such as men of African descent, should be offered screening at age 45 years. For example, a 51-year-old White male who opts to screen according to guidelines has been screening for 1 year (and should have had one PSA and one DRE test), whereas a 51-year-old African American male screening according to guidelines would have been screening for 6 years and have had an equivalent number of tests. Put simply, raw chronologic age is less useful as a predictor of screening frequency across groups for whom the guidelines offer different ages for the initiation of screening. Consequently, we used raw age for descriptive purposes and a recalibrated “years of screening” variable for models predicting screening in diverse groups. This latter variable reflects the years the guideline-adherent individual should have been screening rather than their raw chronologic age (age 50 years for Whites and age 45 years for Blacks).

Insurance Status and Health-Care System Barriers. Men reported on whether they had health insurance (yes/no) and completed a scale assessing barriers to the use of the health-care system. This scale comprised six items with sample questions including “The health-care system was not designed to be conveniently used by people like me.” Items were aggregated to form a perceived barriers measure (a = 0.66).

Physician Discussion. Three items indicated prior physician discussion of prostate health. Men were asked whether their physician had ever discussed their family history of prostate cancer, their risk, and/or recommended that they screen. Responses to the three items were summed to create an aggregate measure (a = 0.80).

Dispositional Anxiety, Prostate Cancer Worry, and Fear of Prostate Cancer Screening. Dispositional anxiety was measured using the Differential Emotions Scale version III (59). The fear subscale has three items on which respondents use a 1 to 5 scale to rate the extent to which anxiety or fear characterizes their day-to-day experience. The scale has been used in numerous studies in older minority groups (60), including examinations of prostate screening (27), and enjoys good psychometric properties (59, 61). We summed the three items to form a measure of trait anxiety (a = 0.80).

Prostate cancer worry was assessed with five items based in prior work assessing breast cancer worry among African Americans (62). Participants answered questions such as “I get uneasy when I think about prostate cancer.” Items were aggregated to form a cancer worry variable (a = 0.65).

Finally, screening fear was assessed with five items including “I am afraid of prostate cancer screening,” “I worry that screening procedures will hurt me somehow,” and “I am too fearful of prostate cancer screening procedures to actually go through with them” (a = 0.79).

Prostate Cancer Screening. Participants recorded the number of DRE and PSA tests in the prior 10 years. Although most research asks men to report on screening within the last year or to report on their most recent screen, we suspected that low screening among men of African descent (20, 27) would produce too many “nonscreeners.” The 2-year concordance between self-report and medical audit measures of screening ranges from 66% for DRE (63) to 74.4% for PSA (64) with discrepancies evident in both self-report and chart measures (65). Self-reported frequency is sometimes higher than that indicated by charts (66), although nearly one third of men in one study were not aware of that a PSA test had just been done (67). Screening data were positively skewed (skewness = 2.18 for PSA and 2.25 for DRE) and were improved with a square root transformation (68).

Analytic Strategy. Analysis proceeded in two stages. First, we conducted multivariate analysis of covariance and follow-up multivariate ANOVA to examine race group differences in background and fear-related variables. Second, we tested predictions regarding the

Table 1. Mean (SD) of sample demographic characteristics by ethnic group and results of ANOVA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Racial group</th>
<th>ANOVA or χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black (n = 414)</td>
<td>White (n = 119)</td>
</tr>
<tr>
<td>Age (y)</td>
<td>53.50 (6.86)</td>
<td>58.10 (8.47)</td>
</tr>
<tr>
<td>Household income (SK)</td>
<td>31.33 (21.94)</td>
<td>33.28 (36.69)</td>
</tr>
<tr>
<td>Education (y)</td>
<td>12.73 (2.91)</td>
<td>14.80 (2.49)</td>
</tr>
<tr>
<td>% Married</td>
<td>40.1</td>
<td>58.0</td>
</tr>
<tr>
<td>% With health insurance</td>
<td>85.3</td>
<td>95.8</td>
</tr>
<tr>
<td>Health-care system barriers</td>
<td>2.27 (0.79)</td>
<td>2.13 (0.65)</td>
</tr>
<tr>
<td>Physician discussion of prostate cancer</td>
<td>1.94 (1.23)</td>
<td>1.90 (1.08)</td>
</tr>
<tr>
<td>Trait anxiety</td>
<td>1.88 (0.80)</td>
<td>2.01 (0.53)</td>
</tr>
<tr>
<td>Prostate cancer worry</td>
<td>2.43 (0.80)</td>
<td>2.21 (0.69)</td>
</tr>
<tr>
<td>Screening fear</td>
<td>1.97 (0.83)</td>
<td>1.63 (0.66)</td>
</tr>
<tr>
<td>No. PSA tests</td>
<td>3.25 (4.45)</td>
<td>4.53 (4.83)</td>
</tr>
<tr>
<td>No. DRE tests</td>
<td>2.67 (3.66)</td>
<td>3.79 (4.61)</td>
</tr>
</tbody>
</table>

NOTE: *P < 0.05.

*p < 0.01.

1The frequencies of DRE and PSA tests are summed across the previous 10 y.
relations between anxiety constructs and screening frequency. We ran two, two-step multiple regressions predicting DRE and PSA frequency in which background variables were entered in the first step. In the second step, we added trait anxiety, cancer worry, and screening fear.

Results

Background Characteristics of the Sample. Table 1 presents the background characteristics of the sample broken and the results of χ² or ANOVA. Race was significant (Wilks’ λ = 22.63; P < 0.01), with significant differences in age, income, years of education, and the percentage of men from each group who were married or had health insurance; background variables that differed by race were treated as covariates in subsequent analyses.

Race Differences in Trait Anxiety, Cancer Worry, and Screening Frequency. A multivariate analysis of covariance (with race as the independent variable, with trait anxiety, cancer worry, and screening fear as dependent variables, with and age, income, education, and marital status as covariates) was run. The model was significant for race (Wilks’ λ = 8.78; P < 0.01), although education was also significant; hence, it was dichotomized and entered into a race by education multivariate ANOVA with the three anxiety measures as dependent variables. Race was again significant (Wilks’ λ = 9.55; P < 0.05), but education was not; to conserve power, it was dropped from the model. Finally, we ran a multivariate ANOVA with race as the factor. Race was significant (Wilks’ λ = 10.09; P < 0.01). Follow-up tests showed that there were race differences in cancer worry [F(1,532) = 7.55; P < 0.01] and screening fear [F(1,532) = 17.63; P < 0.01] but not in trait anxiety [F(1,532) = 1.71; nonsignificant]. Black men reported greater prostate cancer worry and greater screening fear than White men (see Table 1).

Race Differences in Prostate Screening Frequency. Finally, a multivariate analysis of covariance [with ethnic group as the independent variable, with square root–transformed PSA and DRE frequency as outcomes, and with years of screening (see above), income, education, and marital status as covariates] was run. Race was not significant (Wilks’ λ = 0.13; nonsignificant), although there were effects for income, education, and years of screening; hence, they were dichotomized and entered into a multivariate ANOVA with race, income, education, and years of screening as factors and the two screening measures as outcomes. Race remained nonsignificant as a main effect (Wilks’ λ = 0.28; nonsignificant), although years of screening (Wilks’ λ = 14.57; P < 0.01) and income (Wilks’ λ = 6.37; P < 0.01) were significant, and there was an interaction between race and education (Wilks’ λ = 5.74; P < 0.01). Although race was not associated with screening, it interacted with education such that greater education was associated with more frequent DRE screening among Whites but not African Americans [F(1,517) = 9.04; P < 0.01]. Greater years of screening was associated with a greater frequency of both PSA [F(1,517) = 28.04; P < 0.01] and DRE [F(1,517) = 20.06; P < 0.01] screens. Similarly, greater income was associated with more frequent PSA [F(1,517) = 12.72; P < 0.01] and DRE [F(1,517) = 7.06; P < 0.01] screening.

Zero-Order Relations between Psychologic Characteristics and Screening Frequency. PSA and DRE frequencies were related to one another and to greater years of screening, income, education, being married, having insurance, physician discussion, fewer perceived barriers, and lower screening fear; neither screen was related to either trait anxiety or cancer worry in zero-order analyses. Trait anxiety, cancer worry, and screening fear were all positively related to one another and were all related to lower income and education and greater perceived barriers. Worry and screening fear (but not trait anxiety) were related to not having insurance and to low physician discussion. Cancer worry, but not screening fear or trait anxiety, was associated with more years screening (Table 2).

Associations of Trait Anxiety, Prostate Cancer Worry, and Screening Fear with PSA and DRE Screening. The initial model examining the correlates of PSA frequency was significant [F(8,524) = 24.99; P < 0.01] and explained 28% of the variance in self-reported PSA screening. More frequent PSA was associated with more years of screening, greater income, higher education, being married, physician discussion, and by fewer barriers. Adding trait anxiety, prostate cancer worry, and screening fear in step 2 (see Table 3) also produced a significant

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Table 2. Zero-order correlations among study variables

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<tbody>
<tr>
<td>1. Years of screening</td>
<td>—</td>
<td>−0.13*</td>
<td>−0.14*</td>
<td>0.14*</td>
<td>0.02</td>
<td>0.17*</td>
</tr>
<tr>
<td>2. Income</td>
<td>—</td>
<td>—</td>
<td>0.39*</td>
<td>0.29*</td>
<td>0.18*</td>
<td>−0.12*</td>
</tr>
<tr>
<td>3. Education</td>
<td>—</td>
<td>—</td>
<td>0.05</td>
<td>0.12*</td>
<td>0.06</td>
<td>−0.33*</td>
</tr>
<tr>
<td>4. Marital status</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
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<tr>
<td>5. Health insurance</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6. Perceived barriers</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
</tr>
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</table>

*p < 0.01.

*p < 0.05.
model \( F(11,521) = 19.57; \ P < 0.01 \), with an additional 1.6% of the variance in PSA frequency accounted for \( F(3,521) = 3.98; \ P < 0.01 \). More years of screening, greater income, higher education, being married, physician discussion, and the absence of barriers continued to be associated with more frequent PSA. Consistent with our assertions regarding the importance of understanding source when examining fear in screening behavior, whereas cancer worry was associated with more frequent PSA, trait anxiety and fear of screening were unrelated.

The initial model for DRE frequency was similar in many regards. The model was significant \( F(8,524) = 23.37; \ P < 0.01 \) and explained 26% of the variance in self-reported DRE screening. More frequent DRE was associated with more years screening, greater income, being married (marginal), physician discussion, and fewer barriers. Adding trait anxiety, prostate cancer worry, and screening fear in step 2 produced a significant model \( F(11,521) = 19.44; \ P < 0.01 \), with an additional 2.8% of the variance in DRE frequency accounted for \( F(3,521) = 6.87; \ P < 0.01 \). More years of screening, greater income, and physician discussion retained their association with more frequent DRE, although the marginal effect for being married was eliminated and that for health-care system barriers was reduced to marginality \( (P = 0.057) \). Trait anxiety and cancer worry were independently associated with more frequent DRE, whereas screening fear was associated with less frequent DRE. The final model is displayed in Table 3.

### Discussion

Anxiety, worry, and fear are among the most common emotional responses to the threat of potential disease. Consistent with prior work (43), the current data show that these responses are likewise central to men’s responses to prostate cancer screening. As expected, however, anxieties stemming from different sources were differentially associated with the two screens. Specifically, whereas prostate cancer worry was associated with greater DRE and PSA screening, fears about the screening process were associated with less frequent DRE. Below, we focus on the distinctions among trait anxiety, cancer worry, and screening fear, the differences between the characteristics associated with DRE versus PSA screening frequency, and the race differences in levels of prostate cancer worry and screening fear.

### Additive Contribution of Anxiety Characteristics

Consistent with past work, less frequent PSA and DRE were associated with lower education and socioeconomic status (28, 29), a lack of insurance (30-32), fewer years of screening (33-35), less physician recommendation (29, 32, 39), and reports of access issues (36-38); not being married was associated with less frequent PSA (30) but not with DRE. However, demographics provided an incomplete account of screening and adding trait anxiety, cancer worry, and screening fear to the models improved fit for both DRE and PSA; between 1% and 3% additional variance in DRE and PSA screening frequency was added. Effect sizes for the anxiety variables were modest but on par with classic correlates such as income and, in some cases, exceeded the effects of demographic and structural variables other than years of screening. Although demographics are difficult to intervene with directly, psychological characteristics are amenable to intervention (70) and small effects may be of considerable clinical significance (71).

### Object Lesson: Source of Anxiety, Worry, and Fear

A primary aim of the current report was to provide a demonstration of the importance of the source or object of health-related anxieties. Because fears/anxieties arise in response to threatening situations, the nature of these situations must be considered when seeking to understand how fear/anxiety will affect behavior. As expected, the three anxiety constructs we examined—trait anxiety, cancer worry, and screening fear—were related to the frequency of male screening in distinct ways. Specifically, whereas cancer worry was associated with a greater frequency of both DRE and PSA screening, fear of screening was associated with less frequent DRE and trait anxiety was associated with more frequent DRE screening. The finding that cancer worry (and in the case of DRE, trait anxiety) was associated with more frequent screening is consistent with the breast literature (40), with at least one study in prostate screening (27), and with work examining how cancer worry related to use of prostate-related complementary and alternative medicines (50).

However, operationalizing fear of screening as distinct from trait anxiety or cancer worry revealed how critical appreciating the source or object of fear is to understanding how it will relate to behavioral outcome (40, 51). In contrast to work showing a positive relation among trait anxiety, cancer worry, and screening, several studies...
have shown that anxieties about screening are associated with less frequent screening. It has been shown that concern regarding screening are associated with lower screening (20, 49), that higher levels of state anxiety are associated with nonadherence in asymptomatic relatives of men diagnosed with prostate cancer (45), and that concerns regarding embarrassment/discomfort are associated with lower screening (47, 48). Consistent with these data, our analyses showed that whereas cancer worry was associated with more frequent screening, fear of screening itself was associated with less frequent screening at least for DRE.

Taken together, this pattern of findings provides a preliminary demonstration regarding the importance of describing the source, object, or content of fears when examining their associations with outcomes. In theory, the pattern of cognitive, physiological, and motivational changes that comprise a fear/anxiety response are consistent across situations (72). Escape or avoidance is integral to the fear response (52), and fear is thought to promote behaviors that serve to ameliorate the experience of anxiety (40). In this view, cancer worry is associated with more frequent screening because (rightly or wrongly) men anticipate that their anxiety will decline after screening (43) or are seeking peace of mind (19, 73). Prior work has shown reductions in anxiety after a negative screening test (74) or biopsy (75), with reductions being greater for younger men and African Americans (74). Such findings are consistent with the notion that because prostate cancer is the source of fear in cancer worry, men engage in behaviors that appear to reduce the threat—they participate in screening. However, the threat in “fear of screening” is the screening context itself. As such, the escape avoidance motivations that characterize fear prompt threat reduction by avoiding the source—men avoid screening contexts.

**Differences in the Associations with PSA versus DRE Frequency.** The importance of understanding the source of anxiety, worry, and fear is reinforced when recalling that these constructs were differentially related to PSA and DRE frequencies. As expected, whereas cancer worry was positively associated with both screens, fear of screening was negatively related to DRE frequency. This finding seems reasonable given that DRE tests place greater physical, interpersonal, and psychologic demands on men (20) and are more closely associated with concerns regarding vulnerability, sexuality, and humiliation (18). Less readily explained from a “source” perspective is the finding that trait anxiety was associated with greater DRE but not PSA test frequency. Trait anxiety tends to have a positive association with care-seeking behavior (e.g., ref. 57), but this does not explain why effects were only in the DRE model. A general comparison of the two models suggests that PSA frequency is more strongly influenced by demographic and structural characteristics than is DRE, which appears more influenced by anxiety (27); only 1.6% variance was gained when adding anxiety constructs to the PSA model in contrast to 2.8% in DRE. Conversely, in addition to years of screening, income, and physician discussion, which were associated in both tests, PSA frequency was also associated with greater education, being married, and fewer health-care system barriers. This pattern suggests that PSA testing is experienced as being a less-threatening examination that occurs in the context of routine blood samplings.

**Race Differences in Prostate Cancer Worry, Fear of Screening, and PSA and DRE Frequency.** Finally, race was not related to either PSA or DRE screening frequency in the current sample. This finding is inconsistent with national data suggesting lower frequencies of both tests among African American men (7). It may be that the inclusion of a diverse group of Black men is partly responsible. Some prior work including Black men of Caribbean descent has reported ethnic differences (27) although others have not (20). Alternatively, it may be the fact that prior work has used an age variable (33, 35, 58), whereas the current study, prompted by the fact that screening guidelines vary by race (76), employed a variable that reflected the duration for

### Table 3. Raw and standardized coefficients from the final step of two, two-step regressions in which PSA and DRE frequencies were regressed on ethnicity and background characteristics (step 1) before adding trait anxiety, prostate cancer worry, and fear of screening to the models (step 2)

<table>
<thead>
<tr>
<th>Variables</th>
<th>PSA screening frequency</th>
<th>DRE screening frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Background factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>0.06</td>
<td>-0.04</td>
</tr>
<tr>
<td>Years of screening</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Income</td>
<td>-0.08</td>
<td>-0.00</td>
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<tr>
<td>Education</td>
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<td>Marital status</td>
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<td>Health insurance</td>
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<td>Health-care barriers</td>
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<td>-0.13</td>
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<td>Physician discussion</td>
<td>0.28</td>
<td>0.29</td>
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<tr>
<td><strong>Fear characteristics</strong></td>
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<tr>
<td>Trait anxiety</td>
<td>0.09</td>
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<tr>
<td>Prostate cancer worry</td>
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<td>0.13</td>
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<tr>
<td>Screening fear</td>
<td>-0.10</td>
<td>-0.27</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.25</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

NOTE: Race, marital, and insurance status are dummy coded such that 1 = married, has insurance, and is White. $r^2$ = squared part correlation.

* $P < 0.01$.

$P = 0.057$.

$P < 0.05$.
which men have fallen within guidelines. Our data are, however, consistent with work suggesting that fear of prostate cancer and screening are common themes among minority men (17, 18, 77). Screening fear was greater among Black men (20) and the fact that race differences were most pronounced regarding screening fear (versus cancer worry) is consistent with work suggesting that Black men appear particularly averse to DRE testing (17, 18, 20, 77).

Study Strengths and Limitations. Although our study is strengthened in that it comprises a large, representative sample of men and operationalizes distinct anxiety constructs, the data are not without their weaknesses. First, outcomes were self-reported and are thus subject to the biases that may influence remembering/reporting. Chart-ascertained behavioral frequencies are one solution to this problem, although it is worth noting that issues in reporting frequency would appear unlikely to substantially change the relations between anxiety constructs and outcomes in future work. Second, the debate regarding the efficacy of prostate screening, ages of recommendation, and clinical cutoffs (21-25) must be kept in mind. It is possible that the lack of certainty surrounding screening generates anxiety and makes it difficult to overcome other fears; efficacy beliefs may interact with fear in the prediction of screening (20).

More broadly, it should be recalled that the current data are cross-sectional and thus subject the interpretative limitations inherent to such studies. Although we believe that the overall pattern reported here coupled with a growing body of work linking anxiety to breast cancer screening (40, 43) is consistent with an interpretation of affective factors as being a predictor of behavior, it is likewise clear that emotional factors are recursively related to screening behavior; psychological characteristics predict screening but also change in response to experiences and outcomes (74, 75). Given the importance of sustained patterns of screening for various cancers, longitudinal and experimental work in this area is clearly necessary.

Conclusions

Theoretical work suggests that the source of fears must be understood before the relations of fear with behavior can be understood. Although their content may be diverse, different types of fear or anxiety are linked in that they promote avoidance of the source of the fear and engagement in behaviors that reduce anxiety. Analyses showed that whereas cancer worry was associated with more frequent screening, fear of screening was associated with less frequent screening at least for DRE. Fears were also particularly strongly associated with rates of DRE (versus PSA) screening. This is an important demonstration because although both available tests have their flaws, DRE screening is the test that requires men to psychologically “engage” with their provider on the matter of their prostate health.

Although the current report concentrated on prostate cancer screening behaviors as an outcome, the underlying theoretical premise regarding the importance of source is likely to generalize to other cancer screens and other health behaviors. Indeed, given the extent to which anxieties surround diagnosis, detection, and treatment of many leading diseases, identifying the source of fears in different disease contexts would seem an obvious next step for researchers, educators, and practitioners. Organizing diverse fears around their source will enable increasingly precise interventions aimed at alleviating the precise emotional barriers that impede health-promoting behavior profiles.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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References

Cancer Worry versus Screening Fear


70. Conedine NS, Magai C, Kudadjie-Gyamfi EK, Kafuk Longfellows, J Ungar TM, King AR. Stress versus discrete negative emotion in...


An Object Lesson: Source Determines the Relations That Trait Anxiety, Prostate Cancer Worry, and Screening Fear Hold with Prostate Screening Frequency

Nathan S. Consedine, Brenda A. Adjei, Paul M. Ramirez, et al.

Cancer Epidemiol Biomarkers Prev 2008;17:1631-1639.

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