Published in final edited form as:
Am J Mens Health. 2009 December ; 3(4): 340–351. doi:10.1177/1557988308325460.

A computer-tailored intervention to promote informed decision making for prostate cancer screening among African-American men

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Abstract

African-American men experience a disproportionate burden of prostate cancer (CaP) morbidity and mortality. National screening guidelines advise men to make individualized screening decisions through a process termed “informed decision making” (IDM). In this pilot study, a computer-tailored decision-aid designed to promote IDM was evaluated using a pre/post test design. African-American men aged 40+ recruited from a variety of community settings (n=108). At pre-test, 43% of men reported having made a screening decision; at post-test 47% reported this to be the case (p=0.39). Significant improvements were observed on scores (0–100%) of knowledge (54% vs 72%; p<0.001), decision self-efficacy (87% vs 89%; p<0.01), and decisional conflict (21% vs 13%; p<0.001). Men were also more likely to want an active role in decision-making after using the tool (67% vs 75%; p=0.03). These results suggest that use of a computer-tailored decision-aid is a promising strategy to promote IDM for CaP screening among African-American men.

INTRODUCTION

Approximately 16% of American men will be diagnosed with prostate cancer (CaP) during their lifetime and 3% will die from the disease (Centers for Disease Control and Prevention, 2006). African-American men are 60% more likely to develop CaP and 2.4 times as likely to die from it compared to White men (American Cancer Society, 2007). Reasons for these racial disparities are not fully understood, though have been partially attributed to poorer access to healthcare and a historically lower use of screening (Etzioni, Berry, Legler, & al., 2002; Gilligan, Wang, Levin, Kantoff, & Avorn, 2004), a decreased likelihood of receiving aggressive treatment when diagnosed (Godley et al., 2003; Underwood et al., 2004; Zeliadt, Potosky, Etzioni, Ramsey, & Penson, 2004), and a genetically more virulent form of the disease (Aronson & Freedland, 2000; Pettaway, 1999), although this remains disputed (Polednak, 2002; Reddy, Shapiro, Morton, & Brawley, 2003).

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Efforts to eliminate racial disparities in CaP morbidity and mortality are complicated by the lack of modifiable risk factors for the disease and continued controversy about the efficacy of early detection methods. Due to a lack of data reflecting a reduction in disease-specific mortality associated with use of the prostate specific antigen (PSA) test, most major medical organizations do not recommend routine CaP screening for men at average risk for the disease (ACS 2007;U.S. Preventive Services Task Force, 2002). Rather, men are advised to make "informed decisions," which requires adequate knowledge of the risks, benefits and potential limitations of screening, interpretation of this information in the context of one's personal values and preferences, as well as participating in the decision-making process at a level that is personally desired (Briss et al., 2004;Rimer, Briss, Zeller, Chan, & Woolf, 2004).

Since African-American men are at increased risk for the disease, they represent an important priority audience for CaP interventions. Although there are currently no race-specific screening recommendations, many medical organizations advise that African American men be counseled about screening at a younger age (40 or 45 years) than men at average risk for the disease (ACS 2007;National Cancer Institute, 2007). In addition to counseling men at younger ages, formative research (Allen, Kennedy, Wilson-Glover, & Gilligan, 2007;Blocker et al., 2006;Sanchez, Bowen, Hart, & Spigner, 2007) suggests that interventions for African American men need to be specifically designed to address the unique needs, priorities and concerns of this audience. In particular, interventions should be offered in non-clinical settings, include male African-American role models, and address issues of poor provider-patient communication, perceived threats to male sexuality associated with CaP, and medical mistrust (Allen et al., 2007).

In this pilot study, a computer-tailored intervention ("decision aid" or DA) to assist men in making informed decisions about CaP screening was tested. A DA is a tool that is specifically designed to assist individuals who are deliberating about options regarding a medical decision. A recent review of DAs for CaP screening demonstrated that these tools can increase knowledge, lessen decisional conflict, and promote greater involvement in decision making (Volk et al., 2007). With notable exceptions (Myers, 1999; Myers et al., 2005; Taylor et al., 2006), few CaP screening intervention trials have included substantial numbers of African-Americans and until recently, most educational interventions for African-American men have promoted prostate cancer screening (Abernethy et al., 2005; Barber et al., 1998; Boehm et al., 1995; Powell, Gelfand, Parzuchowski, Heilbrun, & Franklin, 1995; Steele, Miller, Maylahn, Uhler, & Baker, 2000; Taylor et al., 2001; S. Weinrich et al., 1998; S. P. Weinrich et al., 1998; Wilkinson, List, Sinner, Dai, & Chodak, 2003), as opposed to promoting IDM.

The majority of published CaP screening interventions have utilized videotaped presentations with or without accompanying written materials (Flood, Wennberg, Nease, & al., 1996; Frosch, Kaplan, & Felitti, 2001; Gattellari & Ward, 2005; Ruthman & Ferrans, 2004; Taylor et al., 2006; Volk, Cass, & Spann, 1999; Volk, Spann, Cass, & Hawley, 2003; Wilkinson, List, Sinner, Dai, & Chodak, 2003). Others have included generic (Davison, Kirk, Degner, & Hassard, 1999; Partin et al., 2004; Shapira & VanRuiswyk, 2000; Watson et al., 2006; Wilt et al., 2001) or tailored print materials (Myers, 1999). Only two of the eighteen studies reviewed were conducted in community settings, despite recent calls to move beyond the clinical setting as a venue for IDM efforts (Briss et al., 2004). An extensive literature search identified no prior publications reporting the use of computerized DAs to promote IDM for CaP screening among African-American men. This approach was selected because the interactive, computerized format does not require interface with the health care system, allows application of state-of-the art graphics audiovisual cues that are culturally appropriate, and enables tailoring to individual characteristics of the user (e.g.,

personal risk of CaP). Tailored communications are thought to hold tremendous potential for addressing health disparities among African American audiences (Campbell & Quintiliani, 2006; Campbell, Resnicow, Carr, Wang, & Williams, 2007), even those with low access to modern information technology. Although there remains a "digital divide" in terms of access to technology along lines of income, education and race/ethnicity, this gap appears to be narrowing (Day, Janus, & Davis, 2005).

Methods

Using a one-group pre/post-test quasi-experimental design, the impact of the DA was evaluated in terms of men's: (a) readiness to engage in decision making, progress towards making a choice, and receptivity to considering or reconsidering options (*Stage of Decision Making*) (O'Connor et al., 2004); (b) knowledge of the benefits, risks and limitations of screening; and (c) self-efficacy regarding decision making (*Decision Self-Efficacy*) (O'Connor et al., 2004) was assessed. In addition, men's level of internal conflict or uncertainty about the decision (*Decisional Conflict*) was measured, because of the potential for the intervention to result in unintended negative consequences by raising awareness about the controversy about screening. The influence of the intervention on men's risk perceptions and desire for involvement in decision-making was also explored.

Sample and Setting

A convenience sample of African-American men were recruited over a period of five months in 2006 and 2007 from churches, barbershops, worksites and other community settings in the Greater Boston, MA area. Community organizations were first approached by an experienced, male African-American study recruiter to obtain permission to approach and enroll participants from each site. Once organizational agreement was obtained, African-American men who were interested in participating were provided informed consent information. Those eligible to participate were: (a) age 40 or over; (b) of self-reported African-American race; and (c) English speaking. Those who consented to participate either utilized the DA immediately (99% of the sample) or scheduled an appointment to use the tool at a later date. A 20–30 minute self-administered, paper-and-pencil questionnaire was administered prior to and following use of the tool in the community venue from which the individual was recruited. The mean time spent on the DA was 27.8 minutes (standard deviation=11 minutes), with a range of 7 to 49 minutes. Men were provided with a $50 incentive for time spent both on data collection and DA use, which took approximately two hours. All study protocols and procedures were approved by the Institutional Review Board at the Dana-Farber Cancer Institute, Boston, MA.

Intervention

The Ottawa Decision Support Framework (DSF) (Murray, Miller, Fiset, O'Connor, & Jacobsen, 2004), which integrates tenets from a variety of social and behavioral theories (Azjen & Fishbein, 1980; Bandura, 1986; Feather, 1982; Fischhoff, Slovic, & Lichtenstein, 1980; Keeney & Raiffa, 1976; Norbeck, 1988; Orem, 1995; Tversky & Kahneman, 1981), provided the conceptual framework for development of the DA. The DSF identifies key factors that influence health decision-making and are amenable to modification through decision support, such as a DA (O'Connor et al., 1998). In addition to the DSF, the development of the DA tool was informed by key principles from the risk communication literature (Weinstein, 1988). Taken together, these theories that suggest that in order to impact decision-making, effective DA interventions must: (1) address the accuracy of risk perceptions; (2) present information about the pros and cons of each potential course of action (screen/not screen); (3) assist in identifying potential outcome expectations of each potential course of action; (4) assess outcome expectancies for each potential course of

action; (5) assist men in developing a plan that addresses potential barriers to action; and (6) provide skills to increase self-efficacy for effectively communicating with one's health care provider about the preferred course of action.

The majority of educational content was provided through video and audio components, and navigation was accomplished by a touch-screen. Therefore, the tool can be used across a wide range of literacy skills and varied levels of computer familiarity. Based on expert opinion and published research (Chan et al., 2003), selected information was determined to be required for an individuals to make an informed decision about screening (e.g., risks, benefits, limitations of PSA; diagnostic procedures; risk factors for CaP). In addition, a menu was provided so that the participants could select from a variety of topics relevant to screening, diagnosis and treatment to gain more in-depth information about a particular topic. At the end of the tool, participants were led through steps of decision-making, based on the Ottawa model (e.g., identifying options, examining decision control preferences; identifying information needs; values clarification). At the end of the session, participants were provided with a tailored printed summary of their session.

Data Collection and Measures

Pre- and post- questionnaires were based on standardized instruments that have demonstrated validity and reliability (Bunn & O'Connor, 1996; O'Connor et al., 2004; Volk, Cass, & Spann, 1999).

Participants' desire to engage in decision-making and progress in making a choice was assessed by the one-item *Stage of Decision Making Scale* (O'Connor, Jacobsen, & Fiset, 2000): "When you think about getting a PSA test in the next 12 months, which sentence best describes you?" Participants were given six response options: (1) "I haven't thought about it before"; (2) "I haven't thought about it, but I am interested in learning more"; (3) "I have started to think about it, but I haven't made a decision"; (4) "I have thought about it and I am close to making a decision"; (5) "I have made a decision, but I am willing to reconsider"; or (6) "I have made a decision or I am not likely to change my mind" were classified as decided. Men who chose options 1–4 were classified as "undecided." Those who selected options 5–6 were classified as being "decided." Analyses of this scale have revealed that earlier stages of decision making are associated with higher levels of decisional conflict (O'Connor, Jacobsen, & Fiset, 2000).

To assess CaP knowledge, a subset of questions from a published and validated instrument (Partin et al., 2004) was used; these items addressed the prevalence of and risk factors for CaP, available screening methods and their limitations, diagnostic procedures and treatment-related side effects (see Table 2). Three of the original 17 items from this scale were excluded because in pre-testing (n=18 men *not* included in intervention results), men either misinterpreted the question or less than 10% of individuals answered the question correctly. Response options for the questions included "true", "false", or "I don't know." Men received a point for each of the ten items for which they provided the correct answer. Scores could range from 0–100%. In this sample, the internal reliability of this scale was adequate (Cronbach's alpha=0.79).

Confidence in one's ability to participate in decision-making at a level personally desired was assessed with the *Decision Self Efficacy Scale* (Bunn & O'Connor, 1996; Cranney et al., 2002). Questions ask the respondent to reflect on how confident they feel about various aspects of the decision making process, with three response options including "very confident" (score=4) "somewhat confident" (score=2) and "not at all confident" (score=0). Scores are summed, divided by 11 and multiplied by 25, to arrive at a range of scores from 0 (low self-efficacy) to 100 (high self-efficacy) (Bunn & O'Connor, 1996). This scale has

shown high reliability, with reported Cronbach's alpha coefficient value ranging from 0.84 to 0.89 (Bunn & O'Connor, 1996; Cranney et al., 2002). In this sample, the internal reliability was excellent (Cronbach's alpha=0.92).

To evaluate the potential negative consequences of the intervention, the *Decisional Conflict Scale* was used. This scale assesses uncertainty about decision making, the degree to which an individual feels informed, and extent to which he perceives that he can make a decision that is consistent with his values. There are 10-items on the scale, with three response options. Scoring is such that 0 represents no conflict; 100 reflects the highest level of conflict. This scale has excellent reliability with a reported Cronbach's alpha coefficient ranging from 0.78 to 0.92. In addition, the scale is able to distinguish between those who make or delay decisions (Bunn & O'Connor, 1996; O'Connor, 1995). This scale has previously been used among an African American sample with adequate reliability (Cronbach's alpha= 0.76) (Taylor et al., 2006). Similarly, in this sample, the internal consistency was satisfactory (Cronbach's alpha= 0.82).

In addition to these outcome variables, men were asked to rate their chances of developing CaP compared with other men their age (response options: higher risk, same level of risk; lower risk). Their preferences for control in the decision-making process were also assessed, using the *Control Preference Scale* (Degner, Sloan, & Venkatesh, 1997). Individuals are asked "Who should make medical decisions?" Response options included: (a) "I make the final make decision on my own"; (b) "I make the decision after seriously considering my doctor's opinion"; (c) "my doctor and I share responsibility for the decision"; (d) "I prefer that the doctor make the decision after seriously considering my opinion"; and (e) "I prefer that the doctor make the decision." In analyses, responses were collapsed to reflect active decision-making styles (options a and b), collaborative styles (option c), and passive styles (options d and e) (Degner, Sloan, & Venkatesh, 1997).

Analysis

Changes from pre- to post- test were assessed using different analytic methods based on the type of data and distribution of the scales. Since scales were not normally distributed and were continuous or ordinal, the Wilcoxon sign rank test was used for the knowledge scale, Decision Self-Efficacy, Decisional Conflict and Control Preferences. Changes in Stage of Decision-Making between pre- and post- tests were determined by McNemar's test.

Multivariate analyses examined whether an increase in scores was due to baseline characteristics. Knowledge and Decision Self-Efficacy scores were dichotomized at the mean; analyses examined whether there was an increase in scores, compared to a reduction or no change in scores. Analyses involving Decisional Conflict modeled whether assessed whether the intervention resulted in a decrease (the intended direction), therefore we modeled the outcome as a decrease in scores compared to an increase or no change in scores. Stage of Decision-Making was not included in multivariate analyses, since there was not a statistically significant difference between pre- and post- intervention. Logistic regression was employed for all analyses. Since few of the demographic variables demonstrated a significant bivariate relationship with the outcomes, only the unadjusted odds ratios and 95% confidence intervals (CI) are presented, unless otherwise stated.

Results

A total of 117 men were recruited to the study, though five were excluded due to missing data and four were under the age of 40, leaving a final sample of 108. The mean age of the group was 52 (standard deviation=9.2). A third had a high school education or less; approximately a third (30%) had completed a four-year college or more. Slightly over one-

half had household incomes of $50,000 or less (see Table 1). Most men reported having health insurance and access to a primary care provider, although recency of their last medical visit was not assessed. More than half rated their overall health as excellent or very good (not shown).

Seventeen percent of men had a family history (brother or father) of CaP. Nearly three-quarters had ever heard of the PSA test; of those, 69% had been screened at least once. Awareness of the digital rectal exam was higher than the PSA test; 82% had heard of the test, and 72% had undergone it. Although not an outcome of this study, 89% of men at pre-test reported that they would opt to have the PSA test if they had to decided immediately; 77% of men reported this preference at post-test (not shown).

Changes in Primary Outcomes

Before the intervention, just over a third (35%) reported that they hadn't thought about the CaP screening decision previously. Following the intervention, less than a quarter of men (24%) reported this to be the case ($p < 0.01$) (data not shown). While more men had made a decision about having a PSA test following use of the DA, this increase was not statistically significant (43.1% vs 47.1%; $p = 0.39$).

Baseline knowledge scores were low, with a sample mean of 53.9 (standard deviation=19.4). The percentage of correct responses on each of the knowledge questions is presented in Table 2. Table 3 presents pre- and post-test mean scores across the sample. Between pre and post-test, scores increased significantly; participants scored an average of 17.9 points higher on post-test as compared with the pre-test (p-value < 0.001). In addition, men had significantly higher levels of confidence in their ability to make a decision after using the DA. Decision Self-Efficacy scores increased from a mean of 87.0 to 88.8 (p-value < 0.01). Even before participating in the intervention, men reported low levels of internal conflict about the screening decision, with a mean Decisional Conflict score of 21.4. Following the intervention, there was a statistically significant decrease in decisional conflict (mean scores: 21.4 vs. 13.1; $p< 0.001$).

Risk Perceptions and Preference for Control in Decision Making

Men were more likely to want an active role in decision-making after using the tool (67% vs 77%; $p=0.03$). In addition, they were more likely to perceive a higher-than-average risk of developing CaP, although this change was not significant (18% vs. 25%; $p=0.13$).

Characteristics Associated with Improvement in Primary Outcomes

We examined the extent to which changes in primary outcome scores were associated with pre-test characteristics (Table 4). Not unexpectedly, pre-test scores were strongly associated with post-test scores. Men with the highest knowledge and self-efficacy scores at pre-test tended to improve slightly less than others. On the other hand, those who had the highest decisional conflict scores at pre-test had slightly greater decreases in conflict at post-test (OR=1.12; CI=1.08–1.17). In addition, men who perceived themselves to be at higher-than-average risk for CaP experienced significantly smaller increases in knowledge than did men who perceived themselves to be at average risk (OR=0.28; CI=0.08–0.95). In terms of changes in decision self-efficacy, we found that men with the lowest incomes (<$25,000) (OR=2.76; CI=1.5–7.22) saw the greatest improvements. We also examined the extent to which changes in knowledge, self-efficacy, decisional conflict were associated with decisional status at pre-test and found that there were no significant relationships (data not shown).

DISCUSSION

This research expands upon what is currently known about decision-aid interventions for CaP screening among African-American men, and documents the feasibility of recruiting men from community settings to participate in IDM interventions. This preliminary research suggests that providing access to computer technology in community settings is a promising intervention strategy that can produce significant improvements in knowledge, decisional processes and skills. This intervention strategy may be particularly suited for African-American men, given their diminished access to health services and documented mistrust of medical providers (Allen, Kennedy, Wilson-Glover, & Gilligan, 2007; Talcott et al., 2007). Although we did not observe a significant increase in the percentage of men who had made a screening decision after using the DA, significant improvements in knowledge, confidence in decision-making ability and decisional conflict were observed, One encouraging finding was that the greatest benefits in CaP knowledge were found among those with the lowest levels of income. Another encouraging result was that the greatest reductions in decisional conflict were seen among those who had the highest degree of conflict before using the DA tool.

No published randomized controlled trials to date have evaluated a computerized DA for CaP screening among African American men. Nevertheless, our findings align well with results of previous trials of educational interventions aimed at IDM for CaP screening. A recent review of decision aids for CaP screening (Volk et al., 2007) included 18 trials that evaluated print, verbal, videotape and in-person educational interventions. This review concluded that DAs have generally produced significant short-term improvements in knowledge (Flood, Wennberg, Nease, et al., 1996; Frosch, Kaplan, & Felitti, 2003; Gattellari & Ward, 2003,, 2005; Partin et al., 2004; Shapira & VanRuiswyk, 2000; Taylor et al., 2006; Volk, Spann, Cass, & Hawley, 2003; Wilt et al., 2001). One study found a decline in knowledge one year post-intervention (Volk, Spann, Cass, & Hawley, 2003). Only one study (Gattellari & Ward, 2003) examined the impact of a DA on decision self-efficacy. Assessing this construct with one-item (“I feel that I can make an informed choice about PSA testing”), investigators found that the provision of an in-depth evidence-based booklet with a values clarification exercise resulted in higher levels of post-intervention self-efficacy, compared with a standard educational pamphlet. Several studies examined the impact of DAs on decisional conflict, with some finding reductions in aspects of conflict (Davison, Kirk, Degner, & Hassard, 1999; Gattellari & Ward, 2003,, 2005; Taylor et al., 2006) and one finding an increase in conflict following intervention (Frosch, Kaplan, & Felitti, 2001).

In the context of low pre-intervention knowledge scores and high decisional self-efficacy, it is possible that educating men about the lack of evidence in support of screening may, in fact, heighten decisional conflict. Although this was not observed in the current study, this dilemma has arisen in other studies (Allen et al., in review). This issue warrants further investigation and suggests that perhaps conceptual models for decision-support interventions may require revision for decision-making in the context of uncertainty. The present study suggests that it is feasible to present a complicated message about hypothetical gains and uncertain risks without increasing decisional conflict among a high risk audience.

Limitations of this study must be acknowledged. As noted, the use of a small, non-probability sampling may result in selection bias. When comparing socio-demographic data from this sample with existing census data, it was evident that the income and education levels among men in this study were slightly higher than the general African American population in Massachusetts. For example, the median household income among Blacks in Boston was $30,447, and 71% of Black households had incomes less than $50,000

(compared with $42,100 and 51.3% in this sample) (Health Survey Program, 2002). This sample also had higher rates of PSA use as compared with the most recent prevalence data from the Behavioral Risk Factor Surveillance System for African American men (58% vs 69% in this sample) (CDC 2004). This provides some evidence that men who agreed to participate had higher levels of awareness of or interest in CaP screening. An additional limitation is that only immediate post-intervention change was assessed. It is likely that improvements in knowledge, decision self-efficacy and decisional conflict fade with time, increased exposure to media messages and interactions with health care providers.

Nevertheless, this study suggests that a computerized decision aid holds potential as a disseminable intervention strategy for African American men. Compared with standard educational approaches, computerized DA can be low-cost, highly effective and engaging (Jibaja-Weiss & Volk, 2007; Jibaja-Weiss, Volk, Friedman et al., 2006; Jibaja-Weiss, Volk, Granch et al., 2006), and most importantly, allow tailoring to specific information needs and priorities of the individual user. However, in considering the future adoption and dissemination of such an intervention, it is critical that technologic advances help to reduce, not exacerbate, existing health disparities (Viswanath & Kreuter, 2007). National data indicate that computer ownership among racial and ethnic minorities is increasing, although it is still lower than that of Whites. In 2003, 64% of Whites reported having at least one computer in the home, compared with 45% and 44% of African American and Hispanic households respectively (Day, Janus, & Davis, 2005). Research also suggests that racial/ethnic minorities and lower-income groups are interested in using computers to access health information (Pew Internet & American Life Project, 2006) and that a growing number of African American computer users look for health or medical information online (Hesse et al., 2005). These trends suggest that a carefully planned approach to the study of e-Health interventions among those who have historically had the least access to this technology and other channels of health information is needed.

Given the preliminary nature of this work, additional investigation of the efficacy of computer-tailored DA interventions among African American men are needed. Future research should focus on the sustainability of improvements in knowledge, self-efficacy and decisional conflict, as well as investigate satisfaction with screening decisions and the decision-making process. Although interventions in non-clinical settings are sorely needed, it will also be important to study the receptivity and response of health care providers to men who have participated in IDM interventions, and the extent to which men can advocate for their personal decisions in the face of opposing medical opinion. These issues are particularly salient for African American men, who generally have diminished access to health services and lack of continuity of care. As a social group, they may also have more mistrust of health care providers and medical institutions, given historical mistreatment. In this context of a DA tool that provides information about the uncertain benefits of screening and potential harms, these issues become even more important for future investigations.

Acknowledgments

We thank the men who participated in this study and gratefully acknowledge the contributions of the following individuals: Christian Brown, Nicole Flynt, Elizabeth Harden, Mark Kennedy, and Jamielle Walker. This study was funded by the Dana-Farber/Harvard Cancer Center Prostate SPORE.

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Table 1

Socio-demographic characteristics of study sample, N=108

Demographic characteristics	N (%)
Age	
40 – 50	55 (50.9)
Above 50	53 (49.1)
Marital status	
Currently Married	62 (57.4)
Not married	45 (41.7)
Missing	1 (0.9)
Income	
< $25,000	29 (26.9)
$25,000 to $49,000	25 (23.2)
$50,000 or more	47 (42.3)
Missing	7 (6.3)
Education	
HS or less	35 (32.4)
Some college or 2-year degree	41 (38.0)
College or more	31 (28.7)
Missing	1 (0.9)
Family history of prostate cancer	
Yes	19 (17.6)
No	88 (81.5)
Missing	1 (0.9)
Ever heard of PSA	
Yes	75 (69.4)
No	25 (23.2)
Missing	8 (7.4)
Ever heard of DRE	
Yes	88 (81.5)
No	17 (15.7)
Missing	3 (2.8)
Ever had PSA (among those that know about PSA)	
Yes	52 (69.3)
No	20 (26.7)
Missing	3 (4.0)
Ever had DRE (among those that know about DRE)	
Yes	63 (71.6)
No	19 (21.6)

Demographic characteristics	N (%)
Missing	6 (6.8)
Health insurance	
Yes	91 (84.3)
No	15 (13.9)
Missing	2 (1.9)
Usual source of care	
Yes	94 (87.0)
No	13 (12.0)
Missing	1 (0.9)

Table 2

Percent correct responses to knowledge questions, pre-test and post-test (N=108)

Knowledge Questions	Percent Correct	
	Pre-test	Post-test
	N (%)	N (%)
Most men diagnosed as having prostate cancer die of something else.	21 (19.6)	50 (47.2)
Men are more likely to die because of prostate cancer than because of heart disease.	40 (37.4)	56 (52.8)
Prostate cancer is the most common cause of problems with urination.	19 (17.8)	38 (35.9)
Prostate cancer never causes problems with urination.	65 (61.3)	90 (83.3)
Prostate cancer is one of the least common cancers among men.	73 (67.6)	83 (76.9)
If you have an abnormal PSA test result, your doctor may recommend that you have a prostate biopsy.	62 (57.9)	78 (72.9)
The PSA will find all prostate cancers	41 (37.3)	87 (80.6)
A prostate biopsy can tell you with more certainty whether you have prostate cancer than a PSA test	63 (59.4)	77 (72.0)
Loss of sexual function is a common side effect of prostate cancer treatments.	50 (46.7)	85 (79.4)
Problems with urination are common side effects of prostate cancer treatments.	45 (41.7)	83 (78.3)
The risk of developing prostate cancer increases with age.	78 (72.2)	88 (81.5)
The risk of developing prostate cancer is higher for African American men as compared with men from other racial/ethnic groups.	90 (83.3)	90 (83.3)
The risk of developing prostate cancer increases if you have a father or brother who has had prostate cancer.	79 (73.2)	86 (79.6)
The risk of developing prostate cancer is higher among smokers than among non-smokers.	83 (76.9)	88 (81.5)

Table 3

Changes in primary outcomes and covariates between pre-test and post-test

Variable	Pre-test	Post-test	Change	p-value*
Primary outcomes				
Stage of decision making (n=102)	N (%)	N (%)	Percentage	
% Decided	44 (43.1)	48 (47.1)	+4% points	
% Undecided	58 (56.9)	54 (52.9)	−4% points	0.39
Prostate cancer knowledge score (n=107)	Mean (sd)	Mean (sd)	Mean (sd)	
(theoretical range: 0–100%)	53.9 (19.3)	71.8 (17.7)	17.9 (17.8)	<0.001
Decision self-efficacy score (n=106)	Mean (sd)	Mean (sd)	Mean (sd)	
(theoretical range: 0–100%)	87.0 (18.5)	88.8 (14.1)	2.31 (18.1)	0.01
Decisional conflict (n=107)	Mean (sd)	Mean (sd)	Mean (sd)	
(theoretical range: 0–100%)	21.4 (21.4)	13.0 (20.6)	−8.3 (24.5)	< 0.001
Covariates				
Risk perception (n=100)	N (%)	N (%)	Percentage	
% higher than average	18 (18.0)	25 (25.0)	+7% points	0.13
% about same as average	41 (41.0)	39 (39.0)	−2% points	
% lower than average	41 (41.0)	36 (36.0)	−5% points	
Control preference (n=106)	N (%)	N (%)	Percentage	
% active	71 (67.0)	82 (77.4)	10.4 points	0.03
% collaborative	25 (23.6)	19 (17.9)	−5.7 points	
% passive	10 (9.4)	21 (4.7)	−4.7 points	

* p-value based on chi-square test for categorical variables and t-tests for continuous variables.

Table 4

Associations between baseline characteristics and an increase in knowledge, increase in self-efficacy, and decrease in decisional conflict between pre and post intervention (unadjusted odds ratios and 95% CIs)*

Characteristics	Increase in knowledge	Increase in self- efficacy	Decrease in decisional conflict
Age			
40– 50	1.97 (0.75 – 5.18)	1.09 (0.49 – 2.42)	2.08 (0.96 – 4.51)
Above 50	REF	REF	REF
Marital status			
Currently Married	REF	REF	REF
Not married	0.51 (0.20 – 1.32)	1.65 (0.73 – 3.74)	1.27 (0.58 – 2.77)
Income			
< $25,000	0.59 (0.20 – 1.77)	2.76 (1.05 –7.27)	2.23 (0.85 – 5.84)
$25,000 to $49,000	1.74 (0.43 – 7.10)	0.52 (0.16 – 1.64)	1.86 (0.69 – 4.98)
$50,000 or more	REF	REF	REF
Education			
High school graduate or less	1.23 (0.43 – 3.51)	1.21 (0.52 – 2.83)	1.45 (0.63 – 3.32)
Some college or more	REF	REF	REF
Family history of prostate cancer			
Yes	REF	REF	REF
No	2.84 (0.96 – 8.40)	3.42 (0.93– 12.63)	1.46 (0.54 – 3.95)
Ever heard of PSA			
Yes	REF	REF	REF
No	2.15 (0.57 – 8.06)	1.74 (0.69 – 4.42)	1.06 (0.42 – 2.63)
Ever heard of DRE			
Yes	REF	REF	REF
No	0.79 (0.23 – 2.69)	0.56 (0.17 – 1.85)	1.19 (0.42 – 3.41)
Risk perception			
More likely to get prostate cancer	0.28 (0.08 – 0.95)	0.88 (0.28 – 2.78)	0.45 (0.15 – 1.37)
Less likely to get prostate cancer	0.74 (0.24 – 2.26)	0.92 (0.38 – 2.20)	0.57 (0.24 – 1.32)
About as likely to get prostate cancer	REF	REF	REF
Control preferences			
Active	1.12 (0.21 –5.88)	0.30 (0.08 – 1.17)	1.45 (0.38 – 5.46)
Collaborative	0.68 (0.12 – 4.00)	0.38 (0.08 – 1.69)	0.86 (0.20 – 3.69)
Passive	REF	REF	REF
Baseline scores			
Knowledge score	0.96 (0.93 – 0.99)		
Decision self-efficacy score	---	0.92 (0.89 – 0.96)	

Characteristics	Increase in knowledge	Increase in self- efficacy	Decrease in decisional conflict
Decisional conflict score	---		1.12 (1.08 – 1.17)

* Reference category for knowledge is no change or a reduction in score; for self-efficacy is no change or reduction in scores; and decisional conflict is no change or an increase in score.