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Effects of a Web-Based Decision Aid on African American Men's Prostate Screening Knowledge and Behavior

Beverly Layton
Walden University

Walden University

COLLEGE OF HEALTH SCIENCES

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Beverly Layton

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Walden University
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Abstract

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M.P.H., University of Michigan, 1993

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Community Health

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Abstract

African American men have the highest prostate cancer occurrence and deaths of any population, yet many are unaware of screening opportunities or prognoses if diagnosed with the disease. The focus of this study was to learn whether a web-based prostate health education decision aid would increase prostate cancer knowledge, declared intention to be screened, and the likelihood of scheduling a prostate-specific antigen (PSA) test. The transtheoretical model of behavior change served as the theoretical framework for the study to assess readiness to adopt new behaviors. A total of 128 African American men between the ages of 40-65 without a history of prostate cancer participated in the study and were divided into 2 nonequivalent groups. The control group had 48 participants, and the intervention group had 80. After reviewing the web-based intervention, participants completed a demographic questionnaire, The Prostate Knowledge Questionnaire, and an Intent-to-Screen Tool. Mean differences in knowledge change were compared while adjusting for covariates using least squares regression. There was no significant improvement in the Prostate Knowledge Change score between the experimental and control groups. Therefore, the alternate hypothesis cannot be accepted. The social change implications suggest that the web-based decision aid studied in this project may not be the best tool to increase knowledge about prostate cancer screening. Therefore, more research is needed regarding ways to reach and inform African American men about the pros and cons of prostate cancer screening to foster informed decision making.

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Dedication

To my stepfather, Robert (Bob) Womack, a quiet warrior who taught me about prostate cancer and its devastating effects well before my clinical exposure to the disease. Bob suffered for over 20 years with the slow progression of prostate cancer. Despite this, he chose to live a full and productive life without the benefit of advanced research targeted at African American men. Thank you, Bob, for awakening my academic curiosity. I dedicate this body of work to you and to your courage in walking through the debilitating death from the final complications of prostate cancer.

Acknowledgments

All praise and honor goes to God the Father, who is the head of my life, for I can do nothing without You and to my husband, Reginald, who supported my efforts financially, emotionally, and spiritually. None of this would have been possible without you first encouraging me and believing that “we” could reach this goal. I love and appreciate you so much! To my son, Joshua, who looked on as I pursued this goal without complaining about the lack of attention or a meal. And, to my mother, Mary, who encouraged me, prayed for me, and looked after Joshua many evenings and nights. I want to also acknowledge the African American entrepreneurs, corporate executives, men of faith, and countless wives who encouraged their spouses to participate in my research. Your individual and compelling stories of your struggles with prostate cancer awareness and screening efforts reaffirmed the need for continued research in this area. More importantly, I am so thankful for the myriad of testimonies that I received regarding your prostate cancer screening experiences. Finally, I would like to extend a resounding “thank you” to Pastor Caples of Jesus Name Apostolic Church who invited men from his congregation to participate in this research. God bless you all.

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Chapter 1: Introduction to the Study

With the expansion of health care consumerism, there is even greater interest in providing medical information to patients. Terms such as *informed consent* and *shared decision making* are part of most health care providers' vocabularies (Volk & Spann, 2000). Most Americans value culturally appropriate and factual health and medical education as well being actively involved in choosing their clinical arrangements (Beadle et al., 2004). One area in which the medical community values patient input is screening for and treating prostate cancer. This screening has been influenced by the growth of decision-support technologies, or decision aids, "a mediation arrangement aiding patients to reach particular and thoughtful decisions among choices (including the status quo) by equipping (at a minimum) data on the choices and consequences pertinent to a person's health situation" (Volk et al., 2007, p. 428). Appropriate training helps patients make educated decisions regarding their health-relevant actions. The goal of such training is to improve physical well-being by promoting health therapy and encouraging healthy lifestyles (Bellamy, 2004).

Prostate cancer is a slow-progressing disease that can remain clinically dormant throughout a patient's lifetime (Schapira & VanRuiswyk, 2000). Garnick (1998) noted that before prostate-specific antigen (PSA) testing, most cancers were detected by a digital rectal exam (DRE). If the cancer was detectable by DRE, it was usually quite advanced. The PSA blood test enables doctors to screen and detect early prostate cancer. Treatment options include surgery, radiation, and hormonal therapy. Although medical science has greatly improved prostate cancer detection and survival rates, there is a continuing need for health education and awareness to increase early detection rates and improve overall survival.

Although PSA screening has become widespread, it is controversial in some circles because randomized controlled trials have not proven to reduce prostate cancer mortality (Chan, Vernon, O'Donnell, & Ahn, 2003). The PSA test misses about 25% of prostate cancers and gives a false positive result approximately 60% of the time (Gambert, 2001). Clinical trials have not demonstrated that the advantages of selection and elimination outweigh the hazards. In addition, PSA screening has not been proven to reduce mortality (Chan et al., 2003; Jones, 2007).

Prostate cancer screening entails the primary tests, prescribed follow-up tests (transrectal ultrasound or rectal biopsy), and therapeutic medications. In early stage asymptomatic patients, treatment can result in numerous complications and decrease overall quality of life (Schapira, 2000). Despite these dangers, many family physicians believe that PSA screening can decrease prostate cancer-related mortality and morbidity (Chan, 2003).

Most medical professionals suggest that physicians should tell men the risks and benefits of PSA screening. The American College of Physicians, the American Cancer Society, the American Academy of Family Physicians, and the American Urological Association have all urged physicians to help men make knowledgeable choices about PSA screening (Chan et al., 2003). Many men are uninformed about the PSA test, despite the fact that an increasing number of primary-care physicians and urologists are using it, and there is a lack of consensus among physicians and specialists regarding the benefits of mass screening (Chan et al., 2003).

Problem Statement

The second-leading cause of cancer death in the United States among men older than 50 is prostate cancer (Volk et al., 2007). In 2007, 218,890 new cases of prostate cancer emerged, resulting in approximately 27,050 deaths (Jones, 2007). Science has firmly established that age, race, and family history are risk factors for developing prostate cancer (Narla, Friedman, & Martignetti, 2003, p. 1047). The prevalence of prostate cancer increases significantly with age. “Basically, every 10 years after the age of 40, the incidence of prostate cancer nearly doubles, with a risk of 10% for men in their 50s increasing to 70% for those in their 80s” (Ellsworth, Heaney, & Gill, 2003, p. 15). About 20% of all cancer-related deaths in men over 75 years are due to prostate cancer (Volk et al., 2007).

Prostate cancer affects all population groups, but when compared by race and ethnicity, incidence, mortality, and survival rates disproportionately affect African American men. Regardless of age, African American men have the highest prostate cancer occurrence and death rates among all racial and ethnic groups (Narla et al., 2003, p. 1047). It was estimated that 35,110 cases of prostate cancer would be diagnosed in African American men and that 5,300 African American men would die from the disease in 2011 (Cancer Facts and Figures, 2011). Prostate cancer is 66% more common among African Americans and is twice as likely to be fatal compared to European Americans (Ellsworth, 2003, p. 15). A family history of prostate cancer significantly increases the probability of having the disease (Sasagawa & Nakada, 2001). According to the Surveillance, Epidemiology and End Results (SEER) program, African American men in the United States have a higher rate of prostate cancer (255.5 per 100,000) than do European American men (164.4 per 100,000) and are more likely to be diagnosed with advanced stages and have a higher mortality rate (Jones, 2007). African American men are also 2.4 times more likely to die from prostate cancer than are European Americans (Bostwick, 2005).

Prostate cancer screening and diagnosis are poorly understood among some African Americans. Price, Colvin, and Smith (1993) found that only 40% of African American men understood their increased risk for prostate cancer. Less than 45% were aware that prostate cancer was deadly if not diagnosed and treated, and less than 50% were aware that African American men should have a screening examination beginning at age 40 years. For these reasons, there is a significant need to improve the participation of African American men in prostate health promotion programs (Cowen, Kattan, & Miles, 1996).

Purpose of the Study

The purpose of this study was to test whether a web-based prostate health decision aid could effectively increase prostate cancer screening and informed decision making among African American men 40 years and older who have not been diagnosed with prostate cancer. In the general population, decision aids lower enthusiasm for testing, lower PSA screening rates, and increase the tendency for watchful waiting over other therapies (Volk et al., 2007). Among African American men who self-select for screening programs, however, decision aids may increase prostate health knowledge, screening participation rates, and intent to screen (Volk et al., 2007). Since African American men are at high risk for prostate cancer, decision aids could expand personal prostate cancer risk knowledge and encourage some men to be tested (Volk, Spann, Cass, & Hawley, 2003).

Nature of the Study

The role of health promotion guidelines is to lower the morbidity and mortality associated with a certain disease and to improve overall quality of care (Mahon, 2003). A specific form of health promotion is the decision aid, a formal technique for involving patients in decisions about their care by presenting pertinent information about their condition or prospects (Volk, 2007). In this study, I tested whether a web-based decision aid would be effective for increasing knowledge about prostate cancer, intention to undergo screening, and actual screening behavior among a sample of African American men ages 40-65 years.

Niche Marketing, a minority-owned consumer marketing agency in North Carolina, provided e-mail addresses of more than 4,000 African American males. The company’s expertise is in targeting and marketing consumer-driven products to diverse populations, and in their 22 years of doing business, they have amassed an extensive database of primarily ethnically diverse consumers. Its customers have included UPS, Toyota, Johnson Controls, and many other Fortune 500 companies.

I sent an e-mail invitation to this population to participate in the study. The sample was 150 African American men over age 40 years who do not have prostate cancer. A sample size of at least 150 was deemed necessary to ensure that differences and commonalities were appropriately represented, as reflected by power analyses. A projected sample size of 150 was based on research by Frosch, Kaplan, and Felitti (2003). If 75% of the experimental group intended to screen, and 53% of the control group intended to screen, the effect size would be 0.25. Per G Power Analysis, a sample size of 67 in the experimental group and 67 in the control group would have 80% power at the 0.05 level of significance to detect an effect size of 0.25 (i.e., a difference of 75% versus 53% between the experimental and control groups). Per G Power Analysis, a sample size of 134 is justifiable for detecting a small effect size for this study (Appendix A).

Dickerson (2006) reported on Pew Internet and American Life Project surveys that most U.S. Internet users (80%, or about 93 million) have searched for health information and that nearly half (47%) said that such information was useful and influenced their health care decisions and provider interactions. Using the Internet for health or medical information was more common among those under age 65 years, women, European Americans, and those with more years of school and higher income (Hesse, 2005).

Although some studies have tested men’s knowledge of prostate cancer risk factors, the specific concept of accurate personal risk has not been widely tested in interventional studies (Sheehan, 2009). Watson et al. (2006) indentified perceived risk as an important independent predictor of men’s intention to seek prostate cancer screening. Schnur et al. (2006) observed that men rated their perceived risk of developing prostate cancer fairly low, yet slightly higher than their risk of developing other diseases. Findings supported the hypothesis that men who have a family history of prostate cancer have higher perceived risk.

Research Questions and Hypotheses

The goal of the study was to learn the answers to four research questions. These questions, in turn, generated four hypotheses.

Research Question 1: Do intervention groups experience a greater increase in prostate cancer knowledge (PCK) than those not exposed to the intervention?

H_{10}: There is no difference in the PCK change score between the experimental and control groups.

H_{1a}: There is a difference in the PCK change score between the experimental and control groups.

Research Question 2: Do participants in the intervention group have a higher intent to screen (IS) score than those not exposed to the intervention?

H_{20}: There is no difference in IS scores between the experimental and control groups.

H_{2a}: There is a difference in IS scores between the experimental and control groups.

Research Question 3: Are participants in the intervention group more likely to schedule a PSA screening test than those in the comparison group?

H_{30}: There is no difference in scheduling a PSA screening test between the experimental and control groups.

H_{3a}: There is a difference in scheduling a PSA screening test between the experimental and control groups.

Research Question 4: Are participants in the intervention group more likely to have a PSA screening test than those in the comparison group?

$H_{40:}$ There is no difference in the odds of having a PSA screening test between the intervention and control groups.

$H_{4a:}$ There is a difference in the odds of having a PSA screening test between the intervention and control groups.

Theoretical Framework

The transtheoretical model (Prochaska & DiClemente, 1992) provided the theoretical framework, one based upon the initial model used for smoking cessation from the early 1980s (Prochaska, 2008). From that time, the model was improved and tested further to add cervical cancer screening and other health behaviors. It also was improved to include the three stages of readiness for change: the decisional balance, self-efficacy, and stages of change. The adaptation further improved that model to convey six stages of change with respect to readiness. These six stages were as follows:

1. Precontemplation.
2. Contemplation.
3. Preparation.
4. Action.
5. Maintenance.
6. Relapse. (Tung, 2008)

Tung (2008) noted the relapse stage and self-efficacy were an indication of the ability of an individual to execute a behavior that was important to achieve a given result (Bandura, 1990). The perceived benefits, in addition to the perceived costs or barriers that a person derives, were the decisional balance with respect to executing behavior (Prochaska, 2008). The model of health belief and theory of behavior proved to be modestly successful in predicting the probability of prostate cancer screening (Weinrich, 2001). As a result, and since the TTM was found to have been successful in predicting breast cancer screening, the application of the model to prostate cancer screening is warranted (Sheehan, 2009).

Definitions of Terms

Digital rectal exam (DRE): Insertion of a gloved, lubricated finger into the rectum of a male to feel the prostate and check for any abnormalities American Urological Association (2008, p.10).

Intent-to-screen tool (IST): A one-question tool used to assess a person's intention to participate in a prostate cancer screening program postintervention. Term established at the following site: http://www.ncbi.nlm.nih.gov/pubmed/21243659.

Prostate cancer: When there are cells that grow fast and abnormally, and those cells are located in the prostate, prostate cancer is the resulting diagnosis. These abnormally growing cells quickly divide and generate new cells that are not biologically necessary for the body and form a mass of tissue called a tumor (AUA, 2008, p.10).

Prostate-specific antigen (PSA): PSA is a protein generated by the prostate gland. It is made only by the prostate gland, and high levels of PSA in the blood can be a sign of cancer of the prostate (AUA, 2008, p.10).

Prostate Cancer Knowledge Questionnaire (PCKQ): An eight-item survey used to gather demographic data and prostate cancer pre- and posttest knowledge (Weinrich, 2004).

Screening: Tests that identify a disease early to improve the chances for cure and prevent complications from the disease (AUA, 2008, p.11).

Assumptions

I assumed that the sample of African American men would be representative of the population targeted by the study. I also assumed that the postintervention sample would be close enough to the preintervention sample with respect to the completed surveys that enough data would be generated to meet the critical number of usable surveys required for the analysis. In addition, I assumed there would be a high degree of accuracy in both collected data and supplied data from the participants.

Limitations

In any study, it is important to assess whether the results could have been influenced by bias. Bias can be introduced through the methods used to identify and recruit subjects (selection bias), the measurement of information (information bias), or through confounding (Ellison, 2008). Potential limitations of this study are selection and information bias, including issues related to instrument validation.

The sample was limited to approximately 150 participants. Most data collected were self-reported. Recall bias may marginalize self-reported data. Spain (2008) noted that recall regarding checkups and PSA tests can be influenced by subsequent events such as patient care and treatment. Data collection represented but a single point in time. Participants completed surveys at their leisure, and the process may not have commanded their complete attention. Unsigned surveys or those with less than 75% of the survey completed were not counted. These criteria produced a smaller population, which could have limited the generalizability of the results.

Delimitations

Study delimitations should be considered when interpreting the results of any study. Unknowns include whether participants volunteered and whether they had access to the Internet and a valid e-mail account. An additional unknown was whether the participants were computer literate and able to read, understand, and comply with instructions.

Significance of the Study

Prostate cancer screening, although controversial, can detect prostate cancer many years before a patient presents with symptoms. Typically, men who develop prostate cancer die of other diseases; however, this is not the case for African Americans, who have a strong genetic predisposition to prostate cancer (AUA, 2009). Screening-detected cancers are predominantly early disease, for which the prognosis is considerably better than that of clinically detected prostate cancer (Etzioni, 2002). Many men with a family history of prostate cancer are unaware of their heightened risk or underestimate it (Myers, et al., 2005). Specifically, African American men are less likely to appreciate family history and other prostate risk cancer factors than European American men (Steele, 2000). Given that African American men are diagnosed with more advanced prostate cancer than are European American men and have a demonstrated lower awareness of prostate cancer risk factors, improvement of risk awareness among African American men merits exploration. Given the vulnerability of this population, the lack of medical consensus around screening guidelines, and strong genetic predisposition to prostate cancer, there is a need to learn ways to lead them to make good choices about their health care. Early detection can save more lives, and the lives of these men and their families should provide positive social change not only for the population they are a part of but to the medical community. Thus, without medical screening consensus and the continued proliferation of prostate cancer morbidity and mortality, the social change of increased quality and length of life of African American males will likely not be realized.

Summary and Transition

My purpose was to test the effects of a web-based decision aid on the knowledge and behavior of African American men regarding prostate cancer screening. The study was based on the transtheoretical model, which assesses people's readiness to adopt new behaviors. The sample was 150 African American men over 40 years who do not have prostate cancer to see whether the web-based information would increase their awareness of prostate cancer prevalence, morbidity, and mortality, as well as screening and treatment options, and to increase the rate of prostate cancer screenings among African American men. Chapter 2 is a review of the relevant literature on prostate cancer and decision aids, especially with regard to African American men. Chapter 3 is the description of the study methods, including research design, population and sample, instrumentation, data collection and analysis, and steps taken for the ethical protection of participants. The results, data analysis, and interpretation comprise Chapter 4, and in Chapter 5, I will include a discussion of any robust findings and recommendations for future research.

Chapter 2: Literature Review

The purpose of this study was to measure differences in screening intent and actual screening behavior in African American men who are initially diagnosed with prostate cancer in its more advanced stages more often than members of other racial groups. Inadequate screening for prostate cancer in African American men reflects a lack of agreement on screening guidelines, which can then result in mixed messages to health care practitioners and patients. Other barriers to screening include lack of health insurance, reluctance to participate in research, and fear (Woods, 2006). One of my goals for this study was to determine the role such barriers play in health care decisions made by African American men.

In this chapter, I present reviews of the relevant literature on prostate cancer, screening, decision aids, and health care attitudes and behavior of African American men. The review includes an exploration of the literature regarding the incidence, prevalence, morbidity, and mortality rates of prostate cancer in the general population and among African American males in particular. Also explored is the incongruence regarding prostate cancer screening guidelines and recommendations, including a discussion of African American male screening behaviors, the role of decision aids on screening behavior and participation, and the study variables. Since this intervention is Internet-based, I also discussed the role of the Internet in providing health information.

The review includes EBSCO databases at Walden University, Abbott Laboratories, and the University of Wisconsin–Parkside. I also searched Medline, PubMed, PsychINFO, CINAHL, BIOSIS, and the Cochrane Controlled Trials Register.

The initial search yielded more than 16,600 peer-reviewed articles. I excluded case reports, commentaries, editorials, and reviews. Keyword searches used the following terms: *health promotion(s), prostate cancer and decision tools, prostate cancer and decision aids, decision aids, decision aids and health promotion(s), informed consent, health education, shared decision making, informed decision making, informed consent, transtheoretical model, PCK change, prostate cancer intent to screen,* and *prostate cancer screening behavior.*

Organization

The literature review includes a discussion of prostate cancer prevalence in the United States, prostate cancer screening, prostate cancer and African Americans, and literature on informal communication about the influences on African American men and their health-seeking behaviors. I also sought information on the issues surrounding low participation of African American men in research studies and the general distrust African Americans have for the medical profession. The transtheoretical model and its application to both health-seeking behavior and cancer screening-seeking behavior is followed by a discussion from the literature relating to decision aids.

The literature review continues with a discussion of the appropriateness of the methodology and data analysis selected for this study, presentation of the dependent and independent variables, and the use of the Internet for health information. It also includes a description of the instruments that were used along with research that shows their validity and reliability.

Prostate Cancer

The incidence of prostate cancer in the United States has decreased and the overall 5-year survival rate is 96% for African American men if the cancer is detected at an early stage (National Cancer Institute, 2012). Despite these trends, prostate cancer is still the most common noncutaneous cancer and the second-leading cause of male cancer mortality (Cancer Facts and Figures, 2011). During 2012, there were an estimated 241,740 new cases and 28,170 deaths from prostate cancer (National Cancer Institute, 2012). One in six men will be diagnosed with prostate cancer in their lifetime (Cancer Facts and Figures, 2011). Further, prostate cancer is the most common nondermatologic cancer in men aged 50 years and older (Wilbur, 2008). Wilber (2008) noted that on average, men have an approximately 17% chance of developing prostate cancer at some point during their lives.

African American men are disproportionately affected by prostate cancer and have one of the highest rates of this cancer in the world (Jones, 2006; Toles, 2008). According to SEER, a program of the National Cancer Institute, African American men were found to have an increased rate of cancer of the prostate (255.5/100,000) than European American men (161.4/100,000), Asians and Pacific Islanders (140.9/100,000), or Hispanics (140.9/100,000). With respect to men of other races, men of African American descent were found to be more likely to have received a diagnosis later along the disease progression path and have an increased mortality rate (Epsey et al., 2007).

In a clinical trial that examined the outcomes of 288 African American and 975 European American men with prostate cancer, Thompson et al. (2001) found that African

Americans had poorer prognoses than European Americans and that prostate cancer was diagnosed at more advanced stages in African Americans. Although the incidence of prostate cancer in African American men has decreased from its high in 1993 (343.1 per 100,000), the rate remains over twice that of European American men. One of the strongest risk factors for developing prostate cancer is family history, which is especially true for African American men, who are more likely than members of other racial and ethnic groups are to have aggressive forms of the disease (Alton, 2008).

Several issues regarding prostate cancer screening could potentially be counterproductive in terms of overall costs of unnecessary procedures and false positives (Wilbur, 2008). Limitations of DRE and PSA tests have indicated that their reliability is relatively poor and that outcomes for those tests are not sufficiently. As a result, expert recommendations regarding prostate cancer screening can vary.

Prostate Cancer Screening

The literature reviewed for this study included the relationships between prostate cancer screening and factors contributing to lack of screening participation among African American men. Several researchers explored belief systems that comprised the major theoretical foundation for this study and how health-seeking behaviors may influence decisions to participate in screening examinations. The review also revealed research that established a basis for continuing distrust among African Americans for the medical and research professions (Clarke-Tasker & Wade, 2002; Gray et al., 2005; Magnus, 2004; Wilson, n.d.).

There is also a significant difference between African American males and European American males with respect to models that would provide an increase in education leading to prostate cancer screening (Barber et al., 1998). The authors investigated the efficacy of an educational cancer screening program in an urban community in the Midwest containing 944 men. The authors were able to provide rectal examinations digitally and PSA blood tests free of charge due to a grant (Barber et al., 1998). Prior to screenings, an educational intervention was used to stress the importance of early detection of prostate cancer. The authors administered a short survey both before and after the educational video and screenings. The questionnaire concentrated on attitudes and knowledge regarding prostate cancer screening (Barber et al., 1998). The results of the pretest showed that African American males were significantly less likely to identify early symptoms of prostate cancer and components of a prostate cancer screening. Importantly, the authors found that after the educational video, all races exhibited an increased knowledge, and the differences among races diminished to the point of not being statistically significant.

Barber et al. (1998) found that radio was the best means for reaching African Americans for prostate cancer screening, while for European Americans, newspapers provided the broadest reach. Further, minorities were found to have a preference for private appointment screenings. The study provides further evidence that there is a significant need for targeted and customized prostate cancer education, appointment, and screening methods that can be applied to African Americans to increase their propensity to get regular prostate cancer screening checkups.

While researchers such as Barber et al. (1998) have concentrated on methodologies for increasing the reach of prostate cancer screening education, there is some evidence that screening may not be as effective as some believe and may be too costly to apply it broadly. As noted in the study by Wilbur (2009), there remain some validity issues with respect to the outcomes of screenings such as false positives. These results can increase costs and have deleterious effects on the patient who receives a false positive diagnosis, as it may result in increased stress on the individual and unnecessary costs associated with treatment (Harisinghani et al., 2003).

Wilbur (2009) indicated that there is a variety with respect to expert recommendations of screening for prostate cancer and found that research indicated too little evidence generated to provide a positive or negative recommendation for DRE or PSA screening. Two examples of the variety of recommendations include both conducting universal screenings for all men over 50 years as well as waiting until the age of 75 years to begin screening since prostate cancer screening before that age resulted in few if any benefits. This finding and others in the literature suggests the wisdom of an individual approach to prostate cancer screening rather than a blanket recommendation to promote screening or recommend against it.

A study by Potosky et al. (1995) considered aspects of screening comingled with the rate of prostate cancer. This study specifically investigated the increases in prostate cancer diagnoses from 1986-1991. The authors randomly sampled 5% of male fee-for-service patients in Connecticut, Georgia, Michigan, and Seattle--approximately 6% of the population of the United States. They found that a significant portion of the 82% rise in prostate cancer diagnoses could be attributed simply to the increase in screening behaviors, mostly PSA tests but to a lesser extent, transrectal ultrasounds conducted during those years. This finding indicates that there may not be a rise in prostate cancer, but rather a rise in detection, which also increases treatment and presumably reduces morbidity.

African American Men and Prostate Cancer

The differences in prostate cancer between African American men and other U.S. men have been attributed to diet, genetic variability, and social status. Some researchers have attributed differences in mortality and morbidity to a delay in or avoidance of interacting with the health care system (Toles, 2008). Toles (2008) found both perceived and real barriers to seeking care and concluded that African American men are aware of their vulnerability to prostate cancer but are doubtful about its cure. A commonly cited source of distrust of the American health care system among African Americans is the Tuskegee Syphilis Study, in which 400 participants were not offered the known cure for syphilis (penicillin), even after the study had been completed.

In a study of recently diagnosed prostate cancer patients in North Carolina, Talcott et al. (2007) identified several barriers to early-stage prostate cancer diagnosis in African American men: insurance coverage, inconvenient health care access, less job flexibility to obtain screening and care, and weak ties to their primary physician. They concluded that “African American men’s distrust and underutilization of PC-related medical and preventive care arise not from researchers’ past misdeeds, but from interactions occurring during their own medical encounters, limited and distorted by their economic and social circumstances” (Talcott et al., 2007, p. 1606). Talcott et al. also found significant differences in knowledge, attitudes, beliefs, and physician trust based on race. African American men were more likely than European Americans to believe that their chances of getting prostate cancer were small, and African American men revealed greater distrust in their physicians compared to European American men. Men with a family history of prostate cancer are at higher risk for contracting the disease, and African American men in particular are less likely to be aware of this higher vulnerability (Spain, 2008). Spain (2008) concluded that if African American men are made aware of the risk factors for prostate cancer, they will more likely be screened, thereby reducing the tendency to be diagnosed at more advanced stages of the disease. Toles (2008) emphasized the importance of health promotion messages that are culturally sensitive to African American males. Although several decisions aids have been developed for prostate cancer screening, few have been evaluated in trials, and none measured actual follow-up behavior (Volk et al., 2007). Volk et al. (2007) noted that “prostate cancer screening decision aids appear to decrease interest in screening and the intention to be screened, decrease PSA testing rates, and increase preferences for watchful waiting over other treatments” (p. 432). Studies of African American patients, however, suggest that aids may slightly increase screening rates.

Informal Communication

There is limited literature on the impact of informal communication and how it influences health-seeking behaviors among African American men. The importance of informal communication in African American communities has been noted in numerous studies about recruitment that began in churches, barbershops, and fraternal organizations (Cowart, 2004; Kleier, 2003; Parchment, 2004; Toles, 2008), thus recognizing the influence of these institutions as sources to provide communication within African American communities. Evidence of the church's importance in African American communities is seen from its role in civil rights movements, establishing food and clothing programs, and advocating for communities by political and educational involvement. However, the barbershop is another source of informal communication within African American communities that may have greater influence among African American males (Cowart, 2004; Franklin, 1985; Toles, 2008).

The African American Barbershop

For many African American males, barbershops are an environment that exudes African American masculinity. The barbershop is also a major source of socialization and communication within the community. Barbershops for younger African American males serve as an institution where sex-role expectations are modeled, confirmed, or explained (Franklin, 1985). In 1983, Franklin (1985) observed and recorded narratives, behaviors, and attitudes of African American males patronizing a Midwestern city barbershop during a 2-month study of male socialization utilizing perspectives of Bandura, Kohlberg, and Freud to describe the development of male sex roles. The importance of the barbershop to this study is that the patrons represented a wide stratum of African American socioeconomic classes, and while in the barbershop, nearly all patrons engage in overly masculine behaviors. Sexual prowess is typically exaggerated, and misogynistic beliefs are unapologetically expressed. Franklin noted that all present were expected to contribute to discussions. Those disagreeing by voicing equality between the sexes or professing a commitment to fidelity were silenced or ridiculed. African American healthcare and education professionals who know how barbershops influence African American male socialization have used these establishments to promote positive health-seeking behaviors (Cowart, 2004; Lewis, Shain, Quinn, Turner, & Moore, 2002; Majors, 2003; Toles, 2008). For example, in 2001 public health officials in Durham, North Carolina, became alarmed when 88% of the HIV cases for 1 month were reported by African Americans. Aware of the strength of informal communication, health officials instituted a barbershop and beauty shop awareness program in places that would demand the attention of those within the communities to promote safer sexual practices. The program was reported as a success (Lewis, et al., 2002). Two years later, Cowart (2004), discouraged with traditional medical communication practices, developed and implemented a program to foster prostate cancer awareness for African American men in the setting they most frequently congregate, the barbershop. The program found men with limited knowledge of prostate cancer and hungry for knowledge and attention.

Low African American Participation in Research Studies

It is surprising that the literature regarding prostate cancer and African Americans is not distinguished from prostate cancer research involving the general population (Cowart, 2004; Gray et al, 2005; Newton, 2002; Pierce et al., 2003) since African Americans are more likely to develop the disease and have a higher mortality than other ethnicities (ACS, 2006; NCI, 2006; Nivens et al., 2001). Countless studies have cited the low participation in research and clinical trials as similar to that found in prostate cancer screening. An earlier study by Gray et al. (2005) supports a major premise of this study that holds African Americans accountable for low participation by referring earlier research where screening costs are low or free and found African American participation lower than European American men (Nivens et al., 2001). The review uncovered research showing a correlation between possible health beliefs of African American men and screening practices (Lu, 2007; Plowden, 2006). In an earlier study to determine if discriminatory medical practices were responsible for the difference in deaths of African American and European American males. Demark-Wahnefried (1998) found some African American males were aware of prostate cancer dangers and avoided screening due to beliefs of susceptibility. Specifically, the men did not believe themselves to be susceptible to prostate cancer or adopted a fatalistic view of prostate cancer as an automatic death sentence.

African American Distrust of the Medical Profession

Among African Americans, there is a mistrust of the medical and mental health professions resulting from slavery and institutional racism and the treatment of African American men: “The institution of slavery undermined African American men’s sense of trust, power, and control” (Wilson, n.d., p. 5). African Americans attempting to escape from servitude during slavery were considered “mad” or “crazy” (Moffic, 2003, p. 1). In matters related to prostate cancer screening, Gilligan et al. (2004) studied 67,000 men over the age of 67 and found that African American men examined by physicians were 35% less likely than European American men to get a PSA test. Studies support allegations of African American men that many physicians do not suggest or discuss prostate cancer screening with them (Clarke-Tasker & Wade, 2002; Siegal et al., 2007). It would appear that given these findings, the medical profession must accept some responsibility for screening deficits. An implication that may be drawn from studies citing a reluctance to participate in screening, specifically digital rectal examinations, may find non-African American physicians hesitant to perform digital rectal examinations on African American men.

Oliver (2007) found that African American participants in a rural Alabama community were uncomfortable when examined by older European American physicians. One participant's perception was, "White gentlemen have created that uncomfortable zone over the years, and it has been difficult for them to practice and talk to Blacks" (Oliver, 2007, p. 78). Studies of medical and pharmaceutical responses to minorities revealed ongoing disparate treatment of African Americans and other minorities (Burroughs, Maxey, & Levy; 2002; Gamble, 1997; Intercultural Council Cancer Facts, 2003; Smith et al., 2007).

As a matter of general applicability to African Americans and medicine, Morrison, Wallenstein, Natale, Senzel, and Huang (as cited in Intercultural Cancer Council Cancer Facts, 2003) found that pharmacies in predominantly African American and Hispanic neighborhoods do not carry a sufficient stock of prescription pain medication for patients. Outpatient cancer treatment programs in minority neighborhoods also provide lower levels of service to African American and Hispanic patients (Burroughs et al., 2002; Cleeland, Gonin, Baez, Loehrer, & Pandya, as cited in the Intercultural Cancer Council Cancer Facts, 2003).

The prescribing of medication and patient compliance is influenced by culture. Research revealed that medication provided to minorities, African Americans in particular, is often based on physicians misdiagnosing a condition and inappropriately prescribing medication that labels African American patients with a condition that would not be diagnosed in European Americans having similar symptom (Suite, Bril, Primm, & Harrison-Ross, 2007). For example, “African American patients are more likely to be over diagnosed as having a psychotic illness and treated with antipsychotic medication regardless of the diagnosis” (Burroughs et al., 2002, p. 11).

The decision to participate in screening programs is further complicated because, prostate cancer screening is controversial due to the low sensitivity and specificity of the PSA and DRE tests (Jones 2007). The PSA test misses about 25% of prostate cancers and gives a false positive result approximately 60% of the time (Sheehan, 2009). Prostate cancer screening has also been controversial because of the lack of evidence that screening reduces mortality from the disease (National Cancer Institute, 2008). As a result, current prostate cancer screening recommendations vary. The NCI (2008) and the 2008 United States Preventative Services Task Force (USPSTF) concluded that there is insufficient evidence to recommend screening with DRE and PSA. The USPSTF recently updated its recommendations to advise against screening for men over age 75.

The American College of Preventive Medicine does not support routine screening using DRE and PSA (Ferrini & Woolf, 2008). The American Cancer Society (ACS) and the American Urological Association (AUA) have a more aggressive approach to screening and recommend DRE and PSA for men at average risk beginning at age 50, and beginning at earlier ages for men with risk factors (ACS 2008; AUA 2008). The USPTF observed that average-risk African American males between the ages of 50 to 70 years and men over 45 years of age will receive the greatest benefit from screening (Ross et al., 2008). The 2005 National Health Interview Survey found that 23.0% of African American men ages 40-49 years had had a PSA test, compared to 15.6% of non-Hispanic European American men and 12.8% of Hispanic men (Ross et al., 2008).

One problem confronting health care practitioners who are initiating conversations with their patients about prostate screening is differing recommendations among organizations. Screening based solely on PSA levels is controversial, as the readings can lead to the discovery of disease that is inconsequential or to the need for more invasive follow-up testing. Explaining PSA levels to patients is challenging, given the complexity of interpreting the results to the patient. Screening results may require more invasive follow-up and delayed benefits. Screening aids are often not tailored to the individual, and too few persons benefit from screening (Barratt, 2004).

The purpose of screening is early detection, lack of which is the primary problem for African American men with prostate cancer. But PSA testing results vary, and there is the element of uncertainty in their results. Reflecting this uncertainty, the AUA (2009) suggested, “The risks of over detection and overtreatment should be included in [a] discussion” and that PSA screening should be recommended “for *well-informed* men who wish to pursue early diagnosis” (AUA, 2009, p. 7). The AUA further recommended, “All discussions of treatment options include active surveillance as a consideration, since many screen-detected prostate cancers may not need immediate treatment" (AUA, 2009, p. 7).

The goal of early detection is to reduce the overall morbidity and mortality of prostate cancer. The European Randomized Study of Screening for Prostate Cancer (ERSPC), in fact, indicated that the decrease of the risk of diagnosis of prostate cancer was achievable in addition to being linked to a reduced probability of 20% of prostate cancer deaths (Schroder et al., 2009); however, it also noted that over diagnosis could be linked to the frequency of the screenings. The AUA (2009) indicated that survival over a longer period was reduced by the diagnosis of prostate cancer. This prostate cancer finding was linked to the spread of the cancer past the prostate. Generally, persons with cases that are similar to these have been found unlikely to experience improvement with therapy than with a reduction in the volume or type (grade) of the tumors (AUA, 2009). The AUA (2009) also found no overarching and agreed-upon distinction with respect to significant and insignificant prostate cancer.

There is some agreement that PSA testing is linked to a significant increase in the number of males diagnosed with cancer of the prostate (Jemal, 2008). "Subsequently, prostate cancer incidence rates in the United States have fallen but are still twice the rates recorded prior to the introduction of PSA testing" (AUA, 2009, p. 12). The use of such testing was also found to be linked to the decrease in age of the diagnosed males when compared to the age of males before PSA testing was as widely used. This has also not reduced the fact that previous literature has demonstrated that the risk of developing prostate cancer throughout a patient's life is approximately 16%; however, the risk of dying was found to be 3.4% (Epsey, 2007). Although many men have latent prostate cancer, they are not destined to die from the disease.

Widespread testing using PSA has increased the concern about detection of cancer of the prostate (AUA, 2009) because the screening can indicate a condition that would cause no deaths and that might have remained undetected had the patient not undergone the test. An additional downside of these tests was that they are better equipped to detect tumors that grow slowly rather than those that are aggressive. Some bias is reduced with repeated testing, but “the likelihood of detecting smaller, more indolent tumors that will never progress to clinical significance remains high” (AUA, 2009, p. 14).

It was also found that mental in addition to physical stress could increase following biopsy. It was noted that males with prostate cancer that were found to be clinically significant had more complications related to treatment (Sanda et al., 2008). Other factors could potentially impact the levels of PSA and, as a result, should be considered when the results are evaluated. Three of the common diseases of this type could be linked to increased levels of serum PSA, and increased PSA levels are also linked to prostate biopsies (AUA, 2009).

According to Weinrich, Holdford, Boyd, and Crenaga (2001) the following are reasons PSA and DRE screening are not necessarily conclusive:

1. “The PSA assay is prostate specific, not cancer specific. . . . Elevations in PSA can be caused by benign prostatic hypertrophy and prostatitis as well as cancer” (p. 80)

2. PSA testing is affected by several variables, including age and race.
3. “A DRE . . . can detect subtle prostate abnormalities, including symmetry, consistency, and marked induration of nodules. . . . Even though the DRE is less effective than the PSA in detecting prostate cancer, it is still recommended” (p. 81).
4. Screening results in false positives and false negatives.
5. There is a lack of national consensus with regard to age range and recommended repetition for prostate cancer screening.
6. “Differences in prostate cancer screening guidelines are related to the inability to estimate which of the prostate cancer cases will remain relatively slow growing and which will cause illness and death” (p. 82).

African American men are less likely to undergo screening for prostate cancer than are members of other racial and ethnic groups. That gap has been attributed to differential access to health care services and cultural barriers. Studies have shown that increased awareness and knowledge about prostate cancer leads to decreased screening in majority populations, but this is not the case for the small number of African American men who have participated in these studies. Most of these studies, though, have targeted primarily European American men.

Transtheoretical Model (TTM)

That perceptual and environmental factors such as exposure to health education influence health-related choices has been proposed TTM (Prochaska & DiClemente, 1983; Prochaska & Velicer, 1997). Spencer, Pagell, and Adams (2005) stated, “The fundamental concept of the transtheoretical model (TTM) is that behavior change is most successful when specific behavioral strategies, called processes-of-change, are applied at the right time, or during the appropriate stage of change" (p. 36). Spencer et al. studied 42 stage-matched mammography interventions and found that the stage-of-change and decision balance appear to apply only to breast cancer screening behavior and suggested that more research is needed on the application of TTM to all cancer screening behaviors.

The application of the transtheoretical model to cancer screening behaviors can be adapted from the Rakowski et al. (1997) stage-of-change definitions, which are as follows:

1. Precontemplation: No previous mammogram and no plan to get one within the next year or two.
2. Relapse: Had a mammogram more than 24 months prior but has no plan to get one within the next year or two.
3. Contemplation: No previous mammogram within the past 24 months but plans to get one within the next year or two.
4. Relapse risk: Had a mammogram in the past 24 months but has no plan to get one within the next year or two.
5. Action: Had the first mammogram within the past 24 months and plans to have another within the next year or two.
6. Maintenance: Has had two or more mammograms on schedule (no more than 24 months apart) and is planning to have another within the next year or two (Rakowski et al., 1997, p. 435).

These TTM categories of the stage-of-change definitions can be applied to prostate cancer screening in African Americans. Citations involving Rakowski comprised over 15% of the Spencer et al. (2005) critical literature review, confirming Rakowski as a cited expert and that properly applying his work would add validity to further studies applying the TTM to cancer screening behavior.

In addition to mammography, the model has been used to determine predictors and variables associated with screenings such as cervical and colorectal cancers (Honda & Gorin, 2006; Kelaher et al., 1999; Rakowski, Dube, & Goldstein, 1966). Trauth et al. (2003) more recently applied the TTM to the colorectal cancer screening behavior among a population of two lower income communities in Pennsylvania. The use of the model involved categorizing the individual participants based upon their stage of readiness to undergo either one of two colorectal screening exams. Trauth et al. conducted a telephone survey of 414 respondents and found relationships between the colorectal cancer screening test behavioral change and factors such as recent doctor checkup, age, gender, prior doctor recommendation, history of prostate antigen blood testing, chronic need for prescription medications, and history of cervical Pap smear testing. The successful application of the colorectal cancer screening behavior with respect to the TTM further demonstrated the efficacy of its use in this study.

More generally, Prochaska and Velicer (1997) researched the application of the TTM to health behavior changes rather than behavior changes directly applied to cancer. Use of the model shows both its breadth of applicable uses and its readily apparent application to health-related behavior. Prochaska and Velicer began with the premise that the TTM explicitly models behavior change through six stages of precontemplation, contemplation, preparation, action, maintenance, and termination. Rakowski et al. (1997) adapted these more general stages to their study of mammography behavior. Prochaska and Velicer also identified an additional four stages of change that were identified with respect to the production of progress along with decisional balance, self efficacy, and temptations. The study also provided a useful rule of thumb with respect to at-risk populations that include African American males, positing that approximately 40% of at-risk populations were in precontemplation; 40% were in contemplation, and 20% were in preparation. They also found that across a dozen health behaviors there were predictable patterns regarding the pros and cons of progressing or digressing through the stages of change and noted that applied research demonstrated significant improvements in recruitment, retention, and progress with the use of stage-matched interventions and proactive recruitment procedures.

The most dramatic results reported were achieved using computer-based individualized and interactive interventions (Prochaska & Velicer, 1997) and personalized counselors. The final and most promising finding, however, was that there was a strong similarity with respect to stage-matched programs between those who were reactively recruited who reached out to the researchers for help and those who were proactively recruited the researchers contacted. Prochaska & Velicer concluded that if similar stage-matched results continued to be encountered, programs to promote health might significantly impact entire at-risk populations.

While the application of the TTM to prostate screening is still under investigation, components of other models such as the health belief model and the theory of planned behavior have also demonstrated modest success in predicting participation in prostate cancer screening but have performed poorly in predicting which men would actively request the PSA test (Weinrich 2004). With lack of successful application of previously tested models and the successful use of the TTM in predicting breast cancer screening, application of the TTM to prostate cancer screening is warranted (Sheehan, 2009).

Decision Aids

The purpose of decision aids is to help health practitioners engage patients in making decisions about their treatment and screening. The Agency for Healthcare Research and Quality defined a decision aid as “an intervention designed primarily to help patients (or patients and clinicians together) with making cancer-related health care decisions when options are available for prevention, screening, and treatment. At a minimum, it should target some component of decision making” (as cited in O’Connor, 1999, p. 67). Decision aids are used to improve patient knowledge and to foster communication between patients and caregivers. Elwyn (2006) found that decision aids are better for improving patient knowledge regarding an issue than is counseling and can have a strong influence on patient choice.

There is agreement among experts who make decisions regarding the goal of decision aids: The aids can increase informed decision making regarding sensitive preferences (Nelson, Han, Fagerlin, Stefanek, & Ubel, 2007); however, experts did not agree on the specific means of achieving the goal of evaluating the efficacy of decision aids. In a recent meta-analysis, Schapira (2000) found decision aids to consistently increase knowledge but to be less likely to affect decisions about a health care intervention. Schapira also noted that the main goal of increased knowledge is not truly obtainable on a continuous basis because increased knowledge is not always put to its optimal use. Schapira also noted that research has indicated that reduced numeracy, bias regarding information, and reasoning linked to heuristics could potentially influence the processing of information and also the making of decisions.

In a study by Ellison et al. (2008), 87 African American men were enrolled in a program aimed at increasing knowledge that enhance health-seeking behaviors. One strategy used was decision aids, which "have been shown to significantly increase knowledge of prostate cancer screening, as well as create realistic expectations of risks and increase awareness of choices and decrease decisional conflict" (Ellison, 2008, p. 1140). The researchers compared two web-based educational programs that were culturally specific to African American men.

In a meta-analysis of clinical trials, O'Brien et al. (2009) considered the effectiveness of decision aids in cancer-related decisions and found they are effective in imparting knowledge without increasing anxiety about cancer screening. O'Brien et al. reviewed 34 trials, of which 22 addressed screening. In a study of 230 African American, Taylor et al. (2006) found significant improvement in knowledge and increased likelihood to have a PSA screening in those participants who received information through decision aids. Ellison et al. (2008) studied the effectiveness of web-based decision aids among African American men and found that they had a significant effect on knowledge of prostate cancer screening.

One purpose of using decision aids is to increase informed decision making (IDM). Rimer et al. (2004) found, though, that IDM can result in a slight decrease in screening behavior. Most IDM studies have targeted European American populations. In a patient education program about prostate cancer, Volk et al. (2003) used an IDM intervention in a group of 160 men ages 45 to 70 years. After 1 year, African American men were more likely to have had a PSA test than were European American men. Krist et al. (2007) found that patients in decision-aid groups (via web-based or paper-based education) were more likely to answer knowledge questions correctly but less likely to be screened. The authors questioned the efficacy of education in shared decision making as a measure of increased screening behavior.

Although it is not clear that PSA decision aids increase knowledge, they do increase PSA uptake (Evans, 2005). The impact of PSA decision aids on testing may also have implications for policy. One such consequence could be cost savings; another is fewer treatments such as prostatectomies. More importantly, findings derived from this study can be used to provide congruent screening recommendations for African American males with the Preventative Health Taskforce, AUA, and other medical organizations. Policymakers may therefore perceive value in developing and disseminating PSA decision aids, but more research is needed in the formal development and assessment of PSA decision aid quality criteria and evaluation (Evans, 2005). Earlier evaluations of studies that used decision aids resulted in the conclusion that they increase knowledge, reduce decision conflict, provide more real expectations, and limit the proportion of patients that have been found to have a passive role in their decisions (O'Connor, 2003).

Methodology Discussion

Stone et al. (2002) investigated methods used to increase preventative care behavior such as cancer screening in a study of 552 abstracts and articles on the topic. They found that 108 such studies met their requirements of controlled trials that analyzed increased use of cancer screening. Of the 108 studies, 81 matched a care-and-control group model. According to Stone et al., the most effective form of intervention was organizational change, which included use of different clinics designed to increase prevention. The second most-effective methodology was patient education, followed by reminders and patient feedback. I used educational interventions and a controlled randomized sampling method, which was also found to be a significant means of improving cancer screening.

Another example of a randomized controlled trial was conducted by McPhee et al. (1989), which used screening reminders and educational interventions similar to Stone et al. (2002) to analyze the increased screening behavior of African Americans. McPhee et al. compared using educational interventions such as sending patients literature on overdue tests with reminders and no intervention. The researchers randomly assigned 180 participants into control and experimental groups and found, unlike Stone et al. (2002), that reminders were more effective than educational interventions.

Shapira and Vanruiswyk (1999) examined the impact of prostate cancer screening aids on patients' beliefs, knowledge, and use of prostate cancer screening tests. They also used controlled randomized sampling to identify 257 men from Milwaukee, Wisconsin. Using pamphlets as aids for increasing knowledge was effective (91% awareness compared with 65% awareness was found to be significant at the 0.01 alpha level); however, there was no significant difference in the use of prostate cancer screening tests. The use of the tests was found to be 82% compared with 84% and was determined to not be statistically significant at the 0.05 alpha level. My study adapted the above noted and validated methodologies by using an experimental controlled and randomized sampling method and active educational interventions to learn the impact of the educational intervention with the population.

Data Analysis

All statistical analyses were performed with PASW 18.0 (formerly SPSS) for Windows. Hypothesis 1 was tested using a two-sample *t* test to compare the average change (from pre- to postintervention) in PCK scores between the experimental and control groups (Ellison, 2008; Gattellari et al., 2005; Weinrich, 2007). If there were statistically significant differences between the experimental and control groups with respect to age, education level, income, insurance status, or stage of change, then analysis of covariance (ANCOVA) was used instead of a two-sample *t* test to control for those variables (Ellison, 2008). Hypotheses 2 and 3 were tested using a chi-square test (Ellison, 2008; Weinrich, 2007). Collection of personal information was limited to information essential for the study. All responses have been stored in a secure server file at my office and with the data collection vendor, who signed a confidentiality agreement. Only my Walden University advisor and I have access to the data, which I will keep for 5 years and then destroy.

Exploration of the Dependent Variables

Knowledge of prostate cancer screening is the most common outcome measured in studies of prostate cancer, and both single- and multiple-item scales have been used (Radosevich, Partin, & Nugent, 2004). It was also found that participants who had been provided with decision aids knew more than the control group. Volk et al. (2003) also found that there was a reduction in knowledge of participants who received a decision aid 12 months after the intervention, and that this reduction was similar to the control group. Frosch et al. (2003) also found that there were no significant differences in measures of knowledge of those who were provided with a video and those who used an aid over the Internet despite the fact that the proportion of participants that viewed the video was larger than the group that had access to the Internet aid. The trials by Gattellari et al. (2005) and Taylor et al. (2006) indicated increased knowledge of those who were provided with a printed guide instead of a video.

The interest in screening or intent to be screened was examined through several studies: Volk (2003), Ruthman (2004), and Gattellari (2005). These researchers used Likert scales in addition to as *yes* and *no* choices. The intent to be screened was reduced in those who had decision aids, findings supported by Partin (2004) and Flood (1996). The rates of screening for PSA for the group that used the decision aids were measured following the receipt of those aids. There were also differences in the time of follow up that ranged from directly following the visit to the office to 48 hours or even up to 12 months from receiving the decision aid (Partin, 2004; Volk, 2003; Wilt, 2001). Because there were differences in the recruitment of patients, the authors divided the studies into those where participants went to the clinic on their own and where they had been recruited from outpatient facilities for the previous 12 months (Myers, 2005). It was found that there was a difference in the low portion of the screening rates but not among the high rates. Specifically, the low for the patients who received a decision aid was 11.7% compared with 98.4% (in the scheduled visit study and free screening study respectively). In terms of the control group, the range was from 21% to 100% (Flood, 1996).

It was found that when screening data were examined where patients were recruited from offices that had their visits regularly scheduled, the RR ratio was found to be only 0.88%. This indicated that participants who were given decision aids had a lower probability of being screened compared with patients who did not. Further, Davidson et al. (1999) concluded that participants who were provided with aids were encouraged to talk about screening with their physicians, a factor that could have increased screening rates (O'Conner, 2003). In a study by Partin et al. (2004), there was no significant difference in rates of screening, which could have been attributed to the fact that approximately 50% of the patients had viewed the decision aid. It was also found by Myers et al. (2005) that screening rates as a whole were less than 10% because the aid was not provided prior to visiting the office. The impact of these aids on screening was still found to be statistically significant, with an RR ratio of 0.92, suggesting that those who saw the decision aids had a lower probability of being screened than those who did not.

Among studies that looked into African American screening behaviors, Myers et al. (2005) indicated that rates of screening among this population were lower than among those who watched an educational video. Myers et al. also found that in patients that exhibited high risks, there can be an increased awareness of the risk that prostate cancer poses. Further, it was found that these could push some participants to be screened; however, Myers et al. noted that more studies were required to ascertain if screening aids actually result in patient empowerment and improved outcomes.

Using the Internet for Health Information

Dickerson et al. (2006) determined that 93 million American Internet users (80%) have searched the Internet for health information. Baker et al. (2003) surveyed more than 60,000 households and received 4,764 responses, of which 40% indicated this type of Internet use, while a smaller percentage had used e-mail to correspond with a health professional. Hesse et al. (2005) found that 63% of adults had accessed the Internet for health information. When participants were asked whether they would go to their physician or to the Internet first for information, the answer was age dependent. Persons 65 years and older were almost 10 times more likely to go to health care providers before using the Internet (75.6% vs. 7.7%), whereas persons 18-34 years or 35-64 years were almost equally split between health care providers at 38.9%) and the Internet at 46.6% (Hesse et al., 2005, p. 2621).

According to the Health Information National Trends Survey (HINTS), 60.5% of African American adults over 18 years have used the Internet to search for health information on behalf of themselves or someone else. Although most participants in the survey said they preferred to get their health information from a physician, only 10.9% typically seek information from a physician first (Hesse et al., 2005). Krist et al. (2007) found no differences in shared decision making between patients who received a web-based intervention compared to those who received a paper-based intervention. According to Ellison (2008), web-based decision aids have two advantages: “The decision aid can be viewed before health appointments with variations in time to review and absorb the content based on individual ability, and technological advances in prostate cancer screening can be quickly updated and disseminated” (p. 1140).

Prostate Cancer Knowledge Questionnaire (PCKQ)

The PCKQ (Appendix F) measures knowledge of limitations, symptoms, risk factors, and side effects of prostate cancer (Weinrich et al., 2007). The instrument is composed of 12 yes/no /don’t know questions. The scores range from 0 to 12 where scores closer to 12 indicate increased knowledge. Weinrich et al. (2004) indicated that there was good reliability and validity for this instrument. Specifically, the Cronbach’s alpha of 0.77 and the theta reliability of 0.61 indicated good internal consistency and reliability. The content validity was provided through the review of five professionals in the cancer field. The construct validity was examined through a factor analysis, and each of the items was kept that had a factor loading of 0.35 or greater. The items were found to align on one factor, which provided evidence for a one dimensional scale.

The PCKQ has also been validated with respect to African Americans and their knowledge of prostate cancer with respect to screening behaviors. Weinrich, Weinrich, Boyd, and Atkinson (1998) utilized the PCKQ to test to see if higher scores on the instrument resulted in higher participation in screenings. The authors used a quasi-experimental design and the PRECEDE framework to test 319 males, of which 82% were African American. The participants' knowledge was measured using the PCKQ prior to the administration of a community-based educational program following which the participants were referred to their personal physicians for a free prostate cancer screening. The findings indicated that increased PCK predicted participation in screening at an alpha level of 0.05. One implication of their study using the same instrument was that there is a need for educational interventions among African American males to significantly reduce mortality rates.

Summary

In this chapter, I reviewed the relevant literature on the effects of a web-based decision aid on the knowledge and behavior of African American men regarding prostate cancer screening. This chapter also included a discussion of prostate cancer and prostate cancer screening, decision aids, and using the Internet for health information. Chapter 3 provides the methods, research design, population and sample, instrumentation, data collection and analysis, and steps taken for the ethical protection of participants.

Chapter 3: Research Method

This study tested the effects of a web-based decision aid on the knowledge and behavior of African American men regarding prostate cancer screening. The study was based on the TTM, which assesses people's readiness to adopt new behaviors. Each decision aid was created to increase the participants' awareness of prostate cancer prevalence, morbidity, and mortality, as well as screening and treatment options, and to explain the benefits and risks of prostate cancer screening. This chapter includes the study methods, including research design, population and sample, instrumentation, data collection and analysis, and steps taken for the ethical protection of participants.

Research Design and Approach

A quasi-experimental design was determined appropriate for this study since it enables the collection of data from a large number of human participants fitting a specific demographic or attitudinal profile. A sample size of at least 50 was deemed necessary to ensure that differences and commonalities were appropriately represented, as reflected by the power analysis conducted using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009). See Appendix A. An experimental design allows a researcher to observe differences in participants' performance and infer quasi-causal differences. This research approach also enables a single researcher with limited resources to collect and analyze data from a sample in a comparatively short time.

Population and Sample

The population studied was African American men ages 40-65 years. Access to this population was via a database of 30,000 African American business owners who agreed to receive e-mail from the database manager, Niche Marketing. From this population, a sample of 625 was randomly selected. Those who responded and agreed to participate had their names and e-mail addresses entered into an Excel spreadsheet. A unique identification number was assigned for each name, and Excel's *rand()* function was used to insert a random number in each row of the spreadsheet. Participants were sorted randomly: The first 75 rows were assigned to the experimental group, and the rest to the control group.

To participate, individuals had to have access to e-mail and a willingness to complete all study requirements. An invitation to participate was sent to all selected. Before the experiment, it was not known how many would meet eligibility requirements. Given that typical response rates to surveys are approximately 24% (Duffy, 2002), it was anticipated that a sample size of at least 134 was achievable, with 67 assigned to the experimental group and 67 to the control group.

Plugging in a sample size of 67 for the experimental group and 67 for the control group indicates the study would have 80% power at the 0.05 level of significance to detect an effect size of 0.25 (i.e., a difference of 75% versus 53% between the experimental and control groups). Per G Power Analysis, a sample size of 167, then, was justifiable for detecting a small effect size for this study.

Frosch (2003) found significantly lower prostate knowledge scores among those who reviewed a website related to prostate cancer compared to a group that used a traditional decision aid. "Knowledge scores were lowest for those assigned to public Web sites (mean [SD] score, 7.49 [0.19] of questions correct) and highest for the traditional decision aid (8.65 [0.18] of questions correct; *p* = .005) " (Frosch et al., 2008, p. 363). It appears the author misreported the standard deviations because these results would reflect an effect size of *d* = 6.27. According to Cohen (1988), small, medium, and large effect sizes for a two-sample *t* test are *d* = 0.2, *d* = 0.5, and *d* = 0.8, respectively. It is likely that Frosch actually reported the standard error of the mean rather than the standard deviation. In that case, the standard errors can be converted to standard deviations by multiplying the standard errors by the square root of the sample size. The square root of 611 is 24.72. If in fact Frosch actually reported standard errors, then the standard deviation would be approximately 0.185 x 24.72 = 4.57. This seems like a more plausible value for the standard deviation. If the standard deviation of the PCK score was 4.57, then the effect size would be (8.65 - 7.49)/4.57 = 1.16/4.57 = 0.25, which would be a small effect size and consistent with what one would expect given a *p* value of 0.005, a sample size of 611, and a difference in means of 8.65 versus 7.49. Based on the Frosch study, it was reasonable to anticipate that this study would also reveal small effect sizes. For that reason, the sample size was determined based on the goal of detecting small effect sizes with 80% power and an alpha level of 0.05.

Instrumentation

Three surveys were used to gather data about prostate knowledge, intent to screen, screening behavior, and basic demographic information. A survey "is a system for collecting information from people to describe, compare, or explain their knowledge, attitudes, and behavior" (Fink, 2006, p. 138). Surveys are considered a practical method for collecting data because they can be effectively and reliably conducted within a relatively short period of time.

The study protocol required that participants complete the PCKQ and demographic survey prior to the web-based intervention. These instruments were developed by Weinrich (2006) and have been tested and used in several studies. Weinrich released the PCKQ and demographic survey for public use for research in 1998 and gave me permission to use it in this study (Appendix B). This survey has been previously tested with African American men (Weinrich, 2004). The survey was content-validated by three subject matter experts (SMEs) and is assumed to reliably measure PCK. The demographic survey contained one question to assess participants' stage of change. The intervention group viewed Website A, CDC Prostate Cancer Screening: A Decision Guide for African Americans. The control group viewed Website B, What You Need To Know About Prostate Cancer. Website A contained a prostate cancer screening decision guide for African Americans developed by the Centers for Disease Control and Prevention (CDC). This booklet covered understanding the prostate, risk factors, symptoms, detection, testing, and the pros and cons of treatment. This decision aid was used by Weinrich et al. and other researchers in similar community-based prostate educational programs and was designed for and tested with African American men.

Website B contained a prostate cancer screening decision guide developed by the National Cancer Institute (NCI–NIH Publication No. 08-1576). This booklet covers topics including understanding the prostate, risk factors, symptoms, detection, diagnosis and staging, treatment options, and testing and research options. In addition, this booklet contained a list of questions to promote discussion and informed decision making with a person's primary care physician, but it was not designed for the culture of African American men. Directly after viewing the web-based prostate screening intervention on Website A or B, the participants completed the PCKQ to measure knowledge change and the IST. These surveys addressed limitations, symptoms, risk factors, side effects from treatment, and screening age guidelines. The PCKQ had 12 questions, answered either true, false, or don't know. The IST had one question and took about 1 minute to answer. The one question on the IST was submitted to participants directly after the web-based intervention. Two weeks after intervention, participants received a final survey question to assess actual screening behavior change.

Because no published studies have used the transtheorical stages of change model in prostate cancer screening interventions, I decided to evaluate stage of change in relation to the dependent variables *PCK*, *intent to screen*, and *screening behavior.* In other studies, the measure *stages of change* has shown high reliability and stability (Morera et al., 1998) and high predictive and construct validity (Crittenden, Manfredi, Warnecke, Cho, & Parsons, 1998).

To assess stage of change, a single question used in colon rectal screenings was added to the demographic survey. In a single-question algorithm, each response option indicates one definite stage, and respondents must classify themselves (Courneya, 1995; Haire-Joshu et al., 1999). Stage of change refers to a participant's readiness to adopt a healthy behavior, such as prostate cancer screening participation (Spencer, Pagell, & Adams, 2005). The stage-of-change question asks participants to select a statement that best describes their current level of interest in prostate cancer screening (DRE or PSA blood test). The response options and corresponding stages were as follows:

1. Precontemplation: I have never had a DRE or PSA and I do not plan to have one.
2. Relapse: I have had at least one DRE or PSA in the past, but I am now off schedule and do not plan to have a DRE or PSA.
3. Contemplation: I have never had a DRE/or PSA, but I plan to have one or I am off schedule after having a prior DRE or PSA but I intend to have one.
4. Action: I have had one DRE or PSA on schedule and I intend to have another as scheduled.
5. Maintenance: I have had at least two DREs /or PSAs on schedule, and I intend to have another in a time frame that will keep me on schedule.

The reliability and validity of the survey were noted in studies that used methods similar to this study. The reported internal consistency (0.77), and the reliability that the knowledge score displayed (0.61) were indications of that finding (Weinrich, 2004). In addition, the finding of content validity was met with agreement by health professionals who specialized in cancer. Finally, the construct validity was calculated through a factor analysis where every item was kept that had a corresponding factor value over 0.35. The final 12 items that remained that clustered on one specific factor showed that the scale was one dimensional.

The IST (Appendix C) contains one yes-no question: “Now that you have reviewed the prostate cancer health information website, will you schedule an appointment for a PSA or DRE prostate cancer screening?” The screening behavior survey (Appendix D) was sent to participants 2 weeks after they reviewed the prostate health information website. It contained one yes-no question: “Two weeks have passed since you reviewed the prostate health information website. Have you scheduled or had a PSA or DRE screening?” Reliability and validity are psychometric properties of instruments designed to measure psycho-social-behavioral constructs. The two yes/no questions on my survey (Appendices C and D) were factual questions and, therefore, reliability and validity did not apply. In addition, reliability and validity did not apply to demographic questions because those were factual also.

The demographic survey (Appendix E) is an eight-item survey that asks participants about age, gender, ethnicity, education, income, and insurance status. It took about 2 minutes to complete. These questions were used to provide descriptive statistics about the participant pool and to screen participants who do not meet the three study criteria: African American descent, age 40-65 years, and no diagnosis of prostate cancer.

Internal validity is defined as how confidently one can conclude that the change in the dependent variable was produced solely by the independent variable and not extraneous ones (Campbell & Stanley, 1966). There are eight empirically identified conditions that can threaten confidence in a study: history, maturation, testing, instrumentation, statistical regression, selection, experimental mortality, and selection interaction. The two most likely threats to internal validity in the study were selection and testing. A selection threat suggests that participants may not be functionally equivalent at time of testing. Efforts to mitigate this threat were made by achieving a sample size that was sufficient for the study and statistical techniques used. A testing threat entails testing participants at different times or under different circumstances. I tested all participants within a short time frame, which reduced the number of extraneous factors that could potentially influence responses.

External validity is defined as the extent to which results can be generalized. Studies that employ randomization to select participants have more external validity than those that do not. This study used convenience sampling, which can weaken external validity. This was used because random sampling of the entire population is not possible. Although the convenience samples were separated into two groups, some weakening of external validity could have occurred, and results may not reflect attitudes of the larger population.

Data Collection

Participants were sent an e-mail reminding them of the purpose of the study and informing them of their ID number. The email discussed voluntary participation and withdrawal along with providing an opportunity to acknowledge their interest in participation. This message instructed them to enter their ID when they took the online survey. At the end of the message was a hyperlink that directed them to the survey site. The first page of the survey was an informed consent form, at the bottom of which was a button that said, “By clicking here, you are providing informed consent.” Approximately 14 days after the first follow-up data were collected, a second e-mail asked if they had had a PSA screening or if they had scheduled one.

After I completed baseline data collection, I downloaded the data from the Zoomerang.com website into an Excel spreadsheet and organized it by group. When the second follow-up data collection was completed, those data were downloaded from the Zoomerang.com website into a second Excel spreadsheet. Using Microsoft Access, I merged the spreadsheets, then exported back into an Excel spreadsheet. In this way, each participant was represented as one row in the spreadsheet, with corresponding demographic data, baseline knowledge data, and follow-up data displayed in columns. When the final follow-up data were collected, an additional column was added to the Excel data file. Finally, the Excel file was imported into PASW software for analysis.

Data Analysis

All statistical analyses were performed with PASW 18.0 (formerly SPSS) for Windows and EpiInfo 7. All analyses were two-sided with a 5% alpha level. Demographic characteristics of the study sample were described using the mean, standard deviation, range for continuous scaled variables, and frequency and percent for categorical scaled variables.

Although participants were assigned to either the experimental or control group, there were differences between the two groups with respect to age, education level, income, and insurance status. To determine if group assignments produced similar groups, each variable was statistically compared between the two groups. If statistically significant differences were found, those variables were controlled for in the analysis. If the age and income distributions were roughly normal, two-sample *t* tests were used to compare the average age and average income between the two groups. Otherwise, age and income were subjected to Mann-Whitney tests. Chi-square tests were used to compare education distribution and insurance status between the two groups.

Operationalizing Dependent and Independent Variables

Data analysis for the study was based on one independent variable (*treatment group*) and three dependent variables (*PCK, intent to screen*, and *screening behavior*). These variables and the techniques that were used to analyze them are described below.

Independent Variable

Treatment group (TG) was measured on a categorical scale with two categories: 0 = *control group*, and 1 = *experimental group*. The experimental group viewed Website A, and the control group viewed Website B.

The following describes the measurements:

1. Age was measured in years on a continuous measurement scale.
2. Education level was measured on a categorical measurement scale. A participant's education level was recorded as 0 = *no high school diploma or GED*; 1 = *high school or GED*; 2 = *some college*; 3 = *associate's degree*; 4 = *bachelor's degree*; 5 = *master's degree*; or 6 = *doctorate degree*.
3. Income was measured on a continuous measurement scale in U.S. dollars.
4. Insurance status was measured on a categorical measurement scale with two categories: 0 = *no insurance*, or 1 = *some insurance*.
5. Stage of change was measured on a categorical measurement scale with two categories: (a) 0 = *I have never had a DRE or PSA, and I do not plan to have one*, or *I have had at least one DRE or PSA in the past, but I am now off*

schedule and do not plan to have a DRE and/or PSA and (b) 1 = *I have never had a DRE or PSA, but I plan to have one*, or *I am off schedule after having a prior DRE or PSA, but I intend to have one*, or *I have had one DRE or PSA on schedule, and I intend to have another as scheduled*, or *I have had at least 2 DREs and/or PSAs on schedule. I intend to have another in a time frame that will keep me on schedule.*

Dependent Variables

Prostate cancer knowledge (PCK) was measured on a continuous scale with a range of 0-100. Participants completed the PCKQ before and after the intervention. The PCK score was derived by calculating the percentage of Questions 1-12 from the survey that were answered correctly. "Don't know" responses were treated as incorrect answers. Smaller scores indicate less knowledge of prostate cancer and larger scores indicate more knowledge. The difference between the post-intervention knowledge score and the pre-intervention knowledge score (change in PCKQ) was the first dependent variable.

Intent to screen (IS) was measured on a categorical scale with two categories. After reviewing the website, participants were asked if they intended to have a PSA screening test. This variable was derived from Question 1 on the IST. Intent to screen status was recorded as 0 = *no intent to have a PSA screening test*, or 1 = *yes, intend to have a test*.

Screening behavior (SB) was measured on a categorical scale with two categories. Approximately 14 days after the intervention, participants were asked if they had had a PSA screening test or had scheduled a screening. This variable was derived from

Question 1 on the SB survey. Screening behavior was recorded as 0 = *no* if no screening and one not scheduled one, or 1 = *yes* if screened or had scheduled a test.

Hypothesis Testing

Research Question 1: Do intervention groups experience a greater increase in prostate cancer knowledge (PCK) than those not exposed to the intervention?

> H_{10}: There is no difference in the PCK change score between the experimental and control groups.
>
> H_{1a}: There is a difference in the PCK change score between the experimental and control groups.

Hypothesis 1 was tested using a two-sample *t* test to compare the mean change (from pre- to postintervention) in PCK scores between the experimental and control groups. The change score was calculated by subtracting the pretest score from the posttest score, separately for each participant. When the *p* value resulting from the *t* test was less than 0.05, the null hypothesis was rejected, and it was concluded that the experimental intervention had a different effect on PCK than did the control intervention. The size and direction of the difference between the two groups was demonstrated by reporting the average change in PCK scores separately for the experimental and control groups.

When there were statistically significant differences between the experimental and control groups with respect to age, education level, income, insurance status, or stage of change, then analysis of covariance (ANCOVA) was used instead of a two-sample *t* test to control for those variables. When the average change in the PCK score was significantly different between the two groups after controlling for the covariate(s), the null hypothesis was rejected, and it was concluded that the experimental intervention had a different effect on PCK than did the control intervention. The size and direction of the differences between the two groups was demonstrated by reporting the adjusted mean postintervention PCK score separately for the experimental and control groups. The adjusted means indicate the expected average PCK score, assuming the two groups were equal with respect to the covariates.

Research Question 2: Do participants in the intervention group have a higher intent to screen (IS) score than those not exposed to the intervention?

> H_{20}: There is no difference in IS scores between the experimental and control groups.
>
> H_{2a}: There is a difference in IS scores between the experimental and control groups.

Hypothesis 2 was tested using a chi-square test. When the chi-square test was statistically significant, the null hypothesis was rejected, and it was concluded that the percentage of participants who intend to screen was different for the experimental and control groups. The size of the difference between the two groups was demonstrated by reporting the number and percentage of participants who intend to screen separately for each group. When there were statistically significant differences between the experimental and control groups with respect to age, education level, income, or insurance status, those variables was controlled for using multiple linear regression analysis. The dependent variable was *intent to screen*, the independent variable was the *group (experimental or control)*, and the covariates were whichever demographic variables were different between the two groups. When multiple linear regression analysis was warranted, the odds ratio for group was the primary focus. When the odds ratio for group was statistically significant, the odds ratio and 95% confidence interval for the odds ratio were reported and interpreted.

Research Question 3**:** Are participants in the intervention group more likely to schedule a PSA screening test than those in the comparison group?

> H_{30}: There is no difference in scheduling or undergoing a PSA screening test between the experimental and control groups.
>
> H_{3a}: There is a difference in the odds of scheduling a PSA screening test between the experimental and control groups.

Research Question 4: Are participants in the intervention group more likely to have a PSA screening test than those in the control group?

> $H_{40:}$ There is no difference in the odds of having a PSA screening test between the experimental and control groups.
>
> $H_{4a:}$ There is a difference in the odds of having a PSA screening test between the experimental and control groups.

Hypotheses 3 and 4 were tested using a chi-square test. When the chi-square test was statistically significant, the null hypothesis was rejected, and it was concluded that the percentage of participants who either had PSA screening or scheduled one was different for the experimental and control groups. The size of the differences between the two groups was demonstrated by reporting the number and percentage of participants who were screened or scheduled a screening separately for each group. When there were statistically significant differences between the experimental and control groups with respect to age, education level, income, insurance status, or stage of change, those variables were controlled for using multiple linear regression analysis. The dependent variable was *knowledge change scores*, the independent variable was *group* (experimental or control) and *appointment*. The coefficients for intervention group (experimental or control) and appointment were the primary focus. When the coefficients were statistically significant, then the effect of independent variables was said to be significant.

Data Storage

Collection of personal information was limited to information deemed essential for the study. All responses were stored in a secure server file at my office and with the data collection vendor. The data-collection firm signed a confidentiality agreement, and only my Walden advisor and I have access to the data. Data will be kept for 5 years after completion of the study and will then be destroyed.

Protection of Human Subjects

This study was conducted in accordance with Walden University's Institutional Review Board (IRB) research protocols, recognizing that students acting as researchers are held accountable for their ethics. One stipulation is that researchers must obtain informed consent from all participants (Gall, Borg, & Gall, 2002). Elements of informed consent include notifying participants of who will conduct the study and the time commitment. Informed consent also means the study has been explained in easily understandable language, participants have been informed that their involvement is voluntary and that they can withdraw at any, and limits of confidentiality have been explained. Informed consent also requires that steps are taken to ensure that participants emerge from the research unharmed (Rudestam & Newton, 2001).

This proposal was given approval number 02-10-11-0061692 by the Walden University IRB. Following approval, I made initial contact with potential participants via e-mail, including a description of the study's purpose and scope, criteria for inclusion, and informed consent. Participants were assured they would not be identified by name in the presentation or dissemination of the findings and that all results would be reported as group data with no identifying individual information.

Summary

In Chapter 3, I described the method used for analyzing the data for the four research questions. Data analysis was based on one independent variable *(treatment group*) and three dependent variables (*prostate cancer knowledge, intent to screen,* and *screening behavior*). Hypotheses were tested using two-sample *t* tests, chi-square tests, ANCOVA, and multiple linear regression analysis. The results, data analysis, and interpretation comprise Chapter 4, and Chapter 5 will include a robust discussion of key findings and recommendations for future research.

Chapter 4: Results

The purpose of this quantitative study was to investigate whether a web-based decision aid would increase the intention and follow through of African American males to seek prostate cancer screening. The chapter includes a description of the demographics of the participants, descriptive statistics of variables used in the study, and the results of the two-samples *t* test used to determine whether there was a significant difference between the PCK scores of preintervention and postintervention with the control and experimental groups. The results of the chi-square analysis were also used to answer whether the intervention affected the experimental group.

A total of 128 men participated in the study. The control group had 48 participants, and the intervention group had 80. Participants were randomly assigned either to the experimental or control group. A unique identification number was assigned for each name, and Excel's *rand()* function was used to insert a random number in each row of the spreadsheet. Participants were sorted randomly, and the first 75 rows were assigned to the experimental group, and the rest to the control group. However, random assignment failed for an unknown reason. The data showed that the number of cases assigned to the conditions was not similar and that characteristics differed significantly between the groups. Dropout rates remained the same for the experimental and control groups, so significance testing could be performed without concern for confounding. Fair tests of differences in outcome variables would require complete adjustment for differences between groups. Consequently, the hypothesis tests were not definitive. Furthermore, the number of cases available for testing two of the outcomes (appointment scheduling and intent to screen) was small, reducing the power of the tests. Per G Power Analysis, a sample size of 67 in the experimental group and 67 in the control group would have 80% power at the 0.05 level of significance to detect an effect size of 0.25 (i.e., a difference of 75% versus 53% between the experimental and control groups; see Appendix F). I had collected data for 9 months and exhausted the entire database and all appropriate contacts resulting in 128 participants. Moreover, the number of 14-day follow-up respondents was very low. The closest to a fair test of the hypotheses were the multiple linear regressions that were run using *knowledge change score* as the dependent variable and *appointment and intervention group* as the independent variables. I have determined that the randomization failure was due to my error while using the Excel's *rand()* function. After re-examination of the data set, it appears that I sorted on the wrong column. I should have sorted on column A which contained the database email addresses verses column B which contained the *rand()* number. To prevent this error in the future, it is better to sort using the Excel Advanced Filter function.

The following research questions and hypotheses were postulated to guide this study:

Research Question 1: Do intervention groups experience a greater increase in prostate cancer knowledge (PCK) than those not exposed to the intervention?

H_{10}: There is no difference in the PCK change score between the experimental and control groups.

H_{1a}: There is a difference in the PCK change score between the experimental and control groups.

Research Question 2: Do participants in the intervention group have a higher intent to screen (IS) score than those not exposed to the intervention?

H_{20}: There is no difference in IS scores between the experimental and control groups.

H_{2a}: There is a difference in IS scores between the experimental and control groups.

Research Question 3: Are participants in the intervention group more likely to schedule a PSA screening test than those in the comparison group?

H_{30}: There is no difference in scheduling a PSA screening test between the experimental and control groups.

H_{3a}: There is a difference in scheduling a PSA screening test between the experimental and control groups.

Research Question 4: Are participants in the intervention group more likely to have a PSA screening test than those in the comparison group?

$H_{40:}$ There is no difference in the odds of having a PSA screening test between the intervention and control groups.

$H_{4a:}$ There is a difference in the odds of having a PSA screening test between the intervention and control groups.

Descriptive Frequency of the Study Variables

Table 1 shows the demographic attributes of the participants. It was found that more held college degrees than is found in the general population of the demographic or in the United States as a whole (Schott Foundation,2008), suggesting that the participants randomly selected by Niche Marketing were atypical of their ethnic group, gender, and nationality. In fact, the reported annual salaries of nearly one third ranged from $50,000 to $100,000, which is much higher than average for the United States. Since 96.9% of them are undiagnosed with prostate cancer, that condition may have accounted for 61% stating they had scheduled an appointment for PSA or DRE prostate cancer screening after the study ended. Most participants have some insurance (92.2%), although few were eligible for Medicare. Again, this is not representative of Americans in general. Over 90% expressed an interest in prostate cancer screening, but most had not scheduled the screening. Too few responded to the follow-up survey to determine if they had scheduled and followed through with the intention to be screened.

Table 1

Descriptive Frequency Analysis of Participants' Demographics

		Frequency	Percent
	CDC—Experimental--Website A	80	62.5
	NIH—Control--Website B	48	37.5
Education	No HS diploma	7	5.5
	High school	12	9.4
	Some college	36	28.1
	Bachelor's degree	27	21.1
	Master's degree	46	35.9
Age	40 and below	15	11.9
	41 – 45	23	17.9
	46 – 50	32	24.9
	51 – 55	29	22.6
	56 – 60	12	9.4
	61 – 65	17	13.4
Income	$49,999 and less	33	26.4
	50,000 to 99,999	39	31.2
	100,000 to 149,999	27	21.7
	150,000 to 199,999	11	8.8
	200,000 to 249,999	8	6.4
	250,000 to 299,999	5	5.0
	300,000 and up	1	0.8
	Total	124	100.0
Appointment	Yes	78	60.9
	No	50	39.1
DX	Yes	4	3.1
	No	124	96.9
Insurance	None	9	7.0
	Some	118	92.2
	Missing	1	0.8
Interest	None	11	8.6
	Some	117	91.4
Scheduled in 2 weeks	Yes	23	37.7
	No	38	62.3
	Total	61	100.0

Note. The number of responses totaled 128 (100%) except as shown.

Data Analysis

An analysis of variance determined whether there was a significant difference in the postintervention PCK scores between the experimental and control groups while controlling for preintervention PCK scores. Based on the results shown in Table 2, it can be seen that there is no significant difference between experimental and control groups with respect to the age, education level, income, insurance status, and stage of change. Therefore, a two-samples *t* test was conducted to check if there was a significant difference between the average change (from pre- to postintervention) in PCK scores between the experimental and control groups. Based on the results shown in Table 3, there was a significant change in those scores (*p* value = .001) who underwent the intervention. Table 4 shows that Website A (intervention group) had a statistically higher mean score difference (*M* = 2.4222) than that of Website B (control group; *M* = .163). This also means that the participants who underwent the intervention learned more about prostate cancer. Thus, the alternate hypothesis was tentatively accepted, pending an examination of the possible effects of covariates.

Table 2

Analysis of Variance Between Groups and Demographics

	Df	*F*	*Sig.*
Age	5	.862	.508
Income	6	.233	.965
Education	4	1.573	.185
Insurance	2	.346	.708
Appointment	1	2.146	.145

Table 3

Two-Sample t *Test Group Statistics Results*

	Intervention group	*N*	Mean	Std. deviation	Std. error mean
Differences in scores	CDC	80	2.4222	3.66268	.38608
	NIH	48	.1633	3.95994	.56571

Table 4

Two Samples t *Test Between Changes in PCK Scores*

		Levene's test for equality of variances		*t* test for equality of means				
		F	*Sig.*	*T*	*df*	Sig. (2-tailed)	Mean difference	Std. Error Difference
Differences in scores	Equal variances assumed	.127	.722	3.375	137	.001	2.25896	.66922
	Equal variances not assumed			3.298	92.325	.001	2.25896	.68489

In addition to the ANOVA, I conducted a series of interaction tests to examine the relationship of the demographic variables to the intervention group. Based on the results shown in Table 5, all variables have a significant relationship to the intervention (*education* = .017, *age* = .001, *income* = .007, *appointment* = .001, and *insurance* = .002). This means that the PCK scores had significant effects based on the intervention group and with respect to the demographics of participants. The interaction test between the covariates and intervention group showed the demographic variables to be significant and that they affected the mean scores of PCK.

Table 5

Interaction Test Between Intervention Groups, Demographics, and Difference of Scores

Source	*Df*	Mean squares	*F*	Sig.
Intervention group * education	2	63.018	4.187	.017
Intervention group * age	2	109.180	7.611	.001
Intervention group * income	2	76.764	5.173	.007
Intervention group * appointment	2	113.373	7.939	.001
Intervention group * insurance	2	97.137	6.686	.002

I conducted a chi-square goodness of fit to test whether there was a significant difference in the intent to screen between the experimental and control groups. After the participants had reviewed the prostate cancer health information website, they were asked if they would be scheduling an appointment for a PSA or DRE prostate cancer screening.

The results shown in Table 6 indicate no significant difference between the intent to screen of those in the experimental group and those who are in the control group (Pearson's Chi-square *p* value = .229*)*. This means that the results of the intention of a participant do not vary based on their intervention group. In this case, the experimental group's intention to screen for prostate cancer does not vary even though participants have more knowledge about prostate cancer than those in the control group. Table 7 shows that the intervention group with respect to the intention to screen for prostate cancer had a significant effect on the difference of PCK scores (*p* value = .020). This means that their perspectives on PSA screening for prostate cancer changed based on the information they obtained through this study. However, based on Table 8, there are no significant differences found in the demographic variables with respect to the intention to screen. This means that the demographic variables cannot predict the intention of a participant to screen for PSA.

Table 6

Chi-Square Goodness of Fit (Intent To Screen)

	Value	*Df*	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	1.445[a]	1	.229		
Continuity correction [b]	.331	1	.565		
Likelihood ratio	2.346	1	.126		
Fisher's exact test				.550	.311
Linear-by-linear association	1.433	1	.231		

N of valid cases 122.
Note. [a] 2 cells (50.0%) have expected count less than 5. The minimum expected count is .96. [b] Computed only for a 2x2 table.

Table 7

Interaction Test Between Intervention Groups, Demographics, and Intent to Screen

Source	*Df*	Mean Square	*F*	*Sig.*
Corrected model	2	28.129	4.069	.020
Intercept	1	70.539	10.204	.002
Intervention group * intention	2	28.129	4.069	.020

Table 8

Results of Logistic Regression (Intent To Screen)

	B	*S.E.*	*Wald*	*df*	*Sig.*
Education	-8.908E-02	.159	.312	1	.576
Age	.041	.155	.069	1	.793
Income	-8.370E-02	.182	.211	1	.646
Appointment	-4.944E-01	.508	.949	1	.330
Insurance	-1.459E-01	1.015	.021	1	.886
Intention	-2.063E+01	28292.943	5.319E-07	1	.999
Constant	21.049	28292.943	5.535E-07	1	.999

To test whether there was a significant difference in scheduling a PSA screening test between the experimental and control group, I conducted another chi-square goodness of fit. Fourteen days after the participants had taken the PCK survey, they completed a screening behavior survey about their scheduling an appointment for PSA or DRE screening. Based on the results shown in Table 9, it can be seen that there are no significant difference in scheduling or undergoing a PSA screening test between the experimental and control groups (Pearson's Chi-square = .298). This means that the perceptions of a participant scheduling a PSA appointment did not change even after he had more knowledge about prostate cancer through reviewing the prostate health information website. Based on the results shown in Table 10, it can be observed that there are no significant effects on the decision of the participants to schedule (*p* value = .439) an appointment for PSA. This means that the participants' decision to schedule for a PSA appointment does not depend on the intervention group, and it does not affect the differences in their scores in the PCK survey. In addition to this, the logistic regression

(Table 11) showed that there are also no significant differences found in the demographic variables with respect to the screening behavior of the participants. This means that none of the demographic variables predicted the decision to schedule for a PSA appointment.

Table 9

Chi-Square Goodness of Fit (Making an Appointment)

	Value	*Df*	*Asymp. Sig. (2-sided)*	*Exact Sig. (2-sided)*	*Exact Sig. (1-sided)*
Pearson's Chi-square	1.082[a]	1	.298		
Continuity correction [b]	.530	1	.467		
Likelihood ratio	1.060	1	.303		
Fisher's exact test				.357	.232
Linear-by-linear association	1.065	1	.302		
N of valid cases	63				

Note. a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 5.33.

b. Computed only for a 2x2 table.

Table 10

Interaction Test Between Intervention Groups, Demographics, and Screening Behavior

Source	*Df*	*Mean Square*	*F*	*Sig.*
Corrected model	2	6.002	.835	.439
Intercept	1	33.014	4.593	.036
Intervention group schedules 2 weeks	2	6.002	.835	.439

Table 11

Results for Logistic Regression (Screening Behavior)

	B	*S.E.*	*Wald*	*df*	*Sig.*
Education	-.545	.316	2.963	1	.085
Age	-.385	.304	1.601	1	.206
Income	.632	.324	3.796	1	.051
Appointment	-.848	.847	1.002	1	.317
Insurance	-.003	2.552	.000	1	.999
Scheduled 2 weeks	-.484	.697	.481	1	.488
Constant	1.915	3.544	.292	1	.589

A multiple linear regression was conducted to assess if intervention group and appointment predicts the knowledge change scores. The results of the multiple linear regression were significant, *F* (2, 115) = 5.32, *p* = .006, suggesting that intervention group and appointment accounts for 8% of the variance in knowledge change scores. Further exploration revealed that intervention group was a significant predictor of knowledge change scores, *B* = -1.13, *p* = .023, suggesting that participants in the intervention group had knowledge change scores that were 1.13 points less than the nonintervention group. The appointment also significantly predicted knowledge change scores, *B* = 1.05, *p* = .031, suggesting that those who had appointments had knowledge change scores increased by 1.05 points. Results of the multiple linear regression are presented in Table 12.

Table 12

Multiple Regression With Intervention Group and Appointment Predicting Knowledge Change Score

Source	*B*	*SE*	*F*	*p*
Intervention group	-1.13	0.50	5.32	.023
Appointment	1.05	0.48	4.76	.031

A multiple linear regression was also conducted to assess if intervention group, appointment, and the interaction predicts the knowledge change scores. The results of the multiple linear were significant, *F* (3, 114) = 3.83, *p* = .012, suggesting that intervention group and appointment accounts for (R^2) 9% of the variance in knowledge change scores. Further exploration revealed that intervention group was a significant predictor of knowledge change scores, *B* = -1.50, *p* = .019, suggesting that participants in the intervention group had knowledge change scores that were 1.50 points less than the nonintervention group. Results of the multiple linear regression are presented in Table 13.

Table 13

Multiple Regression With Intervention Group, Appointment, and the Interaction Predicting Knowledge Change Score

Source	*B*	*SE*	*F*	*p*
Intervention group	-1.50	0.63	5.66	.019
Appointment	-0.22	1.45	0.03	.879
Intervention * Appointment	0.94	1.01	0.87	.354

Summary

In this chapter, I discussed whether there was a significant difference between the experimental and control group based on the PCK scores, intent to screen, and screening behavior. The study aimed to determine whether there is a significant difference between the behavior of the participants in the experimental and control group. In order to determine this, analysis of covariance and a series of chi-square goodness-of-fit analysis were conducted.

The first ANOVA determined that there is no significant difference in the PCK scores between the experimental and control group while controlling the preintervention PCK scores and the demographics of the participants. However, based on the succeeding analysis, it was shown that there is an evident change in the scores of the participants based on the intervention they went through. The CDC group, which is the experimental group, has higher mean scores than the control group. This means that there is an increase in the PCK of the participants who underwent the intervention than the participants in the control group. There were also positive interactions between the demographic variables and the intervention group. This means that the demographic variables are statistically significant to know the effect of the intervention in the current study. This also means that based on the difference of the scores yielded in the study there are significant differences in the scores of the experimental group. Thus, the alternate hypothesis cannot be accepted because the mean difference in outcome knowledge might have been caused by uncontrolled differences in subject differences between the groups.

Moreover, for Hypothesis 2, I conducted a chi-square goodness of fit analysis to investigate the difference in the intent to screen between the experimental and control groups. It was determined that there is no significant difference between participants' attitudes with regard to screening for prostate cancer. This means that the participants' intention to take a screening test for prostate cancer does not vary based on the intervention taken during the study. An interaction test was conducted to examine the intervention on whether there is an effect to the intention of the participants to be screened for prostate cancer. It yielded a positive result, which means that the variables presented in the study had a significant effect on the intention to be screened. Furthermore, logistic regression indicated these variables cannot predict their participants' decision with regard to screening. This indicates that the null hypothesis might be accepted. However, the number of cases available was small, and covariates could not be controlled, so this null result might have been an artifact of low power.

For the third hypothesis, I conducted another chi-square goodness-of-fit analysis to determine if there were any differences in decisions of participants to schedule an appointment in PSA based on knowledge gained through reviewing information about prostate cancer. There was no significant difference in the scores, meaning that even though they had gained more information about prostate cancer and how it can be prevented, it did not encourage them to schedule a PSA appointment. Another interaction test was conducted to examine the effect of the demographic variables to the decision of the participants to schedule for an appointment. There was no significant interaction between the variables, which means that they did not predict the decision to schedule a

PSA appointment. Again, the number of cases available was small, and covariates could not be controlled, so this null result might have been an artifact of low power.

The fairest test of the intervention group's impact on the participants' knowledge score was the final statistical analysis, the multiple linear regression. The findings indicated that the intervention group had a significantly lower knowledge change score than the nonintervention group. In Chapter 5, I will draw conclusions from these results and offer recommendations for further research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to test whether a web-based prostate health decision aid could effectively increase prostate cancer screening and informed decision making among African American men 40 years and older who have not been diagnosed with prostate cancer. I used two samples *t* test, chi-square analysis, analyses of variance, and linear regression to examine the data for both control and experimental groups. From the results presented in Chapter 4, I determined some implications of the findings about the effectiveness of the methods used to inform African American males about prostate cancer screening. Lack of follow-through responses from participants precluded learning whether they scheduled and followed through with decisions to seek or not seek screening

Discussion

Every decade, the risk for American men having prostate cancer increases, and the disease is now the second-leading cause of cancer deaths in the United States among men older than 50 years (Volk et al., 2007). As a result, studies of whether PSA is an accurate predictor of cancer have been of particular interest in medical research. While studies have found that although medical science has greatly improved prostate cancer detection and survival rates, there is a continuing need for health education and awareness to increase early detection rates and improve overall survival (Chan et al., 2003; Jones, 2007; Woods, 2006). The study of Schapira and Van Ruiswyk (2000), who found that prostate cancer is a slow-progressing disease that can remain clinically dormant through much of a patient’s lifetime, suggests that early detection among males and improved health education may help to reduce the number of men who die from prostate cancer.

Frosch et al., (2003) stated that there are no differences found in the participants' likelihood of scheduling a prostate cancer screening exam. However, based on that same study, it was found that an educational video about the risks and benefits of prostate cancer screening was more effective than Internet-based information. The participants in this study showed greater increase in the PSA knowledge but were more likely to decline the PSA test than those in the Internet group. Another study showed that intervention, no matter which method, helps in increasing cancer knowledge (Ellison et al., 2008). Most studies show that educational attainment, geographic location, age, and health behavior have a greater effect on whether a person seeks information about and acts on recommendations of health professionals (Partin, 2004; Volk, 2003; Wilt, 2001).

Although the chi-square goodness-of-fit yielded no significant difference with the intervention group, the result is important in proving that intention for PSA screening is not related to the means participants used to learn about prostate cancer screening. The results of the analysis showed that the participants' mean scores were not significantly different from the groups with respect to their intention to screen for PSA. The result further supported the findings of Jones (2007), who argued that reliability of the tests is a factor that hinders the use of PSA and DRE. Regardless of the provision of information that details the benefits of early detection tests for prostate cancer, there is no assurance that African American males will opt for either PSA or DRE screening.

I also took into account the screening behavior of the participants after the pre- and postsurvey questionnaires. According to the analysis, there are also no significant differences in the mean scores of the participants and intervention group with respect to their screening behavior. The decision to schedule for a PSA appointment did not vary based on the intervention groups. When considering interaction between the groups, intention to screen, and screening behavior, it was evident that the variables did not predict the decision or intention of the participants to screen or to schedule a PSA appointment. This means that even though participants found both benefits and risks from screening, it is likely that other concerns led them not to undergo PSA screening.

The final analysis was a multiple linear regression where the dependent variable was *knowledge change score* and the independent variables were the *intervention group* and *appointment.* In the second regression, an interaction term between the two independent variables. The regressions were both statistically significant with *F* score *p* values of 0.006 and 0.012 respectively. In addition, the findings were consistent in that the knowledge change scores of the intervention group were less than for the nonintervention group. This indicates that the intervention group did worse on the knowledge change scores than did the nonintervention group.

There were several desired outcomes of this study: (a) increased awareness of prostate cancer prevalence, morbidity, and mortality among African American men; (b). increased awareness in African American men regarding the etiology and risk of prostate cancer as well as screening and treatment options; and (c) increased rates of prostate cancer screenings among African American men. While the results contributed to understanding whether increasing awareness of prostate cancer prevalence, morbidity, and mortality affected intention and behavior in terms of scheduling PSA or DRE screening, the results were not empirically robust enough for any conclusions. The only significant finding was a lower knowledge change score for the experimental group than for the control group. The number of cases in the experimental and control groups was dissimilar, and characteristics between the groups also differed significantly. This required an adjustment for the reported differences between the two groups; however, I did not make that adjustment for this study. Thus, the conclusions are only valid with the assumption that there was no significant difference between the characteristics of the participants in the two groups. Further, samples of the study are relatively small to generate a good power of the test for two of the outcomes (appointment scheduling and intent to screen).

Implications for Social Change

Because of the number of advanced prostate cancer cases and subsequent deaths of African American men that is disproportionate to their numbers in the population, I hoped the findings might lead to more effective ways to reach and inform this population with health information and treatment options. Although the results were not definitive, the failure of many participants to either make or follow through with a medical appointment or complete the activities of the study points up the need for additional research in ways to reach this population. Because the population is both vulnerable and relatively uninformed—maybe by choice—there is a great need to learn methods that will lead them to make good choices about their health care. Early detection as a result of a program that convinces them of the wisdom of seeking screening should save more lives, and the lives of these men and their families should provide positive social change not only for the population they are a part of but to the medical community.

Some publications regarding the controversy of PSA and DRE screenings have recommended delaying screenings since prostate cancer is slow growing and occurs late in life. Typically, men who develop prostate cancer die of other diseases; however, this is not the case for African Americans, who have a strong genetic predisposition to prostate cancer. Nonetheless, because they are typically diagnosed later, upon discovery, the disease is more advanced. Because there is no consensus in the medical community about the wisdom of screening, at what age, and what method to use, too few men may be encouraged to be proactive about their health. In fact, the AUA, AMA, and other medical associations do not have congruent recommendations regarding screening for males. Thus, without medical screening consensus and the continued proliferation of prostate cancer morbidity and mortality with African American males, the social change of increased quality and length of life will likely not be realized.

Limitations of the Study

The study is not generalizable to all African Americans in the United States. Although 180 participants were identified and began the activities, many failed to complete the activities, leaving only 80 participants for the CDC group and 48 for the NIH group. Analysis was also only of the relationships of the known variables based from the perceptions of the 128 in the sample population.

The second limitation is that the results of the analyses were not adjusted for group differences. Although the number of cases in each group was unequal, it was assumed that there was no significant difference between the characteristics of the participants in the two groups. Another limitation is that the sample size was small. Moreover, no participants in the study have been diagnosed with prostate cancer. The patients who have diagnosis of prostate cancer and those who have not may have differences in their perceptions. Most of the data collected was also self-reported and could only be used to gauge individual perceptions. The results were not robust and cannot be used to create programs that target a larger population.

Recommendations for Action

While the number of participants in this survey was adequate for data analysis, more participants would likely have yielded results that were more conclusive. As such, the conclusions in this study are applicable only to the narrow population that participants represented. Also, since most research has focused on European Americans, more research studies that look at reasons for the reluctance of African American males to schedule a PSA screening could be valuable for reaching this population.

The limited sample size might also be a reason there were no definitive conclusions regarding the relationships and interactions among the variables in both the control and intervention groups. Although the results of the analysis support the idea that the intervention was effective, the scores were too low to be statistically significant. Because of this, there is no way to attribute changes in knowledge or behavior to the method of access or the kind of information participants read. This may not be the case in a study that includes more data across a broader population. Future researchers who want to conduct a study on the same topic would be advised to use a larger number of participants from a broader demographic.

Another element that may have affected the behavior of participants—following through or failure to follow through with the intention to make a medical appointment for screening—was that the population identified by the database was not a cross section. Rather, it was business owners, a population that typically has more immediate responsibilities because of having to operate a company, and who might be less inclined to take the time to participate fully by carrying out the activities of the research. Indeed, many may have agreed and intended to comply with the requests for follow-up but discontinued the activities because of lack of time, loss of interest, or pressing business reasons. Because the participants discontinued their research activities, and they had been assured that they could do so without giving a reason and at any time, their reasons for quitting were not known.

One possible reason is that business owners, it may be inferred, have either health insurance or the financial resources to pay for the care they might need. This demographic would also be far more likely to have a private physician and would have been informed by him or her about prostate cancer, its warning signs, and the protocol to follow to know about their own health condition. As a result, they should have more and better information, either from their doctors or through reading, other kinds of support not usually available to those in the general population beneath their

The effect on the information and the way it was presented on increased knowledge, although statistically significant, was very weak. Ironically, those in the intervention group actually demonstrated a decrease in knowledge. Therefore, the intervention participants' increase in prostate screening knowledge did not account for the variation in knowledge change. It is possible that the educational intervention did not completely align with the PCKQ survey tool used to assess knowledge change. In addition, the use of the internet with African American males may not be the best method to increase their knowledge about prostate screening. More specifically, there has been a myriad of publicity about and many articles over the past 5 years on potentially negative effects of prostate cancer screening. In my opinion publicity about the potential harm of screening or from other conflicting information had has affected even males who had previously had a prostate screening. Because some men that had prior prostate screening knowledge and participated in a screening exam have been dissuaded regarding the benefits of screening, there is a need to better understand the impact that this information has had on African American men and how it might have influenced their decisions to participate in prostate screening exams.

The United States Preventative Services Task Force (USPSTF) has issued draft recommendations that would eliminate early screening by telling health insurance policies to discontinue use of the PSA test. However, three issues that the preventive task force did not address are relevant to primary care clinicians who initiated most PSA screening.

1. Guidelines on office-based decisions about whether to initiate PSA screening require clinicians to discuss the benefits and harms of screening and to accept patients' screening decisions.
2. There is also the issue of variable and often idiosyncratic management of PSA levels in primary care and urology practices. The substantial variability in how clinicians manage serial PSA levels is understandable, since published guidelines are vague and offer little guidance. But the guidelines are vague precisely because the limitations of PSA screening preclude a rational, standardized, evidence-based algorithm that should inform any routine preventive intervention. Thus, physicians are left to decide—with the patient—whether there would be a benefit from screening.
3. The third issue lies at the interface of clinical practice, public health, and responsible stewardship of health care resources. Although the USPSTF explicitly does not consider costs, policymakers cannot ignore economic aspects of screening, and neither can patients whose out-of-pockets may be high or whose health insurance coverage is inadequate (Brett & Ablin, 2011).

There is a need to reexamine the behaviors of African American males regarding scheduling of PSA screening. Although participation in the study generated awareness and the potential intention for PSA screening, the factors hindering the positive behaviors of the population to seek or schedule for PSA screening were not revealed. The unresolved issues of USPSTF therefore can be used by future researchers as variables to determine its contribution to the overall negative behaviors associated with seeking PSA schedule.

Recommendations for Future Studies

There are several ways future research might be constructed to learn more about the reasons African American men are not tested for prostate cancer as often as European American men. Because this study included a limited demographic that may or may not have been expected to respond to or participate in study activities in the same way as a broader cross section, it is not known whether variables such as urban or rural population, insured or lacking insurance, family history of prostate cancer, religious beliefs, and the degree of relationship with a private physician or health care clinic might affect participants' decisions to seek or avoid learning about prostate cancer and screening. The results might provide insights into whether these variables are separate from ethnicity or are true across cultures. Similar studies of a Hispanic population might determine whether that culture includes unique factors that influence health care decisions. Through learning more about differing populations through additional studies, information that goes beyond language and is culture-specific might be created and potentially applied to developing outreach programs that could be tailored to different populations.

Although African American men are at greater risk of dying from prostate cancer, whatever might be learned from future studies about the reasons some men choose not to be screened could inform protocols for how to educate men about screening and choice of screening type and how to discuss options with men from different social, educational, income, and ethnic backgrounds. Additional studies could determine whether there are better ways of reaching and informing different populations about prostate cancer with the end of identifying the disease early when there is hope for life-saving treatment. Positive social change would occur as a direct result of reaching all men by means that were sensitive to their unique demographic characteristics and providing them with equal opportunities for lifesaving detection and treatment before the disease reaches an advanced stage and death is imminent. Knowing the most effective means of informing men of all cultures in a way that would prompt them to seek screening remains the challenge.

Conclusions

Providing information regarding prostate cancer could be a means for African American males to learn about the disease and thereby influence a decision to be screened, but pamphlets or Internet sites that provide the information might not be the most effective approach. It is not known if participants lost interest in the study or did not like the access to and format of the information that then were provided. While the intention of the African American males involved in the study was a significant effect of access to information, there are no probable demographic variables associated with their intention to be screened. Contrary to other studies, economic status and educational achievement among African American males were not shown to be significant predictors that affected their intention to pursue PSA screening.

While the results suggested the possible relationships between access to information, gaining knowledge, and intention to screen, they did not prove that these variables prompted participants to schedule an appointment to discuss screening with a health care provider. Although works of Jones (2007) can be used to explain the beliefs about PSA and DRE tests and the reluctance or willingness to be screened, negative behavior as an effect of negative perceptions of these tests remains to be empirically tested. Although the effects may be inferred from the literature, they cannot be deduced from this study.

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Appendix A: Sample-size Calculator--G Power

```
[1] -- Sunday, February 26, 2012 -- 20:12:30

t tests - Means: Wilcoxon-Mann-Whitney test (two groups)
Options:   A.R.E. method
Analysis:  A priori: Compute required sample size
Input:     Tail(s)                      =  Two
           Parent distribution          =  Normal
           Effect size d                =  0.5
           α err prob                   =  0.05
           Power (1-β err prob)         =  0.80
           Allocation ratio N2/N1       =  1
Output:    Noncentrality parameter δ    =  2.8279915
           Critical t                   =  1.9789766
           Df                           =  125.9606
           Sample size group 1          =  67
           Sample size group 2          =  67
           Total sample size            =  134
           Actual power                 =  0.8013372
```

Appendix B: Permission To Use Survey Tool

Hello Dr. Weinrich:

I am a PhD student at Walden University. I am writing you for permission to use your Prostate Cancer Knowledge Questionnaire 12 in my dissertation research. I am looking to research changes in African American male prostate cancer knowledge, behavior change, and screening behavior. I have attached a copy of my proposal abstract for your review. Thank you in advance for your consideration of my request. Kindly respond via email.
Bev

Note: I received your personal email address from Elizabeth (Beth) G. NeSmith, PhD, MSN, RN

Yes, glad for you to use it.
I suggest you add a question about screening for risk for CaP based on length of index finger vs ring finger; recent research; see article *Wall Street Journa*l last week.

Best wishes,

Sally Weinrich

Appendix C: Intent To Screen

1. Now that you have reviewed the prostate cancer health information website, will you schedule an appointment for a PSA or DRE prostate cancer screening?

   A. Yes

   B. No

Appendix D: Screening Behavior

1. Two weeks have passed since you reviewed the prostate health information website. Have you scheduled or had a PSA or DRE screening?

A. Yes

B. No

Appendix E: Demographic Questionnaire and Stages of Change

1. What is your gender?
    1. Male
    2. Female
2. What is your ethnicity?
    1. Asian
    2. African American
    3. European American
    4. Hispanic
    5. Other
3. What is your highest level of formal education?
    1. Less than high school graduate
    2. High school graduate
    3. Some college
    4. 4-year degree
    5. Master's degree or above
4. What is your age?
    1. ___________years
5. What is your approximate annual income?
    1. $___________
6. Have you scheduled an appointment for a PSA or DRE prostate cancer screening?

    1. Yes

    2. No

    Have you ever been diagnosed with or are you currently under evaluation for prostate cancer

    Yes

    No

    What kind of healthcare coverage do you have?

    3. None

    4. Medicare/Medicaid

    5. Veterans' benefits

    6. Employer-sponsored or private insurance

7. Please select the response that best describes your current interest in prostate screening (DRE – digital rectal exam and / or PSA – prostate specific antigen blood test):
    a. I have never had a DRE and/or PSA, and I do not plan to have one.

b. I have had at least one DRE and/or PSA in the past, but I am now off schedule and do not plan to have a DRE and/or PSA.
c. I have never had a DRE and/or PSA, but I plan to have one or I am off schedule after having a prior DRE and/or PSA, but I intend to have one.
d. I have had one DRE and/or PSA on schedule, and I intend to have another as scheduled.
e. I have had at least 2 DREs and/or PSAs on schedule, and I intend to have another at a time that will keep me on schedule.

Appendix F: Prostate Cancer Knowledge Questionnaire

Please answer each of the following sentences with "True (YES)," "False (NO)", or "Don't Know."	**True (YES)**	**False (NO)**	**Don't Know**
1. Men who have several family members (blood relatives) with prostate cancer are more likely to get prostate cancer.			
2. A man can have prostate cancer and have no problems or symptoms.			
3. Younger men are more likely to get prostate cancer than older men.			
4. Frequent pain in your lower back could be a sign of prostate cancer.			
5. Most 80-year-old men do not need a prostate cancer screening.			
6. Some treatments for prostate cancer may make it harder for men to control their urine.			
7. Some treatments for prostate cancer may cause problems with a man's ability to have sex.			
8. Some treatments for prostate cancer may stop a man from ever driving a car again.			
9. Doctors can tell which men may die from prostate cancer and which men will not be harmed by prostate cancer.			
10. An abnormal Prostate Specific Antigen (PSA) blood test means I have cancer for sure.			
11. I can have cancer and have a normal PSA blood test.			
12. Prostate cancer may grow slowly in some men.			

Note. True is the correct answer for questions 1, 2, 4, 5, 6, 7, 11, and 12. False is the correct answer for questions 3, 8, 9, and 10.

Curriculum Vitae

BEVERLY JO LAYTON, MPH

blayton@gmail.com
http://www.linkedin.com/in/bevlayton

Professional Attributes

Experienced, goal-oriented professional with a record of meeting and exceeding established goals related to marketing and sales, training and development, and client relations.

Skilled in building long-term relationships within all levels of an organization. Motivated and ambitious with excellent interpersonal communication, relationship management, and presentation skills.

Employment History

UnitedHealthcare, Milwaukee, Wisconsin. September 2010—present

Senior Health Economic Consultant

Analyze and evaluate national and key account business. Provide financial and clinical advice using Excel and Access company-branded reporting tools. Responsible for the development of annual and semi-annual client PowerPoint presentations. Manage the delivery of key findings based on clinical results and financial risk to capture best ROI. Assist strategic account executives in development of key relationships.

Schering-Plough Pharmaceuticals, Kenilworth, New Jersey. April 2006–November 2008

Senior Customer Marketing Manager

Developed and implemented managed care pull-through and push-through in the Great Lakes Region for all product lines, including development of marketing collaterals to support regional management for sales of branded products such as Vytorin, Zetia, Nasonex, Asmanex, Avelox, Levitra, Pegintron, and new women's health and anesthesia lines. Created relationships with managed care organizations, pharmacy benefits managers, and national account TARGET® around quality and disease-management initiatives. Assisted in the launch and development of quality client integration tools, service agreements, management of field integration, and managed-care pull-through.

Takeda Abbott Pharmaceuticals, North Chicago, Illinois. October 2000–March 2006

(Joint Venture of Abbott Labs and Takeda Pharmaceuticals)

Senior Manager, Managed Markets Marketing and Strategy Created and managed marketing strategy for the integrated health channel supporting the Takeda Abbott Pharmaceutical health system, managers, and executives. This included development of marketing collaterals to support strategies and tactics for Prevacid and Lupron. Managed new product launches, disease awareness campaigns, and the development of medical education initiatives within the managed markets channel.

Senior Managed Markets Trainer

Designed curriculum and delivered managed care training, in collaboration with Marketing, Regulatory, Contracting and Medical Affairs divisions. Managed specialty product and initial sales training of Prevacid and Lupron product lines. Trainees included managed care executives, regional account managers, health systems executives, and state government account executives.

Gastrointestinal Sales Specialist/District Managed-Care Specialist. Milwaukee, Wisconsin

Managed Milwaukee market, growing GI annual sales of Prevacid and PrevPac by 4% in targeted gastroenterologists, primary care physicians, and hospitals. Designed and delivered managed-care education and industry updates for district. Excalibur ranked #10 awards: C.W. Hall Saiyushu for leading Prevacid scripts in 2000; Walk-the Walk: highest increase in Prevacid market share with targeted physicians.

Abbott Laboratories, North Chicago, Illinois. June 1998–October 2000
Anti-infective/Gastrointestinal Sales Specialist. Ann Arbor, Michigan

Managed a $3.6 million territory in the Ann Arbor market while growing GI annual sales by 8% through marketing of Biaxin, Omnicef, Prevacid (proton pump Inhibitor) and PrevPac to community physicians and hospitals. Conducted managed care training seminars for physician accounts and Abbott district managers. Managed Henry Ford Medical Center accounts in territory.

Part-time Pharmaceutical Sales Consultant

Marketed antibiotics for respiratory tract infections to emergency and urgent care centers. Expanded account base by 100%. Grew annual territory sales by 10%.

Spring Arbor University, Spring Arbor, Michigan. January 1995–October 2000
Associate Professor

Faculty member, Management of Health Services and Management of Organizational Development departments. Responsible for curriculum development and strategic marketing of the MHS accelerated degree program. Coordinated internships and counseling. Course content knowledge included the following:

- Health Services Systems and Environments (includes managed care)
- Biological, Psychological and Social Aspects of Health Care
- Administration in Health Care Services (includes managed care)
- Health Services Management and Supervision
- Health Services Programs - Design and Implementation
- Policy and Ethical Issues in Health Care
- Values: Personal and Social

Multimedia Consulting Group, Ann Arbor, Michigan. June 1992–June 1998
Partner/Business Development Manager

Started company while in graduate school to provide multimedia services and organizational development training to health care organizations. Created and coordinated interactive computer-based training, presentation graphics, and video production. Training expertise included coaching techniques, computer/software training, strategic planning, creative planning sessions ”storyboarding,” diversity, and power and influence. Managed daily operations, training, and marketing.

Bristol-Myers Squibb, USPNG, Evansville, Indiana. September 1990–May 1992
Oncology Sales Specialist

Managed $8.5 million dollar territory including major teaching institutions in Detroit, Michigan. Trained medical residents, fellows, nurses and research specialist on innovative chemotherapy procedures. Coordinated Grand Rounds and Fellow development programs. Managed funding for research projects at major teaching institutions. Grew annual sales by 20%.

Parke-Davis, Morris Plains, New Jersey. December 1988–September 1990
Hospital Sales Specialist/Account Team Manager/Cardiovascular Sales Specialist

Managed $6.5 million dollar territory. Grew annual sales by 25%. Managed and coordinated sales activities of 12 specialty sales representatives (OB/GYN, neurological, cardiovascular, and primary care specialists). Conducted monthly meetings with account team members to formulate marketing strategies. Trained medical residents, fellows, nurses, and research specialist in lipid/cholesterol metabolism and pharmaceutical therapies.

Education

Walden University, Baltimore, Maryland
PhD (ABD), Public Health/Community Health

University of Michigan, Ann Arbor
MS in Public Health Policy and Administration: Marketing and strategic planning.

- President, Public Health Student Association
- Full scholarship fellow
- Toastmasters International
- Student keynote speaker at graduation

Ursuline College, Pepper Pike, Ohio
BA, Health Administration; Minor, Nursing

- Coordinator, intramural and aquatic activities
- Board of Academic Accreditation, student representative
- Scholarships: University Hospitals of Cleveland and John Huntington

Presentations

- Christian Faith Fellowship Church graduation keynote speaker--2008
- Spring Arbor University graduation keynote presenter--2003 and 2004
- Jesus Name Apostolic Church prostate cancer awareness and education presenter--2011