BLACK MEN'S KNOWLEDGE OF PROSTATE CANCER AND SCREENING AND VITAMIN D SCREENING AND SUPPLEMENTATION: PREDICTORS OF HIGH SELF-EFFICACY TO TALK TO MEDICAL PROVIDERS ABOUT SCREENING

by

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ABSTRACT

BLACK MEN'S KNOWLEDGE OF PROSTATE CANCER AND SCREENING AND VITAMIN D SCREENING AND SUPPLEMENTATION: PREDICTORS OF HIGH SELF-EFFICACY TO TALK TO MEDICAL PROVIDERS ABOUT SCREENING

Peter Shakespeare Afram

Given a global online sample of Black men (n=194) who responded to a social media campaign and completed the study, the convenience sample of Black males (N=194) was mostly married (N=147, 75.85%), had a mean age of 49.53 years (*min 40, max 76, SD=8.73*), and was well educated; 24.7% (n=48) had an Associate Degree, 20.6% (n=40) had a Bachelor's, 18% (n=35) had a Master's, and 5.2% (n=10) had a Doctorate. The mean annual income was 4.21 for category 4 of $40,000-$49,999 *(min 1, max 9, SD=1.64*). Most of the participants were employed (n=188, 96.9%) and born in the United States (n=152, 78.4%).

As a reflection of a global sample, if not a sample of men born in Ghana (77.3%, n=194) who were now dispersed across the globe, over two-thirds (77.3%) were born in

Ghana while 78.4% (n=152) were currently living in the United States; 15.5% (n=30) were currently living in Ghana, followed by 5.1 (n=10) currently living in other countries.

Key findings showed that, as a brief intervention of taking the PC-S-KT-39, as per results of four paired t-tests (Bonferroni Adjustment Significance, .05/4, p=.013), this was associated with a significant increase from pre-knowledge test to post-knowledge test (p<.000; Bonferroni Adjustment Significance, .05/4, p=.013) for (a) knowledge of prostate cancer and screening (*t*=-8.475, df=193, p=.000); (b) self-efficacy for talking to doctor about prostate cancer and screening (*t*=-9.098, df=193, p=.000); (c) knowledge of Vitamin D screening and supplementation (*t*=-9.748, df=193, p=.000); and (d) self-efficacy for talking about Vitamin D screening and supplementation (*t*=-9.384, df=193, p=.000).

The study demonstrated how there is great value in contemporary times in using an online social media campaign, posting and distributing flyers in community venues (barber shops, churches), snowballing, and using smart phones to conduct global online research.

Given these findings, wide dissemination via the Internet of a link to the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) is justified. If men such as those in this study disseminate the link, the impact may be global indeed.

DEDICATION

This dissertation is dedicated to the memory of my father, Mr. Twene Kwadwo Aduasare (October 13, 1940 to November 19, 2015), Suma Ahenkro who died from prostate cancer.

May my Dad know the deep gratitude I hold for him. And may my Dad know the extreme regret I will never overcome for not inviting him to my Master's graduation because his sickness would have been diagnosed early enough to start early treatment. I, however, take consolation in the fact that, as a result of his dying from prostate cancer, I undertook this investigation which will help educate other men to talk to their medical providers about prostate cancer, get early screening, and get early treatment.

We cannot hold mortality's strong hand.

(William Shakespeare, *King John*, Act IV, scene 2)

I love you, Dad, but God loves you better.

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I wish to express my profound gratitude to my supervisor and mother, Professor Barbara C. Wallace, who with tender toughness tailored, directed, guided, and offered constructive criticism of this work.

I will forever be indebted to my parents who never saw the four walls of a classroom yet did not kill the clarion call to educate children and send me to school against their wish for me to become a farmer like them. I dedicate this dissertation to my beloved father, Mr. Twene Kwadwo Aduasare, who unfortunately passed away fighting prostate cancer and motivated me to research this canker.

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P. S. A.

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Chapter I

INTRODUCTION

Strikingly, “Black men in America have the highest death rates” from prostate cancer” in the world (Ogunsanya et al., 2017, p. 1009). Wang et al. (2015) reported that prostate cancer was the “second most frequently diagnosed cancer among men worldwide” and of all racial/ethnic groups (p. 733). Ogunsanya et al. (2017) reported that one “in seven American men will be diagnosed with prostate cancer” (PCa) during his lifetime (p. 1009). However, both the “mortality and morbidity rates are significantly elevated in Black men, compared with men of other racial and ethnic groups” (p. 1009). Batai et al. (2017) indicated that prostate cancer is “the most common cancer among men in the U.S., and African American” men have both “higher incidence and mortality rates compared to European American” men and men from “other racial/ethnic groups” (p. 2). The American Cancer Society (ACS, 2016) estimated that 1 in 6 Black men will be diagnosed with “prostate cancer in his lifetime, compared to 1 in 8” White men (p. 15). Richards et al. (2017) emphasized how African American men “not only present with PCa at a younger age, but they also have 50% higher incidence and twice the mortality compared with European American (EA) men” (p. 1).

Nelson, Batai, Ahaghotu, Agurs-Collins, and Kittles (2016) noted that even though the “incidence rates of prostate cancer have decreased over the years, studies have

shown African American" men to develop prostate cancer "at a rate 1.5-1.9 times higher than their European American" counterparts (p. 1). Also, "racial differences are further emphasized by the increased diagnosis of aggressive prostate cancer" in African American men (p. 2). Nelson et al. offered details, as follows:

> For the year 2016, about 29,530 cases of newly diagnosed prostate cancer were expected for Black men (ACS, 2016). This would account for 31% of all cancers diagnosed for Black men. (ACS, 2016)

Ashorobi et al. (2017) emphasized how African American men not only have the highest incidence and mortality from prostate cancer in the United States, but also have held this status as a persistent trend for more than three decades. Moreover, it was found that men from "low socioeconomic backgrounds are at a higher risk" for having an increased prostate cancer burden, including a lower utilization of prostate cancer screening services (p. 82). Ashorobi et al. found that in Texas, "two racial and ethnic minorities," specifically African American and Hispanic men, "had a lower incidence of digital rectal examination (DRE) performed" (p. 82). Thus, not surprisingly, these groups had a "lower likelihood of being diagnosed with early stage" prostate cancer, yet a "higher likelihood of being diagnosed with late-stage" prostate cancer—in comparison to White men. They concluded that, in order to "address this health disparity among medically underserved racial and ethnic groups, there must be increased education and awareness" on the topic of prostate cancer (p. 82).

Prostate Cancer Screening

Prostate cancer screening with the use of the prostate-specific antigen (PSA) test "is common" (Schenk et al., 2014, p. 2), while the digital rectal examination (DRE) is

also commonly performed by physicians (Ashorobi et al., 2017, p. 82). The ACS has recommended that men start screening for prostate cancer at age 45, "with the interval for further screening based on initial and subsequent PSA levels" (Smith et al., 2018, p. 297). Baptista, Sampaio, Heleno, Azevedo, and Martins (2018) indicated that "screening for prostate cancer is a controversial issue" (p. 1). While the "United States Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial found no benefits from using prostate-specific antigen (PSA) screening for prostate cancer diagnoses," the "results from the European Randomised Study of Screening for Prostate Cancer concluded that one prostate cancer death would be avoided and 27 excess cases detected per 781 men invited for screening with PSA" (p. 3). It was emphasized that a "decision about whether to be screened should be an individual one based on conversations with the physician about the benefits and adverse effects of screening, in order to help men make a decision based on personal values and preferences" (p. 4). However, the majority of experts justified "a shared decision-making process involving doctor and patient, using validated decision aids" (p. 4). Further, it was reported that "many guidelines issued by medical organizations such as the European Association of Urology, the American Cancer Society, and the American College of Physicians supported a shared decision-making process for prostate cancer screening," with decision aids to help ensure the quality of the decision, instead of relying solely on individualized decision making (p. 4).

Ogunsanya et al. (2017) discussed the debate over the importance of prostate cancer screening, noting how "there are controversies associated with routine prostate cancer screening and its specificity"; meanwhile, "screening is beneficial in men with familial (high) risks or at least with one first-degree relative with prostate cancer"

(pp. 1009-1010). Notwithstanding the controversies surrounding screening, "the American Cancer Society endorses prostate cancer screening annually"—but, only after the "benefits and limitations of prostate cancer screening have been outlined to patients" (p. 1010).

According to Ogunsanya et al. (2017), for "effective decision making to take place, it is also important for patients to understand the risks and benefits associated with the decision (prostate cancer screening) to be made" (p. 1010). Consider how screening may also lead to treatment, and while "prostate cancer treatment may be lifesaving, studies suggest that this benefit is not applicable in all cases" (Wang et al., 2015, p. 733). For example, a "large randomized study revealed that in comparison with watchful waiting, 15 men must be treated with radical prostatectomy to save 1 life" (p. 733).

Mahal et al. (2014) expressed doubt as to whether "African Americans (AAs) with intermediate- to high-risk prostate cancer" are given equal treatment as compared to White patients (p. 386). For "patients with intermediate to high-risk" prostate cancer, "definitive treatments have been shown to decrease prostate cancer-specific mortality" and "improve overall survival" (p. 386). African American men with "intermediate- to high-risk" prostate cancer "are less likely" to receive treatment with "curative intent" than are White men—such that the "disparity is worse in high-risk disease and is not improving over time" (p. 386). Given racial disparities in the treatment of prostate cancer, African American men "have a significantly higher risk of dying from" prostate cancer than White men (p. 386).

Mahal et al. (2014) indicated a number of possible causes for the glut of prostate cancer deaths among African American men, as involving "a biologic predisposition for

aggressive disease," poorer access to care, treatment delays, and the receipt of care from lower volume and lower quality centers—all of which contribute to "worse survival" (p. 389). Most noteworthy, the "disparity in the receipt of appropriate treatment, particularly for high-risk disease" has contributed to the excess deaths from prostate cancer (p. 389).

The "American Cancer Society, the National Comprehensive Cancer Network, and the American Society of Clinical Oncology" have all emphasized the "importance of shared and informed decision making in the screening and treatment of prostate cancer" (Wang et al., 2015, p. 733). Also, the study reiterated that "informed decision making is the ability of patients to fully comprehend the risks and benefits of particular treatment options" and to "accomplish this task, health care providers often use medical terminology," while "patients—especially those in underserved areas—are prone to misunderstanding such terminology" (p. 733). Therefore, there is a role for "assessing patients' knowledge level regarding prostate cancer and screening" (Ogunsanya et al., 2017, p. 1010). Of note, "knowledge of prostate cancer and screening has been reported to play an important role in participation in screening practices" (p. 1010).

Consider a relevant study with regard to the role of knowledge level, as per Wang et al. (2015). Research indicated that "less than 50% of men understood the term impotence, and only 5% understood the term incontinence" (p. 734). Further, the study showed that the absence of "comprehension has important implications for the counseling of prostate cancer patients" (p. 734). Also, in a study on the "educational needs of prostate cancer patients, nearly one-fifth of patients felt that they had not received enough information from their physicians to make a treatment decision," and that "lack of

knowledge regarding prostate cancer has also been associated with decisional regret among men treated for localized disease" (p. 734). They concluded that the "ability of patients to fully comprehend the language used" in any such efforts is "essential to the informed decision-making process" (p. 736). Also, a "review has demonstrated that decisional aids improve patient knowledge and enhance patient involvement in the decision-making process for prostate cancer screening" (p. 736). The study concluded that "a videobased educational tool could serve as an effective method for combating the severe lack of comprehension of prostate health terminology" (p. 740).

Regardless, it is recommended that men in higher risk groups (i.e., with positive family histories) receive information on prostate screening "between age 40 and 50 years" (Ogunsanya et al., 2017, p. 1010). Both the "American Urologic Association and the National Medical Association" emphasized the role of "screening in early detection of prostate cancer as a means to support health promotion, especially in Black men" (p. 1010). While the controversy surrounding prostate cancer screening continues, Black men "remain at high risk" and in need of screening (p. 1010).

Screening issues vary by age and life expectancy. In 2017, the United States Preventive Services Task Force (USPSTF) made available draft recommendations that assigned a "C" grade for the recommendation for prostate cancer screening "in men 55-69 years old, stating that the potential benefits and adverse effects of PSA-based screening are closely balanced in that age group" (Baptista et al., 2018, p. 4). According to Smith et al. (2017), "men who have at least a 10-year life expectancy" should have an opportunity to make an informed decision with their health care provider about whether

to be screened for prostate cancer, after receiving information about "the benefits, risks, and uncertainties associated with prostate cancer screening" (p. 110).

Baptista et al. (2018) examined "the impact of using Web-based decision aids to support men's prostate cancer screening decisions in comparison with usual care and other formats of decision aids" (p. 2). Findings indicated that the use of Web-based "decision aids can increase patient knowledge, make people feel clearer about their values, reduce decisional conflict, and promote an active patient role in decision making" (p. 5). Also, it was found that Web-based decision aids significantly reduced the practitioner-controlled role in the decision-making process, in comparison with usual care. Further, as there is an "increasing use and ease of access to the internet, the Web has been proposed as a promising way of delivering decision aids" (p. 6). It is therefore "important to assess the impact of Web-based decision aids in the prostate cancer screening decision-making process, but the number of studies addressing this subject to date have been scarce and showed mixed results" (p. 6).

Screening for Vitamin D Levels

Meanwhile, other research has suggested value in men potentially at risk for prostate cancer, such as African American men, also screening for Vitamin D levels (Richards et al., 2017; Xie et al., 2017; Young & Xiong, 2018). For example, Francis (2017) emphasized the importance of regular testing of Vitamin D levels by health care providers. In this regard, Nelson et al. (2016) offered details on the higher incidence of prostate cancer and aggressive prostate cancer in African American men, as follows, while citing the potential role of Vitamin D:

> Demographic characteristics, such as family history, socioeconomic status, access to medical care, other comorbidities, and diet and lifestyle have been shown to contribute to the increased burden of prostate cancer in AA men. Recently, however, studies have focused on differences in serum 25-hydroxyVitamin D (25(OH)D) concentrations as a source of the disparate trends seen in this disease. Critical to overall health, 25(OH)D plays a role in bone mineralization, diabetes mellitus, and multiple sclerosis. The main source of 25(OH)D is derived from sunlight ultraviolet (UV)-B rays, accounting for over 90% of circulating levels. High melanin, commonly seen in ethnic groups with dark skin, such as AA men, reduces the amount of UVB radiation absorbed in the skin, thus decreasing the concentration of 25(OH)D and increasing susceptibility to developing Vitamin D deficiencies. In the Health, Aging and Body Composition Study, comparison between AAs and EAs showed only 16% of older AA participants had serum 25(OH)D levels over 30 ng/mL, compared to 44% in EAs. Data from the Prostate Cancer Prevention Trial determined AA men with higher Vitamin D levels see a reduced risk in high-grade disease, while results in Afro-Caribbean men residing in the Caribbean indicate Vitamin D insufficiency may contribute to increased prostate cancer risk. Moreover, molecular studies suggest deficiencies in Vitamin D overtime may lead to progression from pre-clinical to clinically aggressive forms of prostate cancer. (p. 2)

Forrest and Stuhldreher (2010) explained how Vitamin D "can be synthesized by the skin through exposure to ultraviolet light of wavelength 290 to 315 nm that stimulates the conversion of 7-dehydrocholesterol to preVitamin D" (p. 49). In addition, the "other source of Vitamin D is from the diet" (p. 49).

Consequently, American men are increasingly looking to dietary supplements to reduce their risk of developing prostate cancer, and to delay progression after diagnosis (Paller et al., 2015). Paller et al. (2015) explained how Vitamin D "supplementation has been promoted for prostate cancer prevention based in part on a 2007 Harvard University study of nearly 15,000 men initially free of prostate cancer" (p. 2). The study found that those men "whose plasma levels of Vitamin D were below (versus above) the median had a significantly increased risk of developing aggressive prostate cancer (OR = 2.1, 95%CI: 1.2–3.4)" (p. 2). Also, another 2014 study on "the association between Vitamin D and

prostate biopsy outcomes in 667 men found that Vitamin D deficiency was associated with higher Gleason grade and tumor stage in both European-American and African American men and with increased odds of prostate cancer diagnosis on biopsy" (p. 2).

Also, the findings of a 2012 study based in the United Kingdom confirmed a relationship between Vitamin D levels and aggressive prostate cancer, such that lower Vitamin D levels correlated with more aggressive cancers; however, the study "found no evidence of a link between Vitamin D levels and overall prostate cancer risk" (Paller et al., 2015, p. 2). The finding of "no association between Vitamin D levels and overall prostate cancer risk is consistent with a retrospective study of 479 prostate cancer patients with age-matched controls that showed no causal relationship between Vitamin D levels and risk of prostate cancer" (p. 2). Also, another population-based cohort study of "1,476 prostate cancer patients" found "no evidence that serum Vitamin D levels measured after diagnosis affect prostate cancer prognosis" (p. 2). Yet another study that matched "1,000 prostate cancer patients with 1,000 controls found men with higher levels of Vitamin D" had an "increased risk of prostate cancer" (p. 2). Given this body of "conflicting data," the National Cancer Institute has not offered a recommendation "for or against the use of Vitamin D supplements to reduce the risk" of prostate cancer (p. 2).

Murphy et al. (2012) discussed how darker skin "pigmentation resulting from increased melanin production in the skin melanocytes can reduce the efficacy of UV-B radiation–induced Vitamin D3 synthesis" (p. 422). Skin with high melanin content can reduce Vitamin D3 synthesis by up to 99%, much in the way as SPF15 (sun protection factor-15) sunscreen (p. 422). According to Murphy et al., African Americans "have been identified as a group with a particularly high risk of Vitamin D deficiency" (p. 422).

Furthermore, it was found that “many of the diseases thought to be associated with Vitamin D deficiency are more prevalent” among African Americans (p. 421). Using the Institute of Medicine (IOM) definition of deficiency being <20 ng/mL, 18% of the EA men were deficient versus 63% of African American men (Murphy et al., 2012).

Murphy et al. (2012) determined that Vitamin D level is estimable by season, African American race, “income, BMI, and Vitamin D supplemental intake” (p. 423). Overall, findings underscored how Vitamin D “supplementation currently remains the most appropriate mode for preventing Vitamin D deficiency in high-risk groups such as” African Americans and “individuals living in UV-poor environments” (p. 425). It was concluded that “more than 90%” of African American men have a deficiency of Vitamin D (p. 423).

Francis (2017) reported that Vitamin D deficiency is a predictor of aggressive prostate cancer, or cancer that has spread outside the prostate. Most people are Vitamin D deficient, especially in the winter, as it is difficult to maintain normal levels of Vitamin D without a lot of sunlight exposure. Further, men with dark skin (e.g., African Americans and others) are far more likely to be Vitamin D-deficient because they need more sunlight to get the Vitamin D. Also, it is important to have one’s health care provider test regularly for level of Vitamin D (e.g., during annual physical exam, or more often). If one’s health care provider tests for Vitamin D level and identifies a deficiency, then it is important to take a daily supplement of high-quality Vitamin D. One’s Vitamin D level should be kept in the upper half of the normal range—with the optimal level of Vitamin D being about 50 to 70 nanograms per milliliter year around. Francis (2017) asserted that avoiding Vitamin D deficiency is part of good preventive health care. An example of a

sound approach to Vitamin D supplementation is to take 5,000 i.u. of a high-quality Vitamin D supplement every day. Francis (2017) stressed how one must be careful in choosing any supplement, such as a daily supplement of Vitamin D, because if the supplement is not high quality, then it may contain toxins and be ineffective.

Batai et al. (2017) found among African Americans "the highest quartile of total Vitamin D intake was associated with 47% lower odds" of PCa diagnosis "(95% C.I.:0.30-0.94)" (p. 6). Betai et al. reported that a larger consumption of Vitamin D indicated a pattern of reduction in PCa. Also, it was found that in leaner men, "high total Vitamin D intake reduced odds of PCa diagnosis" (p. 6). Further, "the interaction between total Vitamin D intake and BMI on high risk and high grade PCa was also statistically significant" (p. 6).

Gao et al. (2018) indicated that the role of Vitamin D in human disease has been given greater attention. It has been perceived as a crucial hormone playing an important role in maintaining the normal functions of various organs and systems in the human body. Research has shown that Vitamin D "has some extraskeletal biological functions including inhibiting the progression of cancer cells" (p. 96). Also, prior research has shown that "Vitamin D can exert a key role in decreasing cancer risk. Meta-analyses of epidemiological studies have suggested that higher circulating 25-hydroxyVitamin D concentration is correlated with decreased risks of several common cancers, such as colorectal cancer and bladder cancer" (p. 96).

Xie et al. (2017) highlighted the association among prostate cancer, Vitamin D status, and inflammation. It was conjectured that Vitamin D inhibits the incidence and progression of prostate cancer through its anti-inflammatory effect (p. 22077). Also,

"numerous in vitro experiments demonstrated that 1,25-(OH)2D3, the active form of Vitamin D, inhibited the growth and differentiation of human prostate cancer cells" (p. 22076). Furthermore, "men with Vitamin D" *deficiency* "had a higher risk of prostate cancer compared to men with Vitamin D" *sufficiency* (p. 22076). Xie et al. indicated that their data provided "evidence for the first time that low Vitamin D status is associated with inflammation in patients with prostate cancer" (p. 22080). They found low levels of Vitamin D in patients with acute prostate cancer as compared to patients with mild and moderate prostate cancer. Also, "low Vitamin D status" was associated with inflammation and the progression of prostate cancer" (p. 22080). They asserted that their data added to the body of increasing evidence, indicating that Vitamin D has an anti-inflammatory activity. They indicated that their "results suggest that inflammation may be a key mediator for prostate cancer progression in patients with low Vitamin D status" (p. 22080).

The research of Young and Xiong (2018) added to "the association between Vitamin D and cancer risk," as well as to the results of "clinical trials involving Vitamin D" (p. 1). Vitamin D in circulation was discussed as being "sufficient (i.e., 30-100 ng/ml), insufficient (i.e., 21-29 ng/ml), or deficient (i.e., <20 ng/ml)" (p. 2). Findings showed that Vitamin D "can also indirectly prevent cancer" (p. 2). The indirect "anti-cancer effects of Vitamin D can also be due to its anti-inflammatory properties" (p. 2). Findings showed that men "with prostate cancer had reduced 25(OH)D and increased inflammatory mediator levels compared to controls" (p. 2). They found a relationship "between circulating 25(OH)D levels and cancer risk" (p. 2). In clinical trials involving treatment with Vitamin D metabolites, it was found that "Vitamin D can temper

inflammation and, thus, has been examined for efficacy in inflammation-associated disorders" (p. 5).

In addition, Young and Xiong (2018) found that "analysis of the prostate transcriptome showed that Vitamin D supplementation (4,000 IU/day) for 2 months prior to undergoing prostatectomy altered expression of inflammatory genes" (p. 5). Body Mass Index (BMI) counterbalanced the effects of Vitamin D. Specifically, a "greater BMI" tempers the "capacity of Vitamin D supplementation to increase 25(OH)D levels" (p. 7). Recommendations included providing "higher doses" for those who were overweight (7,000 IU/day) and obese (8,000 IU/day), in comparison to doses for those of normal weight (6,000 IU/day) (p. 7).

As per Richards et al. (2017), Vitamin D is viewed as "an essential regulatory hormone for normal human physiology," and the "canonical role for Vitamin D is calcium homeostasis; however, Vitamin D deficiency has been associated with both calcium-related conditions, including rickets and osteoporosis" (p. 1). Research has demonstrated that there is a higher risk of prostate cancer as a result of Vitamin D deficiency among African Americans when compared to European Americans. According to Richards et al. (2017), skin pigmentation "is the largest predictor of Vitamin D deficiency in the USA, as UV-induced cutaneous synthesis of Vitamin D is the primary source of the Vitamin D prohormone and is inhibited by melanin" (p. 1). Thus, as a consequence, greater than 90% of African American men "are Vitamin D insufficient by current standards, and 65% are deficient with serum levels below 20 ng/ml" (p. 1). Also, "Vitamin D deficiency affects a greater segment of various world populations"; however, African American men "are disproportionately affected by both

PCa and risk of Vitamin D deficiency" (p. 1). Further, even though "epidemiologic studies on the relationship between PCa incidence and Vitamin D serum concentration have produced mixed results, analyses restricted to aggressive or lethal cases have more consistently shown inverse associations" (p. 2). Indeed, interventional studies "with Vitamin D supplements" have "reported lower prostate-specific antigen levels (20), reduced number of positive biopsies" as well as "decreased prostate proliferation markers" (p. 2).

Of note, the USPSTF (2014) has acknowledged that some studies have demonstrated how low levels of Vitamin D are associated with an increased risk of cancer. The USPSTF concluded from its review of research that the benefits and harms of screening for a Vitamin D deficiency and early intervention cannot be determined. This was based on their finding insufficient evidence to support screening for Vitamin D deficiency in asymptomatic adults, in order to improve health outcomes. The USPSTF acknowledged how the Endocrine Society recommended screening for Vitamin D deficiency only in individuals considered to have an "at-risk" status.

The work of Richards et al. (2017) suggested that African American men have an "at-risk" status, given that greater than 90% of African American men are Vitamin D insufficient. Further, African American men are disproportionately affected by both prostate cancer and Vitamin D deficiency (p. 1). Also, interventional studies "with Vitamin D supplements" have "reported lower prostate-specific antigen levels and a reduced number of positive biopsies" as well as "decreased prostate proliferation markers" (p. 2). With African American men having the highest death rates from prostate cancer in the world, they have a unique "at-risk" status (Ogunsanya et al., 2017).

Statement of the Problem

The problem that this study addressed is the need to educate Black men globally about prostate cancer and screening—and, also about the potential value in screening for Vitamin D level—toward the goal of increasing their level of knowledge and self-efficacy to engage in discussions about screening with their medical providers. This follows from how "knowledge of prostate cancer and screening has been reported to play an important role in participation in screening practices" (Ogunsanya et al., 2017, p. 1010).

Purpose of the Study

The purpose of the study was to identify significant predictors of the two study outcome variables/dependent variables, as follows:

1. Study outcome variable/dependent variable #1—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>prostate cancer and prostate cancer (PC) screening</u>, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39)—as item #4 in survey Part VII *(i.e., POST PC Self-efficacy)*.
2. Study outcome variable/dependent variable #2—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>Vitamin D (VD) screening and supplementation</u>, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39)—as item #8 in survey Part VII *(i.e., POST VD Self-efficacy)*.

Research Questions, Survey Parts, and Data Analysis Plan

Given a global online sample of Black men (n=194) who responded to a social media campaign (i.e., "*Go to https://tinyurl.com/Black-Men-Age-40-PLUS to take the Prostate Cancer & Screening—& Vitamin D Survey for Black Men age 40 and above for a chance to win 1 of 3 $100 Amazon gift cards"*) and completed the study, the following research questions were answered:

1-What are the men's demographic and background characteristics (e.g. age, skin color, partner status, born in the United States—yes/no, living in United States or other country, annual household income, level of education, employment status.)?

Part I: Basic Demographics (BD-9)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

2-How do the men rate their health status, and what is their Body Mass Index, rating of their weight status, and rating of the overall quality of care received for their health?

Part II: Brief Health Survey (BHS-5)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

3-What is the men's prevalence of a diagnosis of prostate cancer, being told they were at risk for prostate cancer, history of screening for prostate cancer by a Digital Rectal Examination (DRE) or Prostate-Specific Antigen (PSA) Test, as well as the prevalence in their family of prostate cancer diagnoses and deaths from prostate cancer?

Part III: Prostate Cancer Scale (PCS-6)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

4-What is the men's history of having a Vitamin D screening, being told they were Vitamin D deficient, being advised to take a Vitamin D supplement, and taking a Vitamin D supplement?

Part IV: Vitamin D Scale (VDS-4)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

5- What is the men's level of knowledge for Prostate cancer and screening, and for Vitamin D and taking a Vitamin D supplement?

Part V: Prostate Cancer and Screening Knowledge Test (PC-S-KT-39)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

6-After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers (i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), do the men recommend the PC-S-KT-39 to other African American men as an online intervention (i.e., diffusion of the innovation)?

Part VI: Diffusion of the Innovation of the Prostate Cancer Knowledge Test (DOI-PCKT-1)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

7-After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers (i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), how do the men rate their self-efficacy—or **item #4 after rating** for confidence to *talk to a medical provider about prostate cancer and screening*, and **item #8 after rating** confidence to *talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement?*

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

Part VII: Pre- and Post-Knowledge Test—Ratings for Knowledge and Self-Efficacy to Talk to a Medical Provider (PRE-A-POST-KT-RF-K-SETMP-8), *specifically, the mean for the:*

After Took PC-S-KT-39 Global Self-Efficacy Subscale #4

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

NOTE: item #4 and item #8 after ratings are the two study outcome variables/dependent variables

8-After taking the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—in order to determine if taking the PC-S-KT-39 may serve as a potential online intervention that may significantly increase knowledge and self-efficacy levels, how do the men **rate themselves for before taking the PC-S-KT-39 versus after taking the PC-S-KT-39** for (1) what they knew about prostate cancer and screening, (2) what they knew about Vitamin D screening and taking a Vitamin D, (3) confidence to talk to a medical provider about prostate cancer and screening, and (4) confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement—**and was there a significant difference in mean scores from before to after taking the PC-S-KT-39**?

Data Analysis Plan: Paired t-tests (before v. after ratings)

9-Are there any significant relationships between selected demographics and (1) study outcome variable/dependent variable #1—a **higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening,**

after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy),* and (2) study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>Vitamin D (VD) screening and supplementation</u>, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)?***

Data Analysis Plan: Inferential statistics, specifically, independent t-tests and Pearson correlations

10-What are the significant predictors of (1) study outcome variable/dependent variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>prostate cancer and prostate cancer (PC) screening</u>, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy),*** and (2) study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>Vitamin D (VD) screening and supplementation</u>, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)?***

Data Analysis Plan: Backward stepwise regression

Rationale for Study

There is a strong rationale for the present study, as it is framed by Health Disparities Theory (Institute of Medicine [IOM], 2012); Self-Efficacy in the Social Cognitive Theory of Bandura (1997), and Diffusion of Innovation Theory (Rogers, 1995).

A strong rationale for this global study and the anticipated findings follows from key research findings. Among men from all racial/ethnic groups, prostate cancer was the "second most frequently diagnosed cancer among men worldwide" (Wang et al., 2015, p. 733). Black men have the highest death rates of prostate cancer in the world (Ogunsanya et al., 2017). African American men present with prostate cancer at a younger age have a 50% higher incidence and twice the mortality of White American men (Richards et al., 2017). The diagnosis of aggressive prostate cancer is higher in

African American men compared to White men (Nelson et al., 2016), and African American men have lower rates of prostate cancer screening, including a lower incidence of having a digital rectal examination (DRE) performed, a lower likelihood of being diagnosed with prostate cancer, and a higher likelihood of being diagnosed with late stage prostate cancer—compared to White men (Ashorobi et al., 2017).

It is recommended that the way to address these health disparities is via increased prostate cancer education for Black men (Ashorobi et al., 2017). Therefore, there is a role for assessing patients' level of knowledge for prostate cancer and screening—while such knowledge has been found to play an important role in participation in screening for prostate cancer (Ogunsanya et al., 2017, p. 1010). It is therefore important to provide education on prostate cancer screening with the prostate-specific antigen (PSA) test (Schenk et al., 2014), and/or the digital rectal examination (DRE) performed by physicians (Ashorobi et al., 2017).

Emphasis has been placed on informed decision making about prostate screening and prostate cancer treatment—as a process that includes the physician and the patient, and requires that patients have adequate knowledge and understanding of key terminology (Wang et al., 2015). Baptista et al. (2018) emphasized that the decision about whether or not to be screened for prostate cancer should be "an individual one based on conversations with the physician about the benefits and adverse effects of screening, in order to help men make a decision based on personal values and preferences" (p. 4).

In order to increase men's knowledge of prostate cancer, prostate cancer screening, and related terminology—and to increase their self-efficacy for talking to their

medical provider about these issues—so as to enable men to participate in decision making and make an informed decision about screening and treatment, this study had a strong rationale for creating a new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39). The new PC-S-KT-39—with all TRUE answers—was designed as an online intervention to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world.

There is a rationale for this study creating and evaluating the potential for the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) to serve as an online intervention that may increase men's knowledge of prostate cancer and screening—with all TRUE answers—and potentially increase self-efficacy for talking to a medical provider about these issues. This follows from the work of Baptista et al. (2018) who found that Internet or Web-based decision aids have great value; they can "increase patient knowledge, make people feel clearer about their values, reduce decisional conflict, and promote an active patient role in decision making" about prostate cancer screening and treatment (p. 5).

Hence, at the conclusion of the study, the intent is to widely disseminate via the Internet a link to the new PC-S-KT-39 in order to potentially replicate the promise that Baptista et al. (2018) found in Web-based decision aids.

The Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) is considered a new innovation in providing online education, and study participants also have an opportunity to indicate if they would recommend the test to other African American men, as an indicator of the value placed on diffusing this new innovation online.

Further, given evidence that supports African American men, in particular, also screening for their levels of Vitamin D, and taking Vitamin D supplements if they are found to be Vitamin D-deficient, the new PC-S-KT-39 also seeks to increase knowledge in this area (Francis, 2017; Richards et al., 2017; Xie et al., 2017; Young & Xiong, 2018). In addition, the new test seeks to increase self-efficacy to discuss these issues with a physician.

Delimitations

The study was delimited to Black men from the global community who are age 40 and above, indicating the ability to read and understand English on the 12th grade level, and who completed the entire survey.

Limitations

Study limitations included the following: being an online study which requires access to the Internet and a computer, potentially creating a sample biased toward those who enjoy such access; the use of an online sample of convenience of volunteers who were able to devote the requisite time for completing the survey, including the use of snowballing; the lack of a measure of social desirability, which could have permitted controlling for socially desirable answers in the regression analysis, but would have added to the limitation of the burden of time to participate in the study; and the fact that the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) has 39 True-False items, with a potential burden of time, given the length of this key test. To reduce the burden of time, the new (PC-S-KT-39) was reduced from 50 items to 39 items, after the

first pilot indicated it took 30 minutes to complete the entire survey; other parts of the survey were also reduced by 1-3 items, where possible (e.g., eliminating questions about prevalence of prostate cancer among friends and associates). The result of the attempt to reduce the burden of time on study participants was a survey that took about 20-30 minutes to complete.

Also, another study limitation involved the use of a study methodology where the study men are asked *at the same time* (i.e., after taking the new PC-S-KT-39 *to rate both their before* taking the PC-S-KT-39 *and their after* taking the PC-S-KT-39 levels of *knowledge* [on prostate cancer and screening, and on Vitamin D screening and supplementation]) and *self-efficacy* (for talking to a medical provider about prostate cancer and screening, and about Vitamin D screening and supplementation).

An alternative methodology that might be perceived as more desirable would be to assess knowledge and self-efficacy before taking the PC-S-KT-39 and, then again, after taking the PC-S-KT-39; however, the method chosen was also deemed a way to shorten the length of the survey and reduce the burden of time on subjects. Also, after reading 39 true facts within the PC-S-KT-39, it was likely that the men could more accurately rate *both their before* taking the PC-S-KT-39 *and their after* taking the PC-S-KT-39 levels of *knowledge* (on prostate cancer and screening, and on Vitamin D screening and supplementation) and *self-efficacy* (for talking to a medical provider about prostate cancer and screening, and about Vitamin D screening and supplementation).

Definition of Terms

The following terms are defined to assist the reader.

- **Aggressive prostate cancer.** This describes a type of prostate cancer tumor or disease that forms, grows, or spreads quickly (National Institutes of Health [NIH], 2019).
- **Benign prostatic hyperplasia (BPH).** BPH, benign prostatic hyperplasia, is a condition in which the prostate is enlarged. With BPH, there is an overgrowth of prostate tissue that pushes against the urethra and the bladder, blocking the flow of urine (NIH, 2019).
- **Biopsy/Prostate biopsy.** The removal of cells or tissues for examination by a pathologist. The pathologist may study the tissue under a microscope or perform other tests on the cells or tissue. There are many different types of biopsy procedures. The most common types include: (a) incisional biopsy, in which only a sample of tissue is removed; (b) excisional biopsy, in which an entire lump or suspicious area is removed; and (c) needle biopsy, in which a sample of tissue or fluid is removed with a needle. When a wide needle is used, the procedure is called a core biopsy. When a thin needle is used, the procedure is called a fine-needle aspiration biopsy (NIH, 2019).
- **Body Mass Index (BMI).** A measure that relates body weight to height. BMI is sometimes used to measure total body fat and whether a person is a healthy weight. Excess body fat is linked to an increased risk of some diseases, including heart disease and some cancers. Also called body mass index (NIH, 2019).

- **Digital Rectal Examination (DRE).** An examination in which a doctor inserts a lubricated, gloved finger into the rectum to feel for abnormalities. Also called DRE (NIH, 2019).
- **Health disparities.** According to the Department of Health and Human Services (HHS), health disparities are "differences in health outcomes that are closely linked with social, economic, and environmental disadvantage and are often driven by the social conditions in which individuals live, learn, work, and play" (NIH, 2019).
- **Impotence.** This refers to the inability to have an erection of the penis adequate for sexual intercourse, while also referred to as erectile dysfunction (NIH, 2019).
- **Incontinence.** Inability to control the flow of urine from the bladder (urinary incontinence), or the escape of stool from the rectum (fecal incontinence) (NIH, 2019).
- **Metastasize.** This is when cancer cells spread from one part of the body to another—or metastasize and form secondary tumors; of note, the cells in the metastatic tumor are like those in the original (primary) tumor (NIH, 2019).
- **Prostate.** A gland in the male reproductive system. The prostate surrounds the part of the urethra (the tube that empties the bladder) just below the bladder and produces a fluid that forms part of the semen (NIH, 2019). Some studies have used the abbreviation PCa and some PC; both are used interchangeably in this document.

- **Prostate cancer.** Cancer that forms in tissues of the prostate (a gland in the male reproductive system found below the bladder and in front of the rectum). Prostate cancer usually occurs in older men (NIH, 2019).
- **Prostate-Specific Antigen (PSA) Test.** This blood test measures the level of prostate-specific antigen (PSA), a substance produced by the prostate and some other tissues in the body. Increased levels of PSA may be a sign of prostate cancer (NIH, 2019).
- **Prostatitis.** Prostatitis is a painful condition in which the prostate is inflamed, swollen, and tender. Inflammation of the prostate gland (NIH, 2019).
- **Radical prostatectomy and a radical treatment.** This involves the use of surgery to remove part or all of the prostate and some of the tissue around it. Nearby lymph nodes may also be removed. It may be done through an open prostatectomy, in which an incision (cut) is made in the wall of the lower abdomen or the perineum, or by using a laparoscope (a thin, tube-like instrument with a light and lens for viewing) (NIH, 2019).
- **Self-efficacy.** This involves an individual's level of confidence to perform specific behaviors in specific situations (Bandura, 1997).
- **Serum 25-hydroxyVitamin D (25(OH)D) concentrations and circulating 25-hydroxyVitamin D.** This refers to two major forms of Vitamin D that are important to humans: Vitamin D2, or ergocalciferol, and Vitamin D3, or cholecalciferol. Vitamin D2 is made naturally by plants, and Vitamin D3 is made naturally by the body when skin is exposed to ultraviolet radiation in

sunlight. Both forms are converted to 25-hydroxyVitamin D in the liver (NIH, 2019).

- **Sunlight ultraviolet (UV)-B rays, ultraviolet light, and UVB radiation.** This refers to invisible rays that are part of the energy that comes from the sun, can burn the skin, and cause skin cancer (NIH, 2019).
- **Vitamin D deficiency.** This occurs when usual Vitamin D intake is lower than recommended levels over time, exposure to sunlight is limited, the kidneys cannot convert 25(OH)D to its active form, or absorption of Vitamin D from the digestive tract is inadequate (NIH, 2019).
- **Vitamin D supplementation.** This is a cost-effective method of correcting Vitamin D deficiency and maintaining adequate levels of Vitamin D (NIH 2019).
- **Watchful waiting.** This involves closely watching a patient's condition, but not giving treatment unless signs or symptoms appear or change. Treatment is given to relieve symptoms and improve quality of life. It is also used when the risks of treatment are greater than the possible benefits. During watchful waiting, patients may be given certain tests and exams. Watchful waiting is sometimes used in prostate cancer (NIH, 2019).

Conclusion

This chapter introduced the topic and provided an overview of Black men's knowledge of prostate cancer and prostate cancer screening, screening for Vitamin D levels, and supplementation. It also introduced the purpose, objectives, research

questions, and rationale of this study. Chapter II provides a review of the literature relevant to this dissertation.

Chapter III includes the methods of this study. Chapter IV includes the results of data analysis for this study. The dissertation concludes with Chapter V, which provides a discussion of the study results, including implications and recommendations for future research.

Chapter II

REVIEW OF LITERATURE

A review of the literature supporting this study is presented in this chapter. This literature review covers the following topics: (a) prevalence of prostate cancer morbidity and mortality globally; (b) health disparities and prostate cancer morbidity/mortality in the United States; (c) factors related to prostate cancer morbidity/mortality for U.S. Blacks; (d) screening tests for prostate cancer; (e) racial disparities in the United States in prostate cancer treatment research; (f) increasing prostate cancer screening to decrease morbidity and mortality; (g) research on the importance of screening for Vitamin D; (h) research to increase knowledge on Vitamin D deficiency; and (i) the theoretical framework guiding this study.

Prevalence of Prostate Cancer (PCa) Morbidity and Mortality Globally

Farhad et al. (2017) indicated that "PCa metrics among different locations and changing trends are valuable to determine how various health policies and screening protocols might affect the outcome of PCa" (p. 1226). In addition, "precise and reliable reports on patterns and trends of diseases in different geographical areas provide policy makers with the evidence needed to allocate resources appropriately" (p. 1226). Farhad et al. reported that in the year 2015 "incident cases of PCa increased at ages 50 to 69 years

and 70 years or older by 4.5-fold and 3.2-fold, respectively. Incidence rates in these age groups also showed a 2.4-fold and a 1.5-fold increase, respectively" (p. 1227). They explained the global trend in detail, as follows:

> The highest number of newly diagnosed prostate cancers were recorded in Western European countries in 2015 while the Australasian region had the highest ASIR in 2015. The high income Asia Pacific region had the largest increase in the PCa incidence with a 4.4-fold and 11.2-fold increase in ASIR and incident cases, respectively, during the study period. United States, France and Japan were the countries with the highest incident cases in 2015. Moreover, the highest ASIR was observed in Dominica, France and Virgin Islands. (p. 1227)

Further, prostate cancer "caused 365,933 deaths (95% uncertainty interval 303,492-459,614) around the world in 2015, a 91% increase from 191,896 deaths (95% uncertainty interval 154,039-236,473) in 1990" and the "highest number of PCa deaths at the global level was recorded in men 70 years old or older in all study years" (Farhad et al., 2017, p. 1227). They concluded that "incidence of PCa is increasing globally, and is expected to increase further as screening is becoming more popular in less developed regions and life expectancy continues to rise" (p. 1232).

Rebbeck et al. (2013) reported that "Prostate cancer (CaP) is the leading cancer among men of African descent in the USA, Caribbean, and Sub-Saharan Africa (SSA)" (p. 2). Also, "The International Agency for Research on Cancer (IARC) estimates that CaP is the leading cancer in terms of incidence and mortality in men from Africa and the Caribbean" (p. 2). It is estimated "that CaP is a growing problem in Africa with approximately 28,006 deaths from CaP in 2010, and approximately 57,048 deaths in 2030," representing an "104% increase in the number of CaP deaths in Africa over the next two decades" (p. 2). The study indicated that "CaP is a major cancer in men of African descent throughout the world, and that the currently available incidence and

mortality rates may represent an underestimate of the actual CaP incidence and mortality rates in SSA and the Caribbean" (p. 6). Rebbek et al. explained in detail, as follows:

> Possible explanations for the wide range in CaP incidence and mortality by geography observed here fall into several categories: (1) differences in health care access, diagnosis, and screening; (2) differences in the methodology used to generate rates including completeness of ascertainment and (3) underlying differences in risk due to demographic differences, genetics/biology, lifestyle, or environmental exposures. (p. 6)

Taitt (2018) also added that the literature on prevalence of prostate cancer morbidity and mortality related to "geography, race, and ethnicity has yielded inconsistent and, in some cases, unreliable information" (p. 1807). Taitt emphasized, despite evidence that "prostate cancer (PCa) incidence and mortality rates are among the highest for African Americans," there is no significant data "regarding PCa rates in native African men, Black men residing in other countries, and men in Asia, Europe, and the Americas" (p. 1807). Taitt reported that "PCa mortality rates have been declining in most Western countries as well as in some European countries" without clear rationale, but suggested that it may be due to "early detection and improved treatment" (p. 1808). However, it is suspected that "variations in incidence and mortality rates reported for many countries may possibly be due to underdiagnosis, underreporting, differences in screening practices, differences in health-care access, gaps in knowledge and awareness, and attitudes toward PCa and associated screening" (p. 1808).

Taitt (2018) investigated the differences in "PCa detection methods, incidence, and mortality rates between races and ethnicities in various regions of the world," and found that "men of African descent outside of the African continent are at a higher risk of developing PCa" (p. 1808). The situation is different with Black men in Africa, as the "data is less definitive for Black men living in Africa" (p. 1809). Further, "comparison of

mortality to incidence ratio (MR/IR) is quite striking between developed and less developed countries" (p. 1810).

Ogunsanya et al. (2017) also found that "mortality and morbidity rates are significantly elevated in Black men, compared with men of other racial and ethnic groups" (p. 1009). In addition, they showed "survival rates comparing Black men with Caucasian men report clear disparity" (p. 1009). Likewise, Taitt (2018) stated that "in developed countries such as the United States and New Zealand, the mortality trend has been declining or stable," and "PSA testing has declined based on the 2012 USPSTF recommendations" (p. 1811). However, "many developing countries have seen a trend of increasing mortality rates, while their incidence rates have increased due to increased testing" (p. 1811).

According to Jemal, Center, DeSantis, and Ward (2010):

> incidence and mortality rates for most cancers (including lung, colorectum, female breast, and prostate) are decreasing in the United States and many other western countries, they are increasing in several less developed and economically transitioning countries because of adoption of unhealthy western lifestyles such as smoking and physical inactivity and consumption of calorie-dense food. (p. 1893)

They further submitted that "the international variations in cancer rates for most cancers largely reflect differences in environmental risk factors (including lifestyle and culture) rather than genetic differences" (p. 1893). Furthermore, "the future burden of cancer in the developing world is likely to be exasperated by the expected increases in life expectancy and aging and growth of the population" (p. 1893).

Jemal et al. (2010) found that "the international variations in prostate cancer incidence rates reflect differences in the use of prostate-specific antigen (PSA) testing, which detects indolent prostate cancer cases that may not otherwise have been detected in

one's lifetime" (p. 1897). They suspected that "the high prostate cancer incidence and mortality rates among black populations in the United States and other parts of the world including Jamaica and Trinidad and Tobago may reflect differences in genetic susceptibility" (p.1897).

Health Disparities and Prostate Cancer Morbidity/Mortality in the United States

There is a reality that in America, the prostate cancer "death rate for African-American men in 2000 was 66.9 per 100,000 males and for white men 27.7 per 100,000 males" (Odedina et al., 2004, p. 780). Scher, Solo, Valant, Todd, and Mehra (2015) also noted that "Prostate cancer is a significant cause of morbidity and mortality in the United States" (p. 1). They reported "an estimated incidence of 233,000 new cases and 29,480 deaths in 2014," which makes it "the most frequently diagnosed cancer and second most frequent cause of cancer deaths in US males" (p. 8).

Per Scher et al. (2015), in the United States, "the point prevalence of prostate cancer was 2.2 million in 2009, which will increase to 3.07 million in 2020"; of that, "2,121,650 (95.6%) presented with localized or locally advanced disease while 97,630 (4.4%) had metastatic prostate cancer (corresponding to non-castrate and mCRPC states)" (p. 8). They found that the "prevalence for 2009 was lower than that reported by SEER, in part because it did not account for prostate cancer incident cases diagnosed prior to 1990" (p. 8). Also, "model estimates for the year 2020 are based on existing/current (2009) disease incidence, diagnosis, and treatment patterns, and reflect demographic changes in the US population over time (e.g., the impact of the baby boomer population)" (p. 5). According to Yedjou et al. (2019), poor quality diet "and

obesity have long been considered as possible risk factors for PC. Several lines of research have shown the association between animal fat such as red meat consumption and diagnosis of PC especially among AA men" (p. 4).

Kelly et al. (2016) indicated that prostate cancer "is the most frequently diagnosed cancer among men in the United States (US), with 180,890 estimated new cases for 2016" (p. 2).They reported that despite evidence of "notable improvements in prostate cancer mortality rates in the US over the last few decades, it is estimated that 26,120 men (8% of male cancer deaths) will die from this disease in 2016," and that racial disparities "in prostate cancer are higher than for any other malignancy, with black men exhibiting a 2.5 fold greater risk of death from prostate cancer compared with white men" (p. 2). The study found that "black men had substantially greater risk of fatal prostate cancer than white men in every period and cohort examined, and this racial disparity was magnified amongst younger men" (p. 5). Further, Kelly et at. (2016) reported that recent studies of "prostate cancer mortality in the US have shown the black-to-white disparity beginning to narrow over the last decade, yet studies prior to 2007 had reported that the racial disparity was rising," adding that their study found "no improvement in the black-to-white disparity over the 28-year period examined" (p. 6). Also, "evidence has found that black race and low-income are associated with lower rates of aggressive treatment of prostate cancer among men with localized/regional disease" (p. 7).

Kelly et al. (2017) further reported that "Metastatic prostate cancer (PCA) remains a highly lethal malignancy in the USA" (p. 1). Also, there is "an urgent need to accurately assess recent incidence trends of metastatic PCA, particularly by age and race/ethnicity, as disparities have not been fully characterized" (p. 3). Moreover, while

their “main models” projected that “the burden of metastatic PCA will increase considerably by 2025 and that incidence rates will steadily rise, particularly among men aged ≤69 yr.,” the “black-to-white racial disparity in metastatic PCA continued to persist” (p. 6). Specifically, Black men currently exhibit prostate cancer “rates two times greater than those of white men, which is heightened to almost five times greater among men younger than age 50” (p. 6).

The American Cancer Society’s (ACS, 2018) age-adjusted incidence rates of prostate cancer among Black men remain 75% higher than those among non-Hispanic White men, and mortality rates among Black men are more than double. Further, the study showed “stark and significant geographic differences in prostate cancer incidence rates between black and white men” (p. 4). Cook et al. (2015) indicated that “it is not just blacks in the U.S. who have a relative high prostate cancer incidence; blacks in Brazil are 1.7-fold (12), and in the UK are 3-fold (13) more likely than whites to be diagnosed with prostate cancer” (p. 5). They concluded that within the United States, there is significant “geographical variability of racial differences in prostate cancer incidence” rates (p. 5).

Factors Related to Prostate Cancer Morbidity/Mortality for U.S. Blacks

According to Taitt (2018), “prostate cancer (PCa) incidence and mortality rates are among the highest for African Americans,” even though “the data is inconclusive regarding PCa rates in native African men, Black men residing in other countries, and men in Asia, Europe, and the Americas” (p. 1807). Taitt further noted that “African American men have among the highest incidence of PCa worldwide” and “are more

likely to develop PCa at any age, and develop the disease earlier in life than men from all other racial and ethnic groups" (p. 1811).

Cook et al. (2015) also noted that "Black men have a higher incidence of prostate cancer than white men in the U.S., but little is known whether incidence or racial differences vary geographically" (p. 1). He and Mullins (2017) indicated that "Prostate cancer mortality rates have decreased over recent decades, but racial disparities in prostate cancer survival still present as a serious challenge," explaining that "disparities may be impacted by age; in fact, African American men younger than age 65 have prostate cancer mortality rates nearly three times greater than that of White men" (p. 1). They added that "African American men are two and a half times as likely to die of prostate cancer as any other race" (p. 2). Also, He and Mullins stipulated that "prostate cancer may become distant metastatic disease at a rate of 4:1 starting at age 40 to 49 years," and concluded that "prostate cancer may grow more rapidly or transform into an aggressive form earlier in African American men compared with White men" (p. 2). Further, the "majority of the articles (68%) indicated the gap in survival and mortality between African Americans and Whites lessened with increasing age," with "a greater mortality difference between African American and White men younger than age 65 than of men older than age 65" (p. 5). Also, "as prostate cancer patients age, African American patients may have increased competing causes of death, which may narrow the disparity gap between the races" (p. 5). He and Mullins offered a detailed explanation, as follows:

> The first explanation to the survival and mortality gap decreasing with age may be that among younger prostate cancer patients, more aggressive disease is seen in African American men than White men. Within the literature collected, several studies have found that in patients younger than 60–70 years, African

> Americans present with higher grade and/or higher staged tumors when compared to Whites, while in patients older than 60–70 years the difference is less pronounced. (p. 5)

Furthermore, He and Mullins (2017) indicated that "African American patients younger than age 65 have reduced access to medical care when compared to White patients," while "the percent of African Americans under age 65 with no health insurance was almost twice that of Whites" (p. 5). For the majority of African Americans, "insurance status and employment status were associated with the presentation of advanced disease of prostate cancer," such that "Medicare could provide health care coverage to the patients over age 65 who could otherwise not afford adequate treatment, and create equal health care access to patients regardless of race" (p. 6).

Yedjou et al. (2019) found that "Prostate cancer (PC) is one of the most common cancers in men," while "global burden of this disease is rising" (p. 1). The study noted that "PC causes nearly 30,000 deaths and 230,300 new cases in the United States with the highest incidence and mortality rates among African-American (AA) men" (p. 2). The study indicated that vegetables and fruits "are the best known anti-cancer agents that contain a wide variety of different micronutrients with properties that could make it more difficult for cancer to develop" (p. 2). While consuming "vegetables and fruits containing high levels of polyphenols and flavonoids" promotes the PC arresting, "several studies and a report from our lab" showed that "a poor diet may contribute to approximately 10% to 75% of various cancer-related deaths" (p. 2). Further, "if a man is eating a healthy diet rich in vegetables and fruits, he can reduce his risk of getting PC by 75%" (p. 2). They explained in detail, as follows:

> A study reported that Asian populations have a relatively low incidence rate of PC compared to whites and black Americans because they use the extract of medicinal plants against cancer [19]. In general, scientific evidence from epidemiological studies suggests that consumption of high fiber, lean protein, and low fat together with high vegetables and fruits significantly reduces the overall cancer risks. (p. 2)

According to Yedjou et al. (2019), the "Asian population living in Asia and the United States exhibit the lowest frequencies of PC because they commonly consume soybeans," and the "organic compounds (isoflavones) that are present in soybeans are thought to have a potential protective effect against PC" (p. 4). The study found that "the biochemical properties and medicinal values of curcumin, garlic, and Vernonia amygdalina for their use in PC prevention and/or treatment" may be beneficial, as "phytochemicals in these natural products are more likely to not only prevent PC development, but also reduce its incidence and mortality rates, improve the survival rate, and reduce racial disparity in PC" (p. 10).

Screening Tests for Prostate Cancer

Globally, there is lack of unanimous opinion in favor of screening for prostate cancer. Sacher et al. (2015) noted that "Prostate-specific antigen (PSA)-based detection strategies are now widely used in the United States, with the result that most men are diagnosed with the disease clinically confined to the gland" (p. 1). This has resulted in "earlier intervention and, in parallel, declining mortality, although the overall impact of early detection is controversial" (p. 1). Sacher et al. indicated that "for many men diagnosed with prostate cancer, the risk of cancer-related symptoms, metastases, and death from disease is low" (p. 1).

Taitt (2018) noted that "PCa screening can detect early disease and it offers the potential to decrease morbidity and mortality," but was also skeptical about "potential and expected better outcomes from early detection" due to the fact that "benefits from PCa screening remained unproven prior to 2018" (p. 1810) He explained further, below:

> Recent data from the U.S. Preventive Services Task Force (USPSTF) report documented that PSA screening offers a potential benefit of reducing the chance of death from PCa in some men aged 55-69 years. The Task Force now recommends that men should discuss the benefits and harms of screening with their doctor, so they can make the best choice for themselves based on their individual circumstances. (p. 1809)

Taitt (2018) further reported there was "decline in PSA use," which resulted in "increase in the incidence of distant-stage disease from 2008 to 2014" (p. 1911). He added that "when there is an increase in screening, several distant cases may be caught in the earlier stages, but with the lowered use of screening, such cases may be missed" (p. 1811). Additionally, as of 2018, "there is adequate evidence from randomized clinical trials documenting that PSA-based screening in men aged 55-69 years might prevent approximately 1.3 deaths from PCa over approximately 13 years per 1,000 men screened" (p. 1811). Per Taitt, "evidence illustrated that screening programs might also prevent approximately 3 cases of metastatic PCa per 1,000 men screened' (p. 1811).

Obana and O'Lawrence (2015) further noted that "prostate-specific antigen (PSA) is discovered in a blood test to find cancerous cells associated with the prostate gland" (p. 17). The "discussion about PSA tests between health care providers and patients usually happens at age 50 years old, but prostate cancer screenings are available as early as 40 years old for those who have family history of cancer" (p. 18). Obana and O'Lawrence noted that men were ignorant of their prostate health, despite nearly 10,000 men dying from prostate cancer each year. It is "important for adult males living in the

United States to become aware of PSA tests to help detect and diagnose early prostate cancer" (p. 18). They indicated that "adult males avoided screening because of the perception that they were at low risk due to lack of family history and the belief that that they are living a healthy lifestyle," and further showed that "80% of primary care physicians (PCPs) in the United States informed adult males about the process of prostate cancer screening and 64% of PCPs recommended their patients to follow up with a PSA test" (p. 18). Obana and O'Lawrence emphasized that "Prostate cancer is one of the leading cancers among male adults 40 years of age and older and it is essential for this intended population to understand the benefits PSA testing" (p. 18). They explained, below:

> With routine doctor visits, adult males would also discuss with their PCP about being a candidate for prostate cancer screening. It is important for physicians to effectively communicate with their patients about the importance of PSA testing and the advantages of early screenings. (p. 18)

Obana and O'Lawrence (2015) showed that public awareness about PSA "testing may also influence patients to follow through with the screening," as "education and income level of adult males are both important to make an informed decision for PSA testing" (pp. 18-19). It is crucial for "adult males to understand the impact that PSA testing has in order to treat prostate cancer at an early stage," which would "prevent further harm to their bodies and improve their quality of life" (p. 19). Obana and O'Lawrence observed that communication "between men and their primary care physicians was critical in improving their awareness of PSA tests, their overall health, and ensuring that they received the proper screening" (p. 20). According to Obana and O'Lawrence, "only 30% of adult male patients" were interested in assuming greater

control of screening for prostate cancer, with the majority of participants desiring a shared decisional process with, and recommendations from, their health care provider.

Similarly, Reynolds (2008) indicated that "African American men have the highest rate of incidence for prostate cancer in the world and are more likely to die from the disease than other ethnic groups" (p. 172). Regular "screening for prostate cancer can lead to early detection of the disease, thereby reducing negative outcomes" (p. 172). However, "African American men are less likely than Caucasian men to engage in screening practices," due to a number of possible causes such as absence of "access to health care, socioeconomic status, inadequate knowledge, fear, patient-provider communication, distrust of the medical profession, and aversion to digital rectal exam" (p.172). As Reynolds explained:

> American Cancer Society, American Urological Association, and the American Medical Association all endorse PSA testing and DRE as screening recommendations. The American College of Physicians suggests that physicians describe the potential benefits and disadvantages of screening then individualize the decision to screen. The American Academy of Physicians has stated that they believe there is insufficient evidence to make a recommendation for or against routine screening for prostate cancer using PSA testing or DRE. Furthermore, the U.S. Preventive Services Task Force agrees that there is inconclusive evidence that early detection improves health outcomes. (p. 173)

Reynolds (2008) recommended that "men 50 and over be tested for prostate cancer annually through the use of PSA and DRE," and emphasized "men at risk for developing prostate cancer (African American men and men with a family history of prostate cancer) should be tested earlier" (p. 173). Results indicated that "Black men are substantially less likely than White men to undergo PSA screening" (p. 173). The study "supports previous research that suggests African American men have less knowledge about the risk for developing prostate cancer and about prostate cancer in general"; this

"lack of knowledge creates fear, which increases the likelihood that an individual will not access information on prevention" (p. 174). Per Reynolds, providers are "not getting the message out about the increased risk of African American men and prostate cancer," while physicians "must provide information about the advantages and disadvantages of the options, and the opportunity to integrate this information with the patient's personal values"; communication between patient and provider was found to be a valuable link in putting knowledge into practice (p. 174). Further, distrust of "medical professionals and the government were predisposing factors identified in both qualitative and quantitative studies that limited the participation of African American men in routine screening for prostate cancer" (p. 174). Reynolds (2008) offered details, as follows:

> Participants in focus groups conducted in the South Bronx voiced a distrust and fear of the health care system and felt that because of their race or ethnicity they received second-class care. One participant said, "Going to the doctor is traumatic. I don't trust any of them…. They don't care; they really don't care…. You're a person of color…your existence is unimportant." (p. 174)

Bergstralh et al. (2007) used "medical records to estimate the effectiveness of screening by PSA testing and/or DRE in reducing PC mortality" (p. 2). The study found that "screening with either DRE or PSA was generally associated with over a 50% reduction in PC mortality," and urged "a potential benefit of PSA and DRE screening on PC mortality" (pp. 5-6). Agalliu, Weis, Lin, and Stanford (2007) examined the "associations between screening by PSA and/or DRE during middle age" and "in relation to death from prostate cancer and other causes" (p. 934). The study found "a 62% reduction in prostate cancer-specific mortality associated with one or more PSA and/or DRE screening tests done within the five-year period preceding prostate cancer diagnosis" (p. 934). Also, "other observational studies have examined the relationship

between screening by PSA and/or DRE and prostate cancer mortality," such as "a population-based case control study in Olmsted County, Minnesota…reported a 50% reduction in prostate cancer mortality associated with DRE tests performed in the ten year period before diagnosis" (p. 934). Bergstralh et al. (2007) stated that "studies have reported a 20-30% prostate cancer mortality associated with screening," and concluded that there is "a reduction in prostate cancer-specific mortality associated with PSA DRE screening in middle-aged men" (p. 936).

Racial Disparities in the United States in Prostate Cancer Treatment and Research

Recall from above that according to Reynolds (2008), racial differences are "contributing factors to screening behaviors and possible causes of the striking disparity between prostate cancer incidence and mortality in African American men" (p. 172). Often, "African American men present at a later stage of prostate cancer than do other ethnic groups," with "a plausible explanation for that fact" being lack of health insurance (p. 173). Indeed, "men report that they do not get screened for prostate cancer because the tests are expensive and they do not have health insurance coverage" (p. 173). Reynolds showed that "Not knowing that screening was needed was cited as the Number 1 barrier of being screened for prostate cancer" among African American men, while "lower income men had significantly lower total knowledge scores using a revised Knowledge of Prostate Cancer Questionnaire than did men with higher incomes" (p. 174). Reynolds explained, below:

> There may also be inadequate knowledge on the part of the physician as well as the patient. In a 2005 survey conducted by Miles, only three quarters of physicians in high-rate cancer states identified African American men as a high-

> risk group. Where does that leave African American men, if 25% of their health care providers are unaware of the cancer risks facing this group? (p. 174)

According to Reynolds (2008), the fear of "developing prostate cancer and being worried that having an early detection exam would result in a diagnosis…were found to have a significantly negative association with intention to be tested for prostate cancer susceptibility" (p. 174). Further, there is "a culturally linked aversion to part of the screening process, namely, the DRE" (p. 174). Per Reynolds:

> A 1995 study conducted by Gelfand and colleagues indicated that older, more educated, and higher income men were more positive toward digital rectal exam than younger, less educated, and lower income men. Additionally, attitudes toward DRE became more negative when fear of cancer increased. In a qualitative study conducted by Forrester-Anderson in 2005, African American men reported that "men shy away because of the finger test." Embarrassment was cited as a barrier for participation in prostate cancer screening among African American men, in a 2005 study conducted by Shelton, Weinrich, and Reynolds. It is not known, however, how the men defined "embarrassment" in the study, or if there is a relationship between the embarrassment of a DRE performed by a personal physician versus an unknown physician. (p. 174)

Recall from Chapter I how Kang et al. (2018) reported that "PCa has risen to the first place among new cancer cases, and become the second leading cause of cancer-related deaths in males" (p. 2377). Further, "the global prevalence rate of PCa is rising rapidly" (p. 2377). The study "forecasted that by 2030, the number of newly diagnosed PCa cases and deaths will rise up to more than 1.8 million and 0.5 million, respectively," indicating that "PCa risk might increase due to multiple factors, including aging, genetic factors, pathological changes, diet, hormonal level, as well as ethnicity and environment" (p. 2377).

Scher et al. (2015) noted that understanding "the prognosis for patient populations at different points in the prostate cancer disease continuum" should be a required step in managing care and improving patient health (p. 1). Yet Mahal et al. (2014) demonstrated

doubt as to whether "African Americans (AAs) with intermediate- to high-risk prostate cancer" are given equal treatment as compared to White patients (p. 386). For "patients with intermediate to high-risk" prostate cancer, "definitive treatments have been shown to decrease prostate cancer-specific mortality" and "improve overall survival" (p. 386). African American men with "intermediate- to high-risk" prostate cancer "are less likely" to receive treatment with "curative intent" than are White men—such that the "disparity is worse in high-risk disease and is not improving over time" (p. 386). Given racial disparities in the treatment of prostate cancer, African American men "have a significantly higher risk of dying from" prostate cancer than White men (p. 386).

Increasing Prostate Cancer Screening to Decrease Morbidity and Mortality

Prostate cancer screening with the use of the prostate-specific antigen (PSA) test "is common" (Schenk et al., 2014, p. 2), while the digital rectal examination (DRE) is also commonly performed by physicians (Ashorobi et al., 2017, p. 82). The ACS recommends commencement of prostate cancer screening at age 45; PSA levels should guide further testing (Smith et al., 2018, p. 297). Scher et al. (2015) also "proposed a dynamic progression model that partitioned both the untreated natural history and post-treatment history of the prostate cancer disease continuum from diagnosis to death into distinct clinical states," where "each state represents a clinically significant milestone and key decision point that is easily recognized by patients, physicians, and researchers" (p. 1).

Recall from Chapter I how Baptista et al. (2018) stipulated that "screening for prostate cancer is a controversial issue" (p. 1). Despite the "United States Prostate, Lung,

Colorectal, and Ovarian Cancer Screening Trial found no benefits from using prostate-specific antigen (PSA) screening for prostate cancer diagnoses," the "results from the European Randomised Study of Screening for Prostate Cancer concluded that one prostate cancer death would be avoided and 27 excess cases detected per 781 men invited for screening with PSA" (p. 3). It was highlighted that a "decision about whether to be screened should be an individual one based on conversations with the physician about the benefits and adverse effects of screening, in order to help men make a decision based on personal values and preferences" (p. 4).

Taitt (2018) identified the "primary goal of screening for PCa is to detect the disease early with the expectation that it can be managed with better outcomes before it reaches the later metastatic stages," and added that "data from the USPSTF reported evidence that PSA screening offers a potential benefit of reducing the chance of death from PCa in some men aged 55-69 years" (p. 1813). Of note, "African American men were significantly less likely than Caucasian men to correctly identify early symptoms of PCa and the basic components of a prostate checkup," and "were also more likely to believe that 'pain' was the first symptom of PCa and were less likely to undergo screening and other early diagnostic procedures such as PSA testing and digital rectal examinations (DRE) compared to Caucasian men" (p. 1813). Taitt also showed how before the revised 2018 USPSTF report, "researchers have questioned whether the high mortality in African American men can actually be reduced by increasing awareness, screening, and treatment," and indicated "several limitations to PCa screening, including potential adverse health effects associated with false positives, overdiagnosis, and possible side effects related to biopsies and treatment" (p. 1813).

Obu (2014) reported that "screening is important for all men at the age when prostate cancer becomes more likely. But for black men, routine prostate cancer screening should start at an even younger age" (p. 041). Mahal et al. (2017) found that "several major cancer organizations in the United States recommend shared decision-making for PSA screening, with specific attention to race," adding that "the American Urological Association (AUA) recommends shared decision making to undergo PSA screening for men age 55-69 years (with individualized plans for Black men younger than age 55 years)" (p. 1098). Also, "the American Society of Clinical Oncology (ASCO) recommends shared decision-making in men with a life expectancy >10 years," while "the American Cancer Society (ACS) recommends the discussion of PSA screening to begin at age 50 years for men at average risk (and age 45 years for Black men) who are expected to live at least 10 years" (p. 1098). Rebbeck et al. (2013) noted that there is lack of data on the prevalence of PSA testing "among men in Sub-Saharan Africa (SSA)" (p. 2).

Taitt (2018) showed that "there is adequate evidence from randomized clinical trials documenting that PSA-based screening in men aged 55-69 years might prevent approximately 1.3 deaths from PCa over approximately 13 years per 1,000 men screened" (p. 1811). Taitt explained, as follows:

> The evidence illustrated that screening programs might also prevent approximately 3 cases of metastatic PCa per 1,000 men screened. The USPSTF therefore revised its 2012 PSA screening rating and concluded that although the net benefit of PSA-based screening in men aged 55-69 years is small, screening offers a potential benefit of reducing the chance of death from PCa in some men. Consequently, for men aged 55-69 years, the decision to undergo periodic PSA screening should be an individual one in consultation with their clinician. (p. 1810)

Hoffman (2011) also noted that in the United States, "approximately 90% of prostate cancers are detected by means of screening" (p. 2013). The "rationale for screening is that early detection and treatment of asymptomatic cancers could extend life, as compared with treatment at the time of clinical diagnosis" (p. 2014). Such screening should be "accurate, reliable, and easy-to-administer…detects clinically important cancers at a preclinical stage," while there should be "availability of effective treatment that results in better outcomes when administered early, rather than after signs or symptoms of disease have developed" (p. 2014). Hoffman urged that "experts recommend that men receive support in making informed decisions," rather than the usual way where "PSA testing is often performed without discussion of the benefits and harms of screening" (p. 2016). The aforementioned AUA and ACS guidelines "encourage shared decision making between patients and clinicians and periodic PSA testing when the patient's life expectancy is at least 10 years," including "informing him of his cancer risk…and educating him about the often indolent natural history of prostate cancer, the limited accuracy of screening and diagnostic tests, and the potential benefits and harms of screening and treatment" (pp. 2017-2018).

Rahal, Badgett, and Hoffman (2016) "found significant benefit from screening among trials with sufficiently long duration of PSA screening compared to control groups" (p. 5). However, the report suggested that "benefit is gained without requiring annual screening, which is consistent with studies that have modeled data from non-randomized cohorts of men and suggested benefit is affected by the interscreening interval" (p. 5). Accordingly, less frequent "screening is recommended for High Value care by the American College of Physicians" (p. 5).

Ogunsanya et al. (2017) evaluated "the knowledge of prostate cancer and screening and its associated factors in young Black men aged 18 to 40 years" (p. 1009). They supported the ACS guidelines that "men in higher risk groups (with positive family histories) should receive this information between age 40 and 50 years" (p. 1010). They observed that "questions regarding risk factors, screening age guidelines, limitations, and diet, were mostly answered incorrectly which are consistent with findings in older Black men," and that those "knowledge deficiencies can be used as a framework to enlighten young Black men about prostate cancer issues" (p. 1013). Ogunsanya et al. indicated that "participants who had positive health screening experiences, were more highly educated, and majored in health care and natural sciences, had higher PC knowledge, compared with their counterparts"; "rural residents also scored significantly lower on their knowledge scores," explained by the "significant geographical, economic, and cultural limitations" (pp. 1013-1014).

According to Tuong, Larson, and Armstrong (2014), modification of health behaviors is crucial in preventing "many diseases that are associated with significant morbidity and mortality in the United States" (p. 219). Health information involves "written pamphlets, videos, face to-face counseling, and web-based applications," but the "use of video as an educational medium offers several potential advantages" (p. 219).

Research on the Importance of Screening for Vitamin D

Recall from Chapter I how Batai et al. (2017) found that "African American men have higher incidence rates of aggressive prostate cancer, where high levels of calcium and serum Vitamin D deficient levels play a role in the racial differences in incidence"

(p. 1). They indicated that demographic features, such as "family history, socioeconomic status, access to medical care, other comorbidities, and diet and lifestyle have been shown to contribute to the increased burden of prostate cancer in AA men," and added that recent "studies have focused on differences in serum 25-hydroxyVitamin D (25(OH)D) concentrations as a source of the disparate trends seen in this disease" (p. 2).

Batai et al. (2017) noted that the "main source of 25(OH)D is derived from sunlight ultraviolet (UV)-B rays, accounting for over 90% of circulating levels," but high melanin, "commonly seen in ethnic groups with dark skin, such as AA men, reduces the amount of UVB radiation absorbed…decreasing the concentration of 25(OH)D and increasing susceptibility to developing Vitamin D deficiencies" (p. 2). Also, "AA men with higher Vitamin D levels see a reduced risk in high-grade disease, while results in Afro-Caribbean men residing in the Caribbean indicate Vitamin D insufficiency may contribute to increased prostate cancer risk" (p. 2). In addition, "molecular studies suggest deficiencies in Vitamin D overtime may lead to progression from pre-clinical to clinically aggressive forms of prostate cancer" (p. 2). Batai et al. established that in studies on "cancer aggressiveness, a large percentage of both aggressive and non-aggressive cases had mean levels of serum 25(OH)D below deficient levels, as defined by the Institute of Medicine (IOM)" (p .6).

Lenz (2009) found that "from 40% to 100% of community-living elderly men and women in both the United States and Europe have deficient levels of Vitamin D" (p. 365). Likely "1 billion people worldwide have Vitamin D deficiency or insufficiency," while an "estimated cost to our society of Vitamin D deficiency is reported to be between $100 and $200 billion per year" (p. 365). Of note, "most Vitamin

D researchers generally agree that 32 ng/mL is considered sufficient, and Vitamin D intoxication is observed at levels of 150 ng/mL or higher" (p. 366).

Lenz (2009) identified "the amount of solar ultraviolet B (UVB) radiation (determined by the time of day, season, latitude, skin pigmentation, use of sunscreen, and age), dietary habits, obesity, and many others" as key determinants of a person's Vitamin D levels (p. 366). The study reported that "emerging evidence showing the relationship between decreased cancer risk and Vitamin D intake may be relatively new or even unheard of for many health care professionals," yet research demonstrating a "relationship between solar radiation and cancer mortality in North America was actually published in 1941" (p. 366). Lenz concluded that obtaining "adequate amounts of Vitamin D is important not only for bone health but also for decreasing the risk for several other diseases and conditions, including cancer" (p. 368).

Forrest and Stuhldreher (2010) investigated "the prevalence of Vitamin D deficiency and its correlates to test the hypothesis that Vitamin D deficiency was common in the US population, especially in certain minority groups," and found that mounting "evidence suggests that Vitamin D deficiency could be linked to several chronic diseases, including cardiovascular disease and cancer"; Vitamin D helps "prevent cancer progression" (pp. 48-49). They noted that the "overall prevalence rate of Vitamin D deficiency was 41.6%, with the highest rate seen in blacks (82.1%), followed by Hispanics (69.2%)" (p. 49). The USPSTF (2014) concluded that the benefits and harms of screening for a Vitamin D deficiency cannot be determined based on a review of the literature. The USPSTF acknowledged how the Endocrine Society recommended

screening for Vitamin D deficiency only in individuals considered to have an “at-risk” status.

Forrest and Stuhldreher (2010) “found that over 80% of black adults, both men and women, would be categorized as Vitamin D deficient,” and “other minorities were also at a higher risk for Vitamin D deficiency, especially Hispanic men” (p. 52). They also found that as a result of “the skin pigment melanin absorbs sunlight, an important source of erethymal Vitamin D, people of color are at particularly high risk for Vitamin D deficiency” (p. 52). They explained that sun exposure is the “primary determinant of Vitamin D status and non-whites require more sunlight exposure to obtain adequate Vitamin D levels because of skin pigmentation” (p. 52). Richards et al. (2017) also noted that skin pigmentation is the “largest predictor of Vitamin D deficiency in the USA, as UV-induced cutaneous synthesis of Vitamin D is the primary source of the Vitamin D prohormone and is inhibited by melanin” (p. 1).

Lappe (2011) reported that Vitamin D deficiency is “pandemic, spanning many continents and including all ages, genders and racial/ethnic groups,” and recently, “world-wide attention is focused on the importance of Vitamin D in optimizing health and preventing disease” (p. 58). The study reported an “optimal level of at least 30 to 32 ng/mL (75-80 nmol/L) is also suggested by the relationship between 25(OH)D and both bone mineral density and lower extremity neuromuscular function in National Health and Nutrition Examination Survey III (NHANES III),” also finding that low Vitamin D status “is prevalent across all age-groups, geographic regions, and seasons” (p .60). Lappe indicated how it is “very difficult to achieve and maintain optimal levels of serum 25(OH)D by diet alone since few foods are natural sources of Vitamin D and fortified

foods contain limited amounts" (p. 61). Thus, "Vitamin D dietary supplements, which are safe and inexpensive, are becoming widely available" (p. 61). The IOM had, during that era, "raised the tolerable upper intake level of Vitamin D from 2000 IU/day to 4000 IU/day" (p. 62).

Two Vitamin D findings were considered highly noteworthy: "(a) Vitamin D receptors are present in nearly every tissue and cell in the body and (b) 25(OH)D-1a-hydroxylase…has been identified in a multitude of cells outside the kidney" (Lappe, 2011, p. 63). Further, "preclinical research has advanced the field by elucidating mechanisms underlying the preventive effects of Vitamin D" (p. 63). Lappe indicated that an "impressive body of evidence suggests that Vitamin D decreases the risk of cancer," while it has "long been recognized that there is an inverse association between sunlight exposure and malignancy" (p. 63). The study concluded that there is even "stronger evidence for the anticancer effect of Vitamin D"—as provided by "numerous cohort and case–control studies that show an inverse association between serum 25(OH)D and cancer incidence/mortality" (p. 63).

Yao et al. (2017) also found "(AA) individuals…have notably lower 25-hydroxyVitamin D [25(OH)D] concentrations…possibly because of the high content of skin melanin coupled with the relatively low UV-radiation exposure of AAs in North American" (p. 1362). The study suggested that Vitamin D deficiency "has been implicated in a number of chronic diseases including cancer," and the "high prevalence of Vitamin D deficiency in AA populations may put them at high risk of these diseases and play a role in the observed health disparities" (p. 1363). Batai et al. (2017) similarly

found that Vitamin D deficiency "is also more common in AAs than EAs, and the difference in serum Vitamin D levels may help explain the PCa disparities" (p. 1).

Batai et al. (2017) further "demonstrated that the active form of Vitamin D, 1,25-dihydroxyVitamin D, has anti-inflammatory effects by mediating immune-related gene expression in prostate tissue" (p. 1). Kang et al. (2018) added that in "a laboratory investigation, prostate cell division and growth was reported to be affected by Vitamin D," and reported that "low plasma levels of Vitamin D were hypothesized to be one of the important contributors to PCa" (p. 2378). They disclosed that "clinical trial also found that pre-diagnostic serum levels of Vitamin D >85 nmol/L may improve survival in men with PCa" (p. 2378).

Research to Increase Knowledge of Vitamin D Deficiency

Trump et al. (2009) reported that Vitamin D "deficiency and insufficiency were common among men with prostate cancer," and indicated that "25-OH Vitamin D is the accepted measure of the adequacy of Vitamin D body stores" (p. 2). The study "reported that 57% of patients admitted to the Massachusetts General Hospital were Vitamin D-deficient and Vitamin D deficiency was still common (42%) after individuals with factors known to lead to Vitamin D deficiency were excluded" (pp. 2-3). Trump et al. explained that "epidemiological data indicate that Vitamin D deficiency is associated with an increased risk of many types of cancer," and reported that increasing data "link Vitamin D deficiency and cancer prognosis, and numerous studies suggest that Vitamin D deficiency is associated with an increased risk of medical complications to which patients with cancer are already predisposed" (p. 3). Petrilli et al. (2018) found that low "serum

25(OH) D levels have been associated with increased cardiovascular and all-cause mortality and other adverse outcomes," and that "Vitamin D supplementation is safe and low cost" (p. 1444).

Cashman and Kiely (2011) offered an "overview of the approach used by the IOM committee to revise the DRI for Vitamin D and to collate from a number of authoritative sources," while identifying "key knowledge gaps in Vitamin D nutrition from the public health perspective" (p. 1617). They found that in "2010, when [IOM] revised the DRI for Ca and Vitamin D, the research output in the field of Vitamin D increased exponentially, yielding a considerable body of data" (p. 1617). This "DRI report is the most comprehensive document on Vitamin D nutrition to date" (p. 1617). Ever since the "amount of research data generated since 1997 advanced the knowledge base in Vitamin D to the extent that for the first time, the DRI committee had sufficient evidence on which to base estimated average requirements (EAR)" (p. 1617). Cashman and Kiely (2011) reported that "the committee proposed a serum 25-hydroxyVitamin D (25(OH)D) level of…50 nmol/l as its estimate of the…level that would meet the requirement of nearly all (i.e. 97·5 %) 'normal healthy persons'" (p. 1617). They explained problems associated with lack of information, however, below:

> The scarcity of information in some life stages, particularly pregnancy, infancy and adolescence, as well as insufficient experimental data in human volunteers for non-skeletal health indicators, were all identified by the DRI committee as obstacles to defining Vitamin D requirements using any but the indices of bone health listed above. Experimental data in appropriately designed studies are required to progress the debate and enable consideration of data appropriate to potentially vulnerable life stages as well as clarify the putative role for Vitamin D in non-skeletal health outcomes. (p. 1618)

Felcher, Gold, Mosen, and Stoneburner (2017) evaluated "the impact of clinical decision support (CDS) tools on rates of Vitamin D testing" (p. 776). The study indicated

that screening for "Vitamin D deficiency has increased in recent years, spurred by studies suggesting Vitamin D's clinical benefits" (p. 776). Further, the "rate of outpatient visits in the United States associated with Vitamin D deficiency tripled from 2008 to 2010, rising to 1,177 visits per 100,000 people; half of clinical laboratories surveyed reported that testing for serum 25-hydroxy Vitamin D rose by at least 50% between 2008 and 2009" (p. 776). The UPSTF and the American Board of Internal Medicine Foundation both "found insufficient evidence to support screening for Vitamin D deficiency in the general population," given "an initiative to reduce overuse of tests and procedures, recommends avoiding screening for patients at low risk of Vitamin D deficiency" (p. 777). Felcher et al. reported "significantly reduced overall rates of Vitamin D screening and a significant increase in the proportion of ordered Vitamin D screening tests that were clinically appropriate," which "support the Institute for Healthcare Improvement's triple aim of increasing quality, increasing patient-centered care, and decreasing cost" (p. 778). The study concluded that "a set of inexpensive, easily implemented CDS changes greatly reduced rates of inappropriate Vitamin D testing in an integrated health plan" (p. 779).

Murphy et al. (2012) "found that season of blood draw and lack of Vitamin D supplement use was significant for EA men; lack of Vitamin D supplement use predicted deficiency among AAs" (p. 424). They explained that because "season is not an easily modifiable risk factor, supplementation may be the easiest way to overcome this issue," and indicated that "more than 90% of the AA men have deficiency" in Vitamin D (p. 424). Further, "AA people are at increased risk for many of these diseases. It is essential, therefore, to maintain normal Vitamin D status," suggesting measures to avoid Vitamin D

deficiency, such as "increased skin exposure to sunlight, increased fortification of food items with Vitamin D, and Vitamin D supplementation" (pp. 424-425). The study offered that in the "absence of adequate exposure to sunlight, there is mounting evidence that at least 1,000 IU of dietary or supplemental Vitamin D intake is required daily to prevent Vitamin D deficiency" (p. 426).

Goodman, Morrongiello, and Meckling (2016) promoted an intervention to increase Vitamin D knowledge and intake. They indicated that Vitamin D is "crucial for bone health, including the prevention of rickets in children and osteomalacia in adults," while sufficient serum Vitamin D concentrations "also may be protective against a range of disease states, including cancer, cardiovascular disease, diabetes and multiple sclerosis, and may enhance the immune system" (p. 2). As "individuals with darker skin pigmentations have a higher concentration of melanin in their skin, placing them at higher risk for Vitamin D insufficiency; this makes Vitamin D particularly important for non-Caucasian individuals, including immigrants to Canada" (p. 2). The study reported that "after adjusting for gender and education, study group had a significant effect on the change in Vitamin D intake from pre- to post-intervention" (p. 9). Goodman et al. offered details, as follows:

> Specifically, the mean Vitamin D intake of intervention participants increased more than that of control participants. Mean Vitamin D intake from supplements increased significantly by 267 IU/day among intervention participants, while a nonsignificant increase was observed in the control group. The increase in total daily Vitamin D intake (food + supplements) was thus approximately 43% greater in the intervention (+308 IU) than the control group (+131 IU). The additional 177 IU/day Vitamin D consumed by intervention participants is roughly equivalent to an extra 1¾ cups of milk or ½ to 1 serving of oily fish per day, an increase we feel is clinically relevant. (p. 9)

In addition, "blood Vitamin D concentrations in our sample improved significantly from pre-test (27 nmol/L) to post test (43 nmol/), but did not differ significantly between groups" (pp. 9-10). Also, "an analysis of survey measures indicates that participation in the intervention led to improved perceptions and knowledge of Vitamin D," and "the intervention group agreed more strongly with the importance of taking Vitamin D supplements…suggesting that the intervention had the intended effect. Vitamin D knowledge increased significantly only in the intervention group" (p. 10). The study found that "higher education was associated with more frequent app use, similar to previous research indicating that individuals with higher education levels were more likely to adhere to a dietary intervention" (p. 10).

Theoretical Framework Guiding the Study

Three theories were the basis for the theoretical framework guiding the present study: Health Disparities Theory (Institute of Medicine [IOM], 2012), Self-Efficacy in the Social Cognitive Theory of Bandura (1997), and Diffusion of Innovation Theory (Rogers, 1995). This section briefly reviews these theories.

Health Disparities Theory

Health disparities theory is also relevant (IOM, 2012). Numerous works, such as the IOM (2012) report, have focused on health disparities as a major public health problem. This includes the 2003 report by the IOM on *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare,* which documented that racial and ethnic minorities have less access to health care and often receive poor quality care. Also, "people of color experience an earlier onset and a greater severity of negative health

outcomes" (p. 4). What emerges is a theory of health disparities that encompasses key themes, including: the persistence of health disparities; impact of the economy and increasing poverty; role of race and racism; importance of place, as in residential segregation and impact of low-income communities; the need to increase awareness about them, given its low level in the public at large; the need for health in all policies; and the role of the community in creating a health disparities agenda (p. 4).

The National Academies of Sciences, Engineering, and Medicine (NASEM, 2017) have continued the effort to address health disparities and foster equity in health, while focusing on taking action on the level of communities via coalitions, collaboration, and partnerships. Others have also contributed to these efforts (Betancourt, Green, Carrillo, & Ananeh-Firempong, 2003; LaVeist, Gaskin, & Richard, 2009; Rose, 2018; Wallace, 2008).

As per NASEM (2017), health disparities are or reflect differences between racial or ethnic groups in their health status, but disparities can exist across many other dimensions as well, such as gender, sexual orientation, age, disability status, socioeconomic status, and geographic location. According to Healthy People 2020, all of these factors, in addition to race and ethnicity, shape an individual's ability to achieve optimal health (NASEM, 2017).

At the same time, the *National Standards for Culturally and Linguistically Appropriate Services in Health and Health Care* (USDHHS, 2013) explained how health disparities "adversely affect neighborhoods, communities, and the broader society, thus making the issue not only an individual concern but also a public health concern" (p. 9). Also, the *National Standards for Culturally and Linguistically Appropriate Services in*

Health and Health Care "align with the" the actions plans of other government agencies (e.g., Health and Human Services) to reduce racial and ethnic health disparities (p. 9).

An analysis by LaVeist et al. (2009) and the Joint Center for Political and Economic Studies found that eliminating health disparities for minorities would have reduced direct medical care expenditures by $229.4 billion for the years 2003-2006. In addition, for the year 2016, about 29,530 cases of newly diagnosed prostate cancer were expected for Black men (ACS, 2016). This would represent 31% of all cancers diagnosed for Black men (ACS, 2016). Hence, the emergent theory of health disparities presented as themes by the IOM (2012), as described above, was important for framing the current research.

Social Cognitive Theory: Self-Efficacy

Bandura's (1997) concept of self-efficacy was advanced as a key component of the social cognitive theory (SCT). According to Bandura, self-efficacy "is based on the principal assumption that psychological procedures, whatever their form, serve as a means of creating and strengthening expectations of personal efficacy" (p. 193). The theory advocates a theme of "triadic reciprocity," which asserts that a person's behavior is constantly under the reciprocal influence of the environment and personal cognitions (Tsang et al., 2012, p. 1). According to Tsang et al., self-efficacy "refers to one's beliefs in one's capability to organize and execute the courses of action required to achieve given results" (p. 1). Further, Bandura emphasized that "self-efficacy beliefs determine how people feel, think, motivate themselves and behave" (p. 1). Tsang et al. emphasized that "self-efficacy functions as a multilevel and multifaceted set of beliefs, each differing in

level, strength, and generativity," where self-efficacy "assessment is needed for understanding the nature and strength of beliefs that influence performance" (p. 2).

Self-efficacy theory assumes that confidence, or perception of a task as doable, is the most important precondition for performing a desired behavior or for changing an ineradicable behavior, while "different modes of efficacy induction, diverse populations, using both inter-individual and intra-individual verification, in all sorts of domains of functioning, and with micro level and macro level relations" may impact self-efficacy (Bandura, 1997, p. 18).

Thus, the study tools used self-efficacy theory for good reason in assessing confidence to talk to a medical provider about key issues of focus: i.e., about prostate cancer and screening as well as about Vitamin D screening and supplementation.

Diffusion of Innovations Theory

Rogers (1995) invented the diffusion of innovations theory to illustrate the adoption and spread of innovations by individuals in a social network. According to Rogers, diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). Greenhalgh, Robert, Macfarlane, Bate, and Kyriakidou (2004) broadened the theory to address the assimilation and implementation of service-level innovations in health care organizations. They defined it as "a novel set of behaviors, routines, and ways of working that are directed at improving health outcomes, administrative efficiency, cost effectiveness, or users' experience and that are implemented by planned and coordinated actions" (p. 582).

The diffusion of innovations theory was pertinent to the present study because it sought to diffuse learning about prostate cancer and screening via the Prostate Cancer and

Screening Knowledge Test (PC-S-KT-39)—and learning about Vitamin D screening and supplementation to other Black males.

The new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) is considered a new innovation in providing online education, and the study participants had an opportunity to indicate if they would recommend the test to other African American men, as an indicator of the value placed on diffusing this new innovation online.

Conclusion

This chapter provided a review of the literature, including the following topics: (a) prevalence of prostate cancer morbidity and mortality globally; (b) health disparities and prostate cancer morbidity/mortality in the United States; (c) factors related to prostate cancer morbidity/mortality for U.S. Blacks; (d) screening tests for prostate cancer; (e) racial disparities in the United States in prostate cancer treatment research; (f) increasing prostate cancer screening to decrease morbidity and mortality; (g) research on the importance of screening for Vitamin D; (h) research to increase knowledge on Vitamin D deficiency; and (i) the theoretical framework guiding this study.

Chapter III next describes in detail the methods used in this study. This includes a description of the study procedures, study participants, and research instrumentation. Also, how the data were collected, treated, and analyzed is presented.

Chapter III

METHODS

This chapter provides a description of the methods and procedures followed in this study. This includes the following: the study design and procedures, description of the study participants, and description of the research instruments. Finally, the chapter provides the treatment of the data and data analysis plan.

Study Design and Procedures

The cross-sectional study used an online survey. Qualtrics provided the platform and secure technology to support the online survey—as the only platform deemed sufficiently secure for research use by Teachers College, Columbia University. This section provides an overview of all relevant study procedures.

IRB Approval

First, before any data collection began, this study received approval from the Teachers College, Columbia University Institutional Review Board (IRB) as Protocol #19-134—with an "exempt status" (see Appendix A, IRB Approval Letter). It was not until IRB approval was attained that the study's data collection began.

Recruitment of Study Participants

This study recruited 194 Black men between the ages of 40 and 76 who were potentially at risk for prostate cancer. Participants were recruited to this study via a social media campaign, globally, wherein the main study recruitment message, shown below, was disseminated via Facebook, emails, text messages, and twitter:

"Go to https://tinyurl.com/Black-Men-Age-40-PLUS to take the Prostate Cancer & Screening—& Vitamin D Survey for Black Men age 40 & above for a chance to win 1 of 3 $100 Amazon gift cards" (see Appendices B and C).

In addition, flyers (see Appendix D, Study Flyer) were distributed in venues frequented by African American men, including barber shops and churches, featuring the same message shown above.

In addition, members of my extended social network were asked to help recruit Black males to the study using three different ways: (a) by posting the study flyer physically in their building, (b) by distributing the flyer to their clientele (many copies were provided to that effect), or (c) by sending an email out on any listserv that they may have had (not all entities had listservs). This flyer outlined the tasks involved in the study, including taking a 20-minute online survey. The flyer may have motivated potential participants to join the study by having photographs of Black men and inviting interested parties to take part in the study for a 3 in 250 chance of winning one of three $100 Amazon gift cards by providing their email addresses.

Also, the study's IRB approved email message (see Appendix B, IRB Approval Email) was also distributed widely. Finally, the Principal Investigator texted an invite to potentially interested participants (see Appendix C, IRB Approval Text Message).

The Screening Tool Questions: Inclusion-Exclusion Criteria

The study Screening Tool embodies the study inclusion-exclusion criteria, as shown in Appendix A and below:

1) Are you a Black man who is age 40 or older?
Yes ___ No___

2) Are you able to read and understand English on a high school level?
Yes ___ No___

3) Are you able to spend about 20 minutes answering a survey—for a chance to win one of three $100 Amazon gift cards?
Yes___ No____

Meeting additional study inclusion criteria: Survey completion with data on a study outcome variable. After a period of 2 weeks, 390 participants had completed the Informed Consent and proceeded to start the survey. However, data analysis could only proceed with 194 who completed the survey to the point of providing data for at least one of this study's two outcome variables. Another 132 were eligible for study participation, but did not complete the survey to the point of providing data for a study outcome variable. When comparing the group of survey completers (n=194) to the group of survey non-completers (n=132), using independent t-tests, there were no significant differences between the groups on dichotomous variables (i.e., if married, if lives in U.S., if employed), and not for continuous variables (i.e., age, skin tone, annual household income, level of education).

Some men contacted the Principal Investigator to share a problem that contributed to survey non-completion: i.e., if taking the survey using their cell phones and a new call came through, the system took them away from the survey online on the Qualtrics platform, and they would have to start all over again. This was both discouraging and

created some duplicate IP addresses, as some attempted survey completion a second time. Some 37 instances of duplicate IP addresses were examined and deemed to be non-suspicious and benign—and not strategic attempts to increase one's chances of winning a prize. Instead of eliminating these 37 and reducing the sample size further from 194 to 157, the decision was made to retain these non-suspicious and benign duplicate IP address cases. Hence, the final sample was N=194.

Although the intent was to collect up to 250 responses, only 194 respondents met the additional study inclusion criteria of providing sufficient data as survey completers on at least one of the study's outcome variables.

Study Completion and Entering Email Address for Chance to Win a Prize

Once the survey was completed, participants were routed to a "thank you" page where they were thanked for study participation and invited to enter their email address, thereby formally entering the lottery for a 1 in 3 chance to win one of three $100 gift cards for use on www.Amazon.com. As a final step, the webmaster of the Research Group on Disparities in Health (RGDH), Dr. Rupananda Misra, had responsibility for the program to select the three winners. The winners received an email with the bar-coded gift certificate information. The Principal Investigator did not have access to the email addresses. Also, of note, study participants were made aware that their study information was not linked to their email addresses, thereby ensuring their confidentiality.

Other Study Procedures

Completion of the survey took an estimated 20 minutes of time. Those participants who were interested in the study were able to click on the study link to access

the survey. Immediately after clicking on the study link, potential participants read and electronically signed informed consent documents and read their participants rights (see Appendix E). After giving consent, participants completed a short screening questionnaire to assess study eligibility (see Appendix G).

If they were not eligible, they were routed to a disqualification page explaining that they were ineligible and could market the website online to their peers. If they were eligible, participants were able to begin the survey.

Description of the Research Instrumentation

The study measure is entitled "The Prostate Cancer & Screening—& Vitamin D Survey for African American Men" (see Appendix G). This survey has many parts, as described in this section.

Most of the survey parts are standard tools used by the RGDH, directed by Professor Barbara Wallace at Teachers College, Columbia University. The RGDH is part of the Center for Health Equity and Urban Science Education (CHEUSE), Teachers College, Columbia University; Professor Barbara Wallace is Co-Director of CHEUSE. Numerous studies are conducted annually by the RGDH, with Dr. Barbara Wallace serving as the research sponsor; this doctoral dissertation was one of those studies. Thus, a good number of the subscales in this study were utilized in previous research studies of the RGDH. Other survey parts are new, having been created for first-time use in the present study by the Principal Investigator and the dissertation sponsor, Professor Barbara Wallace, Director of the RGDH.

This section describes all of the survey parts, or scales and subscales, in detail (see Appendix G).

Part I: Basic Demographics (BD-9)

The BD-9 is a standard tool used by the RGDH. Here, this scale has nine items to capture basic demographics of the sample (e.g., age, race/ethnicity, education level, household income, and employment status). The tool permits descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part II: Brief Health Survey (BHS-5)

The BHS-5 is another standard tool used by the RGDH. In this study, the tool has five items, reduced from a typical eight items, and eliminating type of insurance, for example, to lessen the burden of time on study participants. The tool permits descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part III: Prostate Cancer Scale (PCS-6)

Professor Barbara Wallace developed the PCS-6 as a tool used by the RGDH that was first used by Hall (2018). Questions permit obtaining data on any diagnosis of prostate cancer or being told one is at risk of prostate cancer, as well as history of prostate cancer screening, and family history of prostate cancer diagnoses and deaths. It was reduced by about three items (e.g., prostate cancer diagnoses and deaths for friends and acquaintances) to lessen the burden of time on study participants. The tool permits

descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part IV: Vitamin D Scale (VDS-4)

Professor Barbara Wallace developed the VDS-4 as a new tool used by the RGDH that was created for first-time use in this study. The tool permits determining if participants were ever screened for Vitamin D, or told they were Vitamin D-deficient, or given a recommendation to take Vitamin D supplements, and any history of taking Vitamin D supplements. The tool permits descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part V: Prostate Cancer and Screening Knowledge Test (PC-S-KT-39)

Professor Barbara Wallace and the Principal Investigator developed the PC-S-KT-39 as a new tool used by the RGDH that was created for first-time use in this study. All 39 statements in this True-False test are TRUE, allowing the test to serve as a brief online intervention designed to support men in their decision making about prostate cancer screening and treatment by aspiring to increase their knowledge and self-efficacy to talk to a medical provider. The tool permits ascertaining the men's level of knowledge for (a) prostate cancer and screening, and (b) Vitamin D screening and supplementation. The tool permits descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part VI: Diffusion of the Innovation of the Prostate Cancer Knowledge Test (DOI-PCKT-1)

The DOI-PCKT-1 is a standard tool of the RGDH, being widely used, typically after exposure to a brief online intervention (e.g., Hall, 2018). This tool elicits a yes or no

response to a single question about whether the participant would recommend to others the online intervention of taking the new PC-S-KT-39 and, specifically, for this study, recommend it to other African American men. The tool permits descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part VII: Pre- and Post-Knowledge Test—Ratings for Knowledge and Self-Efficacy to Talk to a Medical Provider (PRE-A-POST-KT-RF-K-SETMP-8)

Professor Barbara Wallace and the Principal Investigator developed the PRE-A-POST-KT-RF-K-SETMP-8 as a new tool for use by the RGDH that was created for first-time use in this study—while following a standard format commonly used for RGDH measure. Specifically, this tool obtains self-ratings for knowledge of prostate cancer and screening, and knowledge on Vitamin D screening and supplementation, as well as self-ratings for self-efficacy to talk to a medical provider about prostate cancer and screening, and about Vitamin D screening and supplementation. Specifically, these ratings are ascertained in succession for *before* taking the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) and for *after* taking the new test.

The PRE-A-POST-KT-RF-K-SETMP-8 tool has the following subscales of special note, requiring special calculation (e.g., item #1 and item #5):

- **Before Took PC-SKT-39 Global Knowledge Subscale #1** = based on item #1 *before* rating of what knew about prostate cancer and screening, and item #5 *before* rating of what knew about Vitamin D and taking a Vitamin D supplement.
- **After Took PC-SKT-39 Global Knowledge Subscale #2** = based on item #2 *after* rating of what knew about prostate cancer and screening, and item #6 *after* rating of what knew about Vitamin D screening and taking a Vitamin D supplement.
- **Before Took PC-SKT-39 Global Self-Efficacy Subscale #3** = based on item #3 *before* rating for confidence to talk to a medical provider about prostate

cancer and screening, and item #7 b*efore* rating for confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement.

- **After Took PC-SKT-39 Global Self-Efficacy Subscale #4** = based on item #4 *after* rating for confidence to talk to a medical provider about prostate cancer and screening, and item #8 *after* rating for confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement.

Finally, the new tool permits descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Treatment of the Data

The data were transferred from the online Qualtrics platform to the latest version of SPSS, i.e., 25.0. Data analysis proceeded using SPSS 25.0.

Data Analysis Plan

Given a global online sample of Black men (n=194) who responded to a social media campaign (i.e., "*Go to https://tinyurl.com/Black-Men-Age-40-PLUS to take the Prostate Cancer & Screening—& Vitamin D Survey for Black Men age 40 and above for a chance to win 1 of 3 $100 Amazon gift cards"*) and completed the study, the following research questions were answered, using the data analysis plan indicated.

1-What are the men's demographic and background characteristics (e.g., age, skin color, partner status, born in the United States—yes/no, living in United States or other country, annual household income, level of education, employment status.)?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

2-How do the men rate their health status, and what is their Body Mass Index, rating of their weight status, and rating of the overall quality of care received for their health?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

3-What is the men's prevalence of a diagnosis of prostate cancer, being told they were at risk for prostate cancer, history of screening for prostate cancer by a Digital Rectal

Examination (DRE) or Prostate-Specific Antigen (PSA) Test, as well as the prevalence in their family of prostate cancer diagnoses and deaths from prostate cancer?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

4-What is the men's history of having a Vitamin D screening, being told they were Vitamin D-deficient, being advised to take a Vitamin D supplement, and taking a Vitamin D supplement?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

5- What is the men's level of knowledge for prostate cancer and screening, and for Vitamin D and taking a Vitamin D supplement?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

6-After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers (i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), do the men recommend the PC-S-KT-39 to other African American men as an online intervention (i.e., diffusion of the innovation)?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

7-After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers (i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), how do the men rate their self-efficacy—or **item #4 after rating** for confidence to *talk to a medical provider about prostate cancer and screening*, and **item #8 after rating** for confidence to *talk to a medical provider about Vitamin D screening and taking a Vitamin D supplemen*t?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

NOTE: item #4 and item #8 after ratings are the two study outcome variables/dependent variables

8-After taking the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—in order to determine if taking the PC-S-KT-39 may serve as a potential online intervention that may significantly increase knowledge and self-efficacy levels, how do the men **rate themselves for before taking the PC-S-KT-39 versus after taking the PC-S-KT-39** for (a) what they knew about prostate cancer and screening, (b) what they knew about Vitamin D screening and taking a Vitamin D, (c) confidence to talk to a medical provider about prostate cancer and screening, and (d) confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement—and

was there a significant difference in mean scores from before to after taking the PC-S-KT-39?

Data Analysis Plan: Paired t-tests (before v. after ratings)

9-Are there any significant relationships between selected demographics and (a) study outcome variable/dependent variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy),*** and (b) study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)?***?

Data Analysis Plan: Inferential statistics, specifically, independent t-tests and Pearson correlations

10-What are the significant predictors of (a) study outcome variable/dependent variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy),*** and (b) study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)?***

Data Analysis Plan: Backward stepwise regression

Conclusion

Chapter III provided the methods used in the present study. This included an overview of the study design, study procedures, recruitment of participants, description of the study participants, and a description of the research instrumentation. The chapter concluded with the data analysis plan.

Chapter IV, Results, provides the results of data analysis.

Chapter IV

RESULTS

This chapter provides the results of the data analysis. The results are organized by research question, including presentation of data in tables, to summarize the findings.

Data Analysis Results by Study Question

Results for Research Question #1

What were the demographic characteristics of the sample? (Survey Part 1-BD-10)

The study sample included 194 Black males. While 393 gave informed consent to engage in the study, 194 finished the entire survey. There were 132 who were eligible for study participation, but did not complete the survey to the point of providing a primary outcome; t-tests showed there were no differences between completers (n=194) versus non-completers (n=132) on several variables (age, skin color, annual household income, level of education, and if married, if born in the U.S., and if employed)—finding no significant group differences.

The study's convenience sample of Black males (N=194) was mostly married (75.85, N=147) and had a mean age of 49.53 years (*min 40, max 76, SD =8.73*). For example, those ages 51 to 70 made up 34.2% (n=66). The sample was well educated with 24.7% (n=48) having an Associate Degree, 20.6% (n=40) having a Bachelor's Degree,

18% (n=35) having a Master's Degree, and 5.2% (n=10) having a Doctoral Degree. *The mean annual income was 4.21. for category 4 of $40,000-$49,999 (min 1, max 9, SD=1.64*); for example, 17.3% (n=30) reported having annual household incomes of $40,000 to $49,000. Most of the participants were employed (n=188, 96.9%) and born in the United States (n=152, 78.4%).

As a reflection of being a global sample, if not a sample of men born in Ghana (77.3%, n=194) who are now dispersed across the globe, over two-thirds (77.3%) were born in Ghana, while 78.4% (n=152) were currently living in the United States and 15.5% (n=30) were currently living in Ghana—followed by another 5.1 (n=10) currently living in other countries (e.g., 2 [1.0%] each in United Kingdom, Canada, Jamaica, Spain; and 1 [.05%] each in Netherlands, Armenia, Germany, Italy). [Note that data for n=1 at 05% do not appear in the table, being combined for other countries].

If not born in Ghana, another 10.8% (n=21) were born in the United States, while 4.1% (n=8) were born in Jamaica, 2.1% (n=4) in Nigeria, followed by lower representation of other African countries or Black nations around the globe.

See Table 1.

Table 1. Demographic Characteristics of Sample (BD-10) (N=194)

	N	%		N	%
Race/Ethnicity (N=194)			**Employment Status (N=194)**		
Black (All Male)	191	98.5	Employed	188	96.9
Missing	3	1.5	Unemployed	6	3.1
Age (N=194)					
40-45	81	41.8	**Household Income (N=194)**		
46-50	40	20.7	1. Less than $10,000	17	9.8
51-55	34	17.5	2. $10,000 to $19,000	8	4.6
50-60	16	8.1	3. $20,000 to $39,000	29	16.8
61-65	9	5.0	4. $40,000 to $49,000	30	17.3
66-70	7	3.6	5. $50,000 to $99,000	58	33.5

71-75	5	2.5	6. $100,000 to $199,000	24	13.9
76-80	2	1.0	7. $200,000 to $299,000	4	2.3
M age=49.53, SD=8.73,			8. $300,000 to $399,000	1	0.6
Min=40, Max=76			9. $400,000 or more	2	1.2
			10. I don't know	7	
			11. Missing	14	
			M Income= 4.21, SD=1.64, Min=1, Max=9		

Country of Birth (N=194)			**Lives in US Currently (N=194)**		
Ghana	150	77.3	Yes	152	78.4
US	21	10.8	No	42	21.6
Jamaica	8	4.1			
Nigeria	4	2.1	**Country Lives in Now (N=194)**		
Cameroon	2	1.0	United States	152	78.4
Cote d'Ivoire	2	1.0	Ghana	30	15.5
Other African			United Kingdom	2	1.0
or Black Nation	7	3.6	Jamaica	2	1.0
			Spain	2	1.0
			Other Countries	4	2.1

Education (N=194)			**Relationship Status (N=194)**		
High School	61	31.4	Married	147	75.8
Associate Degree	48	24.7	Divorced	18	9.3
Bachelor's Degree	40	20.6	Separated	5	2.6
Master's Degree	35	18	Widowed	2	1.0
Doctoral Degree	10	5.2	Never Married	8	4.1
			With Significant Other	2	1.0
Skin Color (N=194)			Committed Relationship	3	1.5
2. Very Light	1	.5	Currently Dating	4	2.1
3. Light	11	5.7	Other	5	2.6
4. Medium to Light	27	13.9			
5. Medium to Dark	58	9.9			
6. Dark	85	43.8			
7. Very Dark	12	6.3			

Results for Research Question #2

How do the men rate their health status, and what is their Body Mass Index, rating of their weight status, and rating of the overall quality of care received for their health? (Survey Part II-BHS-5)

The **mean health status was 4.56** (Min=1-very poor, Max=6-excellent, SD=869), or **between good and very good**. For example, 39.7% (n=77) endorsed very good.

The **mean for Body Mass Index (BMI) was 23.31 for normal weight** (Min=5.94-underweight, Max=44.71, SD=7.51). The **mean self-rated weight status** score **was 2.20 for normal weight status** (Min=1-underweight, Max=4-obese, SD=.450).

For the **quality of medical care they receive, the sample's mean score was 4.41**, SD=.857, Min=2, Max=6) **for good**. For example, 38% (N=73) rated their quality of care as very good.

See Table 2.

Table 2. Health Status, Self-Rating of Weight, Body Mass Index (HSSBMIROW-2), Rating of Quality of Care (ROQOC-1)

	N	**%**
Self-Rate of Health Status (N=194)		
1-Very poor	1	.5
2-Poor	2	1.0
3-Fair	12	6.2
4-Good	77	39.7
5-Very good	77	39.7
6-Excellent	25	12.9
Mean=4.56, SD=.869, Min=1, Max=6		
Body Mass Index (BMI) (N=194)		
1-<18.24=Underweight	47	32.5
2-18.65-24.96=Normal Weight	45	22.5
3-25.09-29.95=Overweight	67	33
4->30=Obese	35	17.5
Mean=23.31, SD=7.51, Min=5.94, Max=44.71		
Self-Rating of Weight (N=194)		
1- Underweight	3	1.5
2- Normal weight	150	77.3
3- Overweight	40	20.6
4- Obese	1	.5
Mean=2.20, SD=.450, Min=1, Max=4		

Rating of Quality of Medical Care (N=194)		
2-Poor	4	2.1
3-Fair	19	9.9
4-Good	80	41.7
5-Very good	73	38.0
6-Excellent	16	8.3
7 Not Applicable (I do not receive any health care)	2	1
Mean=4.41, SD=.857, Min=2, Max=6		

Results for Research Question #3

What is the men's prevalence of a diagnosis of prostate cancer, being told they were at risk for prostate cancer, history of screening for prostate cancer by a Digital Rectal Examination (DRE) or Prostate-Specific Antigen (PSA) Test, as well as the prevalence in their family of prostate cancer diagnoses and deaths from prostate cancer? (Survey PART III: PCS-6)

The vast majority of the study population, or 94.3% (n=183), indicated they have not been told by a doctor or medical professional they have prostate cancer. Of note, the prevalence of a diagnosis of prostate cancer in this convenience sample was 5.2% (n=10), while only 8.8% (n=17) have been told they are at risk for prostate cancer. Only 7.7% (n=15) said a family member has been diagnosed with prostate cancer.

See Table 3.

Table 3. History of Prostate Cancer and Screening and Prostate Cancer in Family Network

	N	**%**
1-Have you ever been told by a doctor or medical professional that you have prostate cancer?		
1 Yes	10	5.2
2 No	183	94.3
3 Unsure	1	.5
2-Have you ever been told by a doctor or medical professional that you are at risk for prostate cancer?		

1 Yes	17	8.8
2 No	173	89.2
3 Unsure	4	2.1
3-Have you ever had a doctor or medical professional perform a digital rectal examination (DRE) on you (i.e., placing their gloved finger in your anus/rectum)?		
1 Yes	65	33.5
2 No	123	63.4
3 Unsure	6	3.1
4-Have you ever been told by a doctor or medical professional that you were going to have your PSA measured, or that you were being given a screening test for prostate cancer?		
1 Yes	57	29.4
2 No	132	68.0
3 Unsure	5	2.6
5-Do you know someone in your family who has been diagnosed with prostate cancer?		
Yes	15	7.7
No	166	85.6
Unsure	13	6.7
6-Do you know someone in your family who died from prostate cancer?		
1 Yes	15	7.7
2 No	166	85.6
3 Unsure	13	6.7

Results for Research Question #4

What is the men's history of having a Vitamin D screening, being told they were Vitamin D-deficient, being advised to take a Vitamin D supplement, and taking a Vitamin D supplement? (Survey PART IV: VDS-4)

Regarding their Vitamin D level, 60.85% (n=118) had never had it ordered by a medical provider for laboratory testing, 82.5% (n=160) were never told it was too low, and 83.5% (n=162) had never been advised by their doctor or medical professional to take a daily Vitamin D supplement.

See Table 4.

Table 4. History of Vitamin D Screening (HHVDSTWVDD-3) and Daily Dosing (TVDS-1)

	N	%
1-Have you ever had a doctor or medical professional measure your level of Vitamin D by laboratory testing?		
Yes	55	28.4
No	118	60.8
Unsure	21	10.8
2-Have you ever been told by a doctor or medical professional that your level of Vitamin D was too low?		
Yes	27	13.9
No	160	82.5
Unsure	7	3.6
3-Have you ever been advised by a doctor or medical professional to take a daily Vitamin D supplement?		
Yes	30	15.5
No	162	83.5
Unsure	2	1.0
4-Have you ever taken a Vitamin D supplement?		
Yes	74	38.1
No	109	56.2
Unsure	11	5.7

Results for Research Question #5

What is the men's level of knowledge for Prostate cancer and screening, and for Vitamin D and taking a Vitamin D supplement? (Survey PART V: PC-S-KT-39)

The **mean for PC knowledge score was 25.84** (Min=0, Max=37, SD=9.50), or **moderately high.** For example, consider the top-ranked knowledge items that the men indicated were "True": (1) A benefit of prostate cancer treatment is that it can prevent death from prostate cancer (93.8%, n=182); (2) A benefit of prostate cancer screening is that the cancer could be found and prostate treatment could be started (93.8%, n=182); (3) Some experts recommend that prostate cancer screening start as early as age 40 for Black men, while the American Cancer Society recommends that men considered high risk, such as Black men, screen for prostate cancer every year, starting at age 45—for

example, as part of their annual physical examination—but only after a medical provider has explained the *risks and benefits* of prostate cancer screening (91.2%, n=177); (4) Some experts think Black men need to be better informed, so they can actively participate in a decision about screening with their doctor and decide what is best for them (91.2%, n=177); (5) Screening for prostate cancer is important so it can be detected (caught, diagnosed) and treated as early as possible—and this decreases the chances of death (91.2%, n=177); (6) Some experts recommend that the medical provider and the patient discuss screening for prostate cancer together so that a good decision is made about screening and the decision to screen is not left up to the individual patient (86.6%, n=168); and (7) During the Digital Rectal Examination (DRE), the medical provider inserts a gloved finger into the rectum (anus) of the man—allowing the provider to detect an enlarged (swollen) prostate and anything else that feels abnormal (hard nodules, bumps) (78.9%, n=153).

See Table 5.

Table 5. Level of Knowledge of Prostate Cancer and Screening (LKPCS-1) and Vitamin D Screening and Supplementation (VDTVDS-1) (N=194)

Item	N	%
1-**Black men around the world have the highest rates of prostate cancer, and Black men in America**, have the **highest death rates** from prostate cancer in the entire world.		
1. True	100	51.5
2. False	15	7.7
3. Unsure	79	40.7
2-**Black men** are more likely to be diagnosed with a **late stage** of prostate cancer (cancer is caught late and more advanced)—while White men are more likely to be diagnosed with an **early stage** (caught early and less advanced).		
1. True	122	62.9
2. False	8	4.1
3. Unsure	64	33.0
3-Because the prostate cancer of **Black** men is caught (diagnosed) **much later** than it is in White/Caucasian men, **Black** American men are **more likely to die** from their prostate cancer.		

1. True	139	71.6
2. False	11	5.7
3. Unsure	44	22.7

4-Screening for prostate cancer is important so it can be detected (caught, diagnosed) and treated as early as possible—and, this decreases the chances of death.

1. True	177	91.2
2. False	5	2.6
3. Unsure	12	6.2

5-Some experts recommend that the medical provider and the patient discuss screening for prostate cancer together so that a good decision is made about screening and the decision to screen is not left up to the individual patient.

1. True	168	86.6
2. False	6	3.1
3. Unsure	20	10.3

6-Some experts think Black men need to be better informed, so they can actively participate in a decision about screening with their doctor and decide what is best for them.

1. True	177	91.2
2. False	4	2.1
3. Unsure	13	6.7

7- Some experts recommend that prostate cancer screening start **as early as age 40 for Black men**, while the American Cancer Society recommends that **men considered high risk, such as Black men, screen for prostate cancer every year, starting at age 45**—for example, as part of their annual physical examination—but only after a medical provider has explained the *risks and benefits* of prostate cancer screening.

1 True	177	91.2
2 False	4	2.1
3 Unsure	13	6.7

8-A *benefit* of prostate cancer screening is that the cancer could be found and prostate treatment could be started.

1 True	182	93.8
2 False	3	1.5
3 Unsure	9	4.6

9-A *benefit* of prostate cancer treatment is that it can prevent death from prostate cancer.

1 True	182	93.8
2 False	3	1.5
3 Unsure	9	4.6

10-A *benefit* of some prostate cancer treatments is that the cancer will not spread (metastasize) to the bones, lungs, brain, or other parts of the body.

1 True	166	85.6
2 False	9	4.6
3 Unsure	19	9.8

11-A *risk* of some prostate cancer treatments is **impotence**—meaning a man can no longer have or keep an erection, or his penis will not stay hard or firm enough to have sex.

1 True	124	63.9
2 False	17	8.8
3 Unsure	53	27.3

12-Another *risk* of some prostate cancer treatments is incontinence—meaning a man can no longer control when he has a bowel movement or urinates, or urine may leak out of his penis.

1 True	130	67.0
2 False	22	11.3
3 Unsure	42	21.6

13-Some researchers think **Black men** with prostate cancer are **less likel**y to receive cancer treatment where the intention is to **cure** them—while **White men** are **more likely** to receive treatment where the intention is to **cure** them.

1 True	127	65.5
2 False	7	3.6
3 Unsure	60	30.9

14-Note that this item was in the original survey document, but was not programmed into the Qualtrics Survey. Therefore, no data for this item are available.

15-Prostate cancer treatments where the intent is to **cure** the man of prostate cancer are called radical treatments—for example, a radical prostatectomy (surgery that removes the prostate gland and surrounding tissue).

1 True	127	65.5
2 False	7	3.6
3 Unsure	60	30.9

16-"Watchful waiting" is an example of what is **not** a cancer treatment where the intention is to cure the patient of prostate cancer.

1 True	99	51.0
2 False	12	6.2
3 Unsure	83	42.8

17- "Watchful waiting" involves just monitoring a man's prostate cancer, or the medical provider just watching what is going on with the prostate cancer—with no therapy being given to the man diagnosed with prostate cancer, until there is a complication from the cancer.

1 True	108	55.7
2 False	24	12.4
3 Unsure	62	32.0

18-Some experts say "watchful waiting" is definitely not the right choice for any patient who is under age 65 with a prostate cancer that could be cured with a radical treatment (e.g., a radical prostatectomy).

1 True	119	61.3
2 False	9	4.6
3 Unsure	66	34.0

19-Other experts say that radical treatments (e.g., a radical prostatectomy, etc.) are the first choice of treatment for all patients under age 70 with localized prostate cancer (it has not spread or metastasized).

1 True	97	50.0
2 False	27	13.9
3 Unsure	70	36.1

20-If there is **not good control** of medical conditions such as diabetes, heart disease, high blood pressure, or lung problems, then a radical prostatectomy is not a good choice.

1 True	112	57.7
2 False	22	11.3
3 Unsure	60	30.9

21- The **Prostate-Specific Antigen (PSA) Test** and the **Digital Rectal Examination (DRE)** are two ways to screen for prostate cancer, or to try to detect or catch it.

1 True	147	75.8
2 False	5	2.6
3 Unsure	42	21.6

22-The **Prostate-Specific Antigen (PSA) Test** measures levels of prostate-specific antigen, a protein made by cells of the prostate gland.

1 True	144	74.2
2 False	4	2.1
3 Unsure	46	23.7

23-When a medical provider talks with a patient about testing their **PSA**, the goal is to determine the levels of the **Prostate-Specific Antigen (PSA)** in the patient's blood.

1 True	161	83.0
2 False	3	1.5
3 Unsure	30	15.5

24-It is normal for men to have low levels of **PSA** in their blood, and normal for **PSA** levels to increase with age, but prostate cancer can increase a man's **PSA** levels.

1 True	130	67.0
2 False	8	4.1
3 Unsure	56	28.9

25-**PSA** levels may be higher in men with a common, noncancerous condition called benign prostatic hyperplasia (BPH), or with a condition called prostatitis, an inflammation of the prostate gland.

1 True	122	62.9
2 False	6	3.1
3 Unsure	66	34.0

26-If a man has a high **PSA**, or the **PSA** level is rising over time, then another medical procedure may be needed to diagnose prostate cancer.

1 True	137	70.6
2 False	9	4.6
3 Unsure	48	24.7

27-A **prostate biopsy** is a medical procedure where tiny pieces of tissue are removed from the prostate and studied in a laboratory in order to diagnose cancer—and **only a biopsy** can determine the presence of cancer.

1 True	135	69.6
2 False	10	5.2
3 Unsure	49	25.3

28-A **Digital Rectal Examination (DRE)** may be performed as part of a man's regular physical examination and is another way that a medical provider can determine the health of a man's prostate.

1 True	145	74.7
2 False	6	3.1
3 Unsure	43	22.2

29-During the **Digital Rectal Examination (DRE),** the medical provider inserts a gloved finger into the rectum (anus) of the man—allowing the provider to detect an enlarged (swollen) prostate any anything else that feels abnormal (hard nodules, bumps).

1 True	153	78.9
2 False	6	3.1
3 Unsure	35	18.0

30-**Black men** are **less likely** to have a **Digital Rectal Examination (DRE)** performed by a medical provider, in comparison to **White men** who receive them **more regularly.**

1 True	117	60.3
2 False	21	10.8
3 Unsure	56	28.9

31-A prostate that feels abnormal during a **Digital Rectal Examination (DRE)** and a high **PSA** level are **both possible indicators** of prostate cancer, but only a **prostate biopsy** can diagnose cancer.

1 True	128	66.0
2 False	10	5.2
3 Unsure	56	28.9

32- The Digital Rectal Examination (DRE) and the Prostate-Specific Antigen (PSA) Test are both screening tests performed during a regular physical exam, while another screening test for your **Vitamin D** level may also be a part of that exam.

1 True	131	67.5
2 False	8	4.1
3 Unsure	55	28.4

33-Some experts recommend that Black men, in particular, need to have their **Vitamin D** level checked as a part of their regular physical exam.

1 True	137	70.6
2 False	6	3.1
3 Unsure	51	26.3

34-Some experts say that **men with dark skin (e.g., Black men)** and those who avoid the sun have the greatest need for **Vitamin D** testing because they are **much more likely to have low levels of Vitamin D** (because they need more sunlight to get Vitamin D).

1 True	130	67.0
2 False	10	5.2
3 Unsure	54	27.8

35-Some experts point to research showing a low level of **Vitamin D** predicts having prostate cancer, or having an aggressive form of prostate cancer (spreads fast), or prostate cancer that has spread (metastasized).

1 True	125	64.4
2 False	26	13.4
3 Unsure	43	22.2

36-**Black men** are more likely to have **aggressive prostate cancer** (spreads fast), and research has found a **major link between having aggressive prostate cancer and having low levels of Vitamin D.**		
1 True	107	55.2
2 False	17	8.8
3 Unsure	70	36.1
37-When the medical provider orders a **screening test for the Vitamin D level**, and if the level of **Vitamin D is too low** (i.e., Vitamin D deficiency), then it is important to take a **Vitamin D pill every day** (daily supplement of high-quality Vitamin D).		
1 True	146	75.3
2 False	4	2.1
3 Unsure	44	22.7
38-Some experts believe that avoiding **Vitamin D deficiency** (being too low) is a part of good health care to prevent having health issues.		
1 True	125	64.4
2 False	26	13.4
3 Unsure	43	22.2
39-Some experts believe that everyone needs to make sure they get enough **Vitamin D,** and recommend taking 5,000 i.u. of high-quality **Vitamin D** every day.		
1 True	125	64.4
2 False	15	7.7
3 Unsure	54	27.8
Mean PC Knowledge=25.84, SD=9.50, Min=0, Max=37		

Results for Research Question #6

After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—(i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), do the men recommend the PC-S-KT-39 to other African American men as an online intervention (i.e. diffusion of the innovation)? (Survey PART VI: DOI-PCKT-1)

The majority, or 90.2% (n=175), indicated "yes" they would recommend the Prostate Cancer Knowledge Test (PC-S-KT) to other African American men as an online

intervention. Thus, 9 out of 10 would diffuse the innovation of teaching about prostate cancer and screening using a true-false test. Some 7.2% (n=14) were unsure.

See Table 6.

Table 6. Do the Men Recommend the PC-S-KT-39 to Other African American Men as an Online Intervention (Diffusion of the Innovation)? (DOI-PCKT-1)

	N	%
1-Would you recommend the Prostate Cancer Knowledge Test to other Black men?		
1 Yes	175	90.2
2 No	5	2.6
3 Unsure	14	7.2

Results for Research Question #7

After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers (i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), how do the men rate their self-efficacy—or item #4 after rating for confidence to talk to a medical provider about prostate cancer and screening, and (plus, +) item #8 after rating confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement? (PART VII: PRE-A-POST-KT-RF-K-SETMP-8)

The mean score of the **prostate cancer self-efficacy** *post-knowledge test* was 5.17 or **80% confident** (Min=1, Max=6, SD=.942). More specifically, 33.5% (n=65) indicated their *post-knowledge test* self-efficacy for talking to a provider about prostate cancer screening was 80% confident.

The mean score for **Vitamin D self-efficacy** *post-knowledge test* was 5.14 or **80 % confident** (Min=2, Max=6, SD=.985). More specifically, 30.4% (n=59) rated their *post-knowledge test* self-efficacy for talking to a provider about Vitamin D screening and supplementation as 80% confident.

See Table 7.

Table 7. Post-Knowledge Test: Ratings of Self-Efficacy to Talk to a Medical Provider About Prostate Cancer and Screening, and About Vitamin D Screening and Taking Vitamin D Supplement (N=194)

	N	%
After I took the Knowledge Test, I would rate my level of confidence for talking to my doctor about prostate cancer and screening for prostate cancer (e.g., Digital Rectal Examination, PSA). (N=194)		
1 0% - Not Confident	1	.5
3 40%	11	5.7
4 60%	29	14.9
5 80%	65	33.5
6 100% - Very Confident	88	45.4
Mean=5.17, SD=.942, min=1, max=6		
After I took the Knowledge Test. I would rate my level of confidence for talking to my doctor about screening for Vitamin D level and taking a Vitamin D supplement. (N=194)		
2 20%	4	2.1
3 40%	8	4.1
4 60%	33	17.0
5 80%	59	30.4
6 100% - Very Confident	88	45.4
Missing	2	1.0
Mean=5.14, SD=.985, min=2, max=6		

Results for Research Question #8

After taking the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—in order to determine if taking the PC-S-KT-39 may serve as a potential online intervention that may significantly increase knowledge and self-efficacy levels, how do the men rate themselves for before taking the PC-S-KT-39 versus after taking the PC-S-

KT-39 for (1) what they knew about prostate cancer and screening, (2) what they knew about Vitamin D screening and taking a Vitamin D, (3) confidence to talk to a medical provider about prostate cancer and screening, and (4) confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement—and was there a significant difference in mean scores from before to after taking the PC-S-KT-39?

The four paired t-tests conducted indicated a significant increase from pre-knowledge test to post-knowledge test (with four comparisons, or Bonferroni Adjustment Significance, .05/4, p=.013), suggesting the knowledge test did serve as an effective online brief intervention, as follows:

- First, for **self-rating of knowledge of prostate cancer and screening**, the *pre-knowledge test mean was 3.50* (N=194, SD=1.393) versus the *post-knowledge test mean of 4.34 (N=194, SD=1.100)*, as a difference that was statistically significant (*t*=-8.475, df=193, p=.000).
- Second for **self-efficacy for talking to doctor about prostate cancer and screening**, the *pre-knowledge test mean was 4.19* (N=194, SD=1.544) versus the *post-knowledge test mean of 5.17 (N=194, SD=.942)*, as a difference that was statistically significant (*t*=-9.098, df=193, p=.000).
- Third, for self-rating of **knowledge of Vitamin D screening and supplementation**, the *pre-knowledge test mean was 3.60* (N=194, SD=1.535) versus the *post-knowledge test mean of 4.67 (N=194, SD=1.070)*, as a difference that was statistically significant (*t*=-9.748, df=193, p=.000).
- Fourth for **self-efficacy for talking about Vitamin D screening and supplementation**, the *pre-knowledge test mean was 4.05* (N=192, SD=1.627)

versus the *post-knowledge test mean of 5.14 (N=192, SD=.985)*, as a difference that was statistically significant (*t*=-9.384, df=193, p=.000).

See Table 8.

Table 8. Changes From Before to After Taking the Knowledge Test: Paired t-Tests

	Before Versus After Taking Knowledge Test			t-tests		
	N	M	SD	t	df	P
Self-Rating of Knowledge of Prostate Cancer & Screening				-8.475	193	.000***
Before Knowledge Test	194	3.50	1.393			
After Knowledge Test	194	4.34	1.100			
Self-Efficacy for Talking to Doctor about Prostate Cancer & Screening				-9.098	193	.000***
Before Knowledge Test	194	4.19	1.544			
After Knowledge Test	194	5.17	.942			
Self-Rating of Knowledge of Vitamin D Screening & Supplementation				-9.748	193	.000***
Before Knowledge Test	194	3.60	1.535			
After Knowledge Test	194	4.67	1.070			
Self-Efficacy for Talking to Doctor about Vitamin D Screening & Supplementation				-9.384	19	.000***
Before Knowledge Test	192	4.05	1.627			
After Knowledge Test	192	5.14	.985			

*p<.05, **p<.01, ***p<.001 Bonferroni Adjustment Significance (.05/4, p=.013)
Note: All p values above .013 are considered non-significant, and only those below .013 are considered statistically significant

Results for Research Question #9

Are there any significant relationships between selected demographics and 1-study outcome variable/dependent variable # 1 - a higher self-rating for Self-Efficacy to

Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, i.e., POST PC Self-efficacy), and 2-study outcome variable/dependent variable #2—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, i.e., POST VD Self-efficacy)?

Independent t-tests comparing groups on outcome variable #1. First, independent t-tests were conducted to compare dichotomous groups (e.g., if married, if employed, etc.) on **1**-study outcome variable/dependent variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening**, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy.* Only one comparison was significant, as follows: Those who **responded "yes," that they had prior prostate cancer screening with a Digital Rectal Exam (DRE) had a mean self-efficacy for talking to their provider about prostate cancer and screening (mean=5.43, SD=.790) that was significantly higher than the mean self-efficacy of those who never had a DRE** (t=12.782, df=192, p=.003; < Bonferroni Adjustment Significance (0.05/10, p=0.005).

See Table 9.

Table 9. Independent t-Tests Comparing Dichotomous Groups on Self Efficacy for Talking to Provider About Prostate Cancer and Screening

	Self-Efficacy For Talking to Provider About Prostate Cancer			*t*-tests		
	N	**M**	**SD**	***t***	**df**	**p**
If currently married				.598	192	.571
0 no	46	5.24	.874			
1 yes	148	5.15	1.017			
If currently lives in US				-1.512	192	.132
0 no	42	4.98	.975			
1 yes	152	5.22	.929			
If full- or part-time employed				-1.233	192	.219
0 no	27	4.96	.898			
1 yes	167	5.20	.948			
If had DRE				-2.782	192	.003***
0 no	129	5.04	.987			
1 yes	65	5.43	.790			
If had PSA				-1.904	192	.058
0 no	137	5.09	.989			
1 yes	57	5.37	.794			
If tested for Vitamin D				-.954	192	.341
0 no	139	5.13	.977			
1 yes	55	5.27	.849			
If told Vitamin D low				-1.192	192	.235
0 no	167	5.14	.963			
1 yes	27	5.37	.792			
If recommended take D supplement				-1.458	192	.147
0 no	164	5.13	.973			
1 yes	30	5.40	.724			
If taken Vitamin D supplement				-.378	192	.706
0 no	120	5.15	.958			
1 yes	74	5.20	.921			
If family member had prostate cancer				-1.843	192	.067
0 no	170	5.12	.956			
1 yes	24	5.50	.780			

*p<0.05, **p<0.01, ***p<0.001; Bonferroni Adjustment Significance (0.05/10, p=0.005)
Note: All p values above 0.005 are considered non-significant, and only those below 0.005 are considered statistically significant.

Independent t-tests comparing groups on outcome variable #2. Second, independent t-tests were conducted to compare dichotomous groups (e.g., if married, if employed, etc.) on **2**-study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>Vitamin D (VD) screening and supplementation</u>,** after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy.* None of the 10 comparisons were significant (Bonferroni Adjustment Significance (0.05/10, p=0.005).

See Table 10.

Table 10. Independent t-Tests Comparing Dichotomous Groups on Self Efficacy for Talking to Provider About Vitamin D Screening and Supplementation

	Self-Efficacy For Talking to Provider About Vitamin D Screening			***t*-tests**		
	N	M	SD	*t*	df	p
If currently married				1.295	190	.197
0 no	46	5.30	.866			
1 yes	146	5.09	1.017			
If currently lives in US				-1.211	190	.227
0 no	41	4.98	.908			
1 yes	151	5.19	1.003			
If full- or part-time employed				-.112	190	.911
0 no	25	5.12	.833			
1 yes	167	5.14	1.008			
If had DRE				-2.167	190	.031*
0 no	127	5.03	.999			
1 yes	65	5.35	.926			
If had PSA				-1.936	190	.054
0 no	135	5.05	1.010			
1 yes	57	5.35	.896			
If tested for Vitamin D				-.717	190	.474
0 no	138	5.11	1.030			
1 yes	54	5.22	.849			
If told Vitamin D low				-1.798	190	.074
0 no	166	5.09	1.008			
1 yes	26	5.46	.761			

If recommended take D supplement				-1.168	190	.244
0 no	162	5.10	1.019			
1 yes	30	5.33	.758			
If taken Vitamin D supplement				-.412	190	.681
0 no	119	5.11	1.035			
1 yes	73	5.18	.903			
If family member had prostate cancer				-1.925	190	.056
0 no	168	5.09	.978			
1 yes	24	5.50	.978			

*p<0.05, **p<0.01, ***p<0.001; Bonferroni Adjustment Significance (0.05/10, p=0.005).
Note: All p values above 0.005 are considered non-significant, and only those below 0.005 are considered statistically significant.

Pearson correlations and study outcome variables #1 and #2. Third, Pearson correlations explored relationship between selected variables (i.e., age, household income etc.) and the two study outcome variables. There were 13 independent variables, so the Bonferroni adjustment significance (.05/13=0.004) involved the higher significance level of .004.

1-The higher the self-rating for Self-Efficacy to Talk to a Medical Provider about *prostate cancer and prostate cancer (PC) screening,* after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39), then:

- The *higher their Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) Score* (r=.226, p=.002; < Bonferroni Adjustment Significance of .004)
- The *higher the Amount of Change in Prostate Cancer Self-Efficacy (confidence to talk to a medical provider about prostate cancer and screening) from Pre-Knowledge Test to Post-Knowledge Test* (r=.145, p=.000; < Bonferroni Adjustment Significance of .004)

2-And, the higher self-rating for Self-Efficacy to Talk to a Medical Provider about *Vitamin D (VD) screening and supplementation*, then**:**

- The *higher their Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) Score* (r=.290, p=.000; < Bonferroni Adjustment Significance of .004)

- The *higher the Amount of Change in Prostate Cancer Self-Efficacy (confidence to talk to a medical provider about prostate cancer and screening) from Pre-Knowledge Test to Post-Knowledge Test* (r=.234, p=.001; < Bonferroni Adjustment Significance of .004)
- The *higher the Amount of Change in Vitamin D Self-Efficacy from Pre-Knowledge Test to Post-Knowledge Test* (r=.286, p=.000; < Bonferroni Adjustment Significance of .004)

See Table 11.

Table 11. Correlations Between Selected Variables and the Two Study Outcome Variables of Prostate Cancer Self-Efficacy and Vitamin D Self-Efficacy—Post-Knowledge Test

	Post Knowledge Test: Prostate Cancer Self-Efficacy		**Post Knowledge Test: Vitamin D Self-Efficacy**	
13 Selected Variables	**R**	**P**	**R**	**P**
Age	.095	.185	.095	.189
Skin Color	.029	.689	-.005	.941
Annual Household Income	.078	.309	.000	.996
Education	.064	.373	-.048	.509
Self-Rating of Health Status	-.002	.974	-.050	.492
Self-Rating of Weight Status	.017	.818	-.006	.938
Rating of Quality of Care	.134	.064	.056	.444
BMI (Body Mass Index)	.207	.004**	.154	.033*
Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) Score	.226	.002**	.290	.000***
#Amount of Change in Prostate Cancer Knowledge from Pre-Knowledge Test to Post-Knowledge Test	.132	.066	.158	.029*
#Amount of Change in Vitamin D Knowledge from Pre-Knowledge Test to Post-Knowledge Test	.153	.033*	.193	.007**
#Amount of Change in Prostate Cancer Self-Efficacy from Pre-Knowledge Test to Post-Knowledge Test	.267	.000***	.234	.001**
#Amount of Change in Vitamin D Self-Efficacy from Pre-Knowledge Test to Post-Knowledge Test	.145	.045*	.286	.000***

***p<.05, **p<.01, ***p<.001 Bonferroni Adjustment Significance (.05/13=.004)**

#NOTE: These 4 variables were change scores, capturing the amount of change from pre-knowledge test to post-knowledge test. See Appendix H, *About the Option of Using Change Scores*, and see explanation of their calculation and scoring.

Results of Research Question #10

What are the significant predictors of 1-study outcome variable/dependent variable #1—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, i.e., POST PC Self-efficacy), and 2-study outcome variable/dependent variable #2—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, i.e., POST VD Self-efficacy)?

Backward stepwise regression. Significant predicators were sought for the two study outcome variables.

1. **a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy).***
2. study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy).***

The independent variables. Each backward stepwise regression proceeded, given the following 19 independent variables as potential predictors: age; skin color; annual household income; level of education; if married, if currently lives in the U.S.; if

employed; if had a digital rectal examination (DRE); if had a PSA test; if screened for Vitamin D; history of low Vitamin D test results; ever advised to take Vitamin D supplement; ever took Vitamin D supplement; if family member had prostate cancer; rating of health status; rating of weight status; rating of quality of care received; Body Mass Index (BMI); and the amount of change in prostate cancer knowledge from pre- to post-knowledge test.

Backward stepwise regression. This analysis began with the full group of **19** predictor variables or independent variables entered into the regression model. Next, the backward stepwise method involved the least significant variable (one with the largest p value) being removed when the model was refitted. Then, a new model is built in the absence of that one independent variable and the evaluation process is repeated again—removing the least significant variable. This removal process and equation-reconstruction process was continued until only significant independent variables ($p<.05$) remained—as the final model reported for the backward stepwise regression.

The rationale for using this approach comes from the work of Mantel (1970), who explained that backward selection serves to reduce the degrees of freedom, has joint predictor capability, and removes noise caused by including unrelated variables or variables that may be highly correlated with each other.

First, when using backward stepwise regression, it was found that the significant predictors of **1-**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39 as item #4 in survey Part VII, i.e., POST PC Self-efficacy) were:

- Had History of Screening with a Digital Rectal Exam (DRE) (b=.435, SEB= -.225, p=.003)
- Higher Rating of Quality of Care (b=-.160, SEB=-.152, p=.041)
- Greater Amount of Change in Prostate Cancer Knowledge from Pre-Knowledge Test to Post-Knowledge Test (b=.116, SEB=.181, p=.016)

For this model, the R 2=.095, and the Adj R 2=.079, meaning 7.9% of the variance was explained by this model.

See Table 12.

Table 12. Backward Stepwise Regression Predicting Study Outcome Variable #1 of Higher Post-Knowledge Test Prostate Cancer Self-Efficacy

Variables	**B**	**SE$_B$**	**P**
Had History of Screening with DRE	.435	.225	.003**
Higher Rating of Quality of Care	**.**160	.152	.041*
#Greater Amount of Change in Prostate Cancer Knowledge from Pre-Knowledge Test to Post-Knowledge Test	.116	.181	.016*

**p<.05,* **p<.01, ***p<.001, *F=5.846 (p=.012; R^2=(0.095), Adjusted R^2=(0.079)—meaning 7.9% of variance was explained by this model. F=5.846*

#NOTE: This was based on a change score, capturing the amount of change from pre-knowledge test to post-knowledge test. See Appendix H, About the Option of Using Change Scores, and see explanation of their calculation and scoring.

Second, when using backward stepwise regression, it was found that the significant predictors of **2**-study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>Vitamin D (VD) screening and supplementation</u>, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)*** were:

- Had History of Being Told Low Vitamin D (b=.418, SE_B=-.159, p=.038)
- Greater Amount of Change in Vitamin D Knowledge from Pre-Knowledge Test to Post-Knowledge Test (b=.140, SE_B=.231, p=.003)

For this model, the R 2=.065, and the Adj R 2=.053, meaning 5.3% of the variance was explained by this model.

See Table 13.

Table 13. Backward Stepwise Regression Predicting Study Outcome Variable # 2 of Higher Post-Knowledge Test Vitamin D Self-Efficacy

Variables	**B**	SE_B	**P**
Had History of Being Told Low Vitamin D	.418	.159	.038*
#Greater Amount of Change in Vitamin D Knowledge from Pre-Knowledge Test to Post-Knowledge Test	.140	.231	.003**

**p<.05,* **p<.01, ***p<.001, *F=5.771 (p=.004; R^2=(0.065), Adjusted R^2=(0.053)—meaning 5.3 % of variance was explained by this model. F=5.771*

#NOTE: This was based on a change score, capturing the amount of change from pre-knowledge test to post-knowledge test. See Appendix H, About the Option of Using Change Scores, and see explanation of their calculation and scoring.

Conclusion

This chapter presented the results of data analysis by research question, including the use of tables to present summary data. Chapter V next discusses the results while also providing summaries, implications, recommendations, limitations, and a conclusion.

Chapter V

SUMMARY, DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSION

This chapter provides a summary of the dissertation research, as well as a discussion of the results, along with implications. This chapter ends with a discussion of the limitations of this research and offer a final conclusion.

Summary of the Review of Literature

The American Cancer Society's (ACS, 2018) age-adjusted incidence rates of prostate cancer among Black men remain 75% higher than those among non-Hispanic White men, and mortality rates among Black men are more than double (ACS, 2018). Strikingly, "Black men in America have the highest death rates from prostate cancer" in the world (Ogunsanya et al., 2017, p. 1009). Yet, this is a global problem. Wang et al. (2015) reported that prostate cancer was the "second most frequently diagnosed cancer among men worldwide" and of all racial/ethnic groups (p. 733). Cook et al. (2015) indicated that "it is not just blacks in the U.S. who have a relative high prostate cancer incidence; blacks in Brazil are 1.7-fold (12), and in the UK are 3-fold (13) more likely than whites to be diagnosed with prostate cancer" (p. 5). On the other hand, Taitt (2018) emphasized how "prostate cancer (PCa) incidence and mortality rates are among the

highest for African Americans," even though "the data is inconclusive regarding PCa rates in native African men, Black men residing in other countries, and men in Asia, Europe, and the Americas" (p. 1807).

The ACS (2016) estimated that 1 in 6 Black men will be diagnosed with "prostate cancer in his lifetime, compared to 1 in 8" White men (p. 15). Richards et al. (2017) emphasized how African American men "not only present with PCa at a younger age, but they also have 50% higher incidence and twice the mortality compared with European American (EA) men" (p. 1).

Ashorobi et al. (2017) emphasized how African American men not only have the highest incidence and mortality from prostate cancer in the United States, but also have held this status as a persistent trend for more than 3 decades. Moreover, it was found that men from "low socioeconomic backgrounds are at a higher risk" for having an increased prostate cancer burden, including a lower utilization of prostate cancer screening services (p. 82). They concluded that, in order to "address this health disparity among medically underserved racial and ethnic groups, there must be increased education and awareness" on the topic of prostate cancer (p. 82).

Prostate cancer screening with the use of the prostate-specific antigen (PSA) test "is common" (Schenk et al., 2014, p. 2), while the digital rectal examination (DRE) is also commonly performed by physicians (Ashorobi et al., 2017, p. 82). The ACS has recommended that men start screening for prostate cancer at age 45, "with the interval for further screening based on initial and subsequent PSA levels" (Smith et al., 2018, p. 297).

Baptista et al. (2018) indicated that "screening for prostate cancer is a controversial issue" (p. 1). It was emphasized that a "decision about whether to be

screened should be an individual one based on conversations with the physician about the benefits and adverse effects of screening, in order to help men make a decision based on personal values and preferences" (p. 4). However, the majority of experts justify "a shared decision-making process involving doctor and patient, using validated decision aids" (p. 4).

Further, it was reported that "many guidelines issued by medical organizations such as the European Association of Urology, the American Cancer Society, and the American College of Physicians support a shared decision-making process for prostate cancer screening"—including the patient and their medical provider, and with the use of decision aids to help ensure the quality of the decision, instead of relying solely on individualized decision making (Baptista et al., 2018, p. 4). Further, "the American Cancer Society endorses prostate cancer screening annually," but only after the "benefits and limitations of prostate cancer screening have been outlined to patients" through such discussion with medical providers (Ogunsanya et al., 2017, p. 1010).

According to Ogunsanya et al. (2017), for "effective decision making to take place, it is also important for patients to understand the risks and benefits associated with the decision (prostate cancer screening) to be made" (p. 1010). Consider how screening may also lead to treatment; while "prostate cancer treatment may be lifesaving, studies suggest that this benefit is not applicable in all cases" (Wang et al., 2015, p. 733). For example, a "large randomized study revealed that in comparison with watchful waiting, 15 men must be treated with radical prostatectomy to save 1 life" (p. 733).

Mahal et al. (2014) expressed doubt as to whether "African Americans (AAs) with intermediate- to high-risk prostate cancer" are given equal treatment as compared to

White patients (p. 386). For “patients with intermediate to high-risk” prostate cancer, “definitive treatments have been shown to decrease prostate cancer-specific mortality” and “improve overall survival” (p. 386). African American men with “intermediate- to high-risk” prostate cancer “are less likely” to receive treatment with “curative intent” than are White men—such that the “disparity is worse in high-risk disease and is not improving over time” (p. 386). Given racial disparities in the treatment of prostate cancer, African American men “have a significantly higher risk of dying from” prostate cancer than White men (p. 386).

Hoffman (2011) urged that “experts recommend that men receive support in making informed decisions,” rather than the usual way where “PSA testing is often performed without discussion of the benefits and harms of screening” (p. 2016). It is crucial for “adult males to understand the impact that PSA testing has in order to treat prostate cancer at an early stage,” which would “prevent further harm to their bodies and improve their quality of life” (p. 19).

Batai et al. (2017) found that “African American men have higher incidence rates of aggressive prostate cancer, where high levels of calcium and serum Vitamin D deficient levels play a role in the racial differences in incidence” (p. 1). Also, “AA men with higher Vitamin D levels see a reduced risk in high-grade disease, while results in Afro-Caribbean men residing in the Caribbean indicate Vitamin D insufficiency may contribute to increased prostate cancer risk” (p. 2). In addition, “molecular studies suggest deficiencies in Vitamin D over time may lead to progression from pre-clinical to clinically aggressive forms of prostate cancer” (p. 2). Batai et al. established that in studies on “cancer aggressiveness, a large percentage of both aggressive and non-

aggressive cases had mean levels of serum 25(OH)D below deficient levels, as defined by the Institute of Medicine (IOM)" (p .6).

Lappe (2011) indicated that an "impressive body of evidence suggests that Vitamin D decreases the risk of cancer," while it has "long been recognized that there is an inverse association between sunlight exposure and malignancy" (p. 63). The study concluded that there is even "stronger evidence for the anticancer effect of Vitamin D"—as provided by "numerous cohort and case–control studies that show an inverse association between serum 25(OH)D and cancer incidence/mortality" (p. 63). Lappe indicated how it is "very difficult to achieve and maintain optimal levels of serum 25(OH)D by diet alone since few foods are natural sources of Vitamin D and fortified foods contain limited amounts" (p. 61). Thus, "Vitamin D dietary supplements, which are safe and inexpensive, are becoming widely available" (p. 61). The IOM had, during that era, "raised the tolerable upper intake level of Vitamin D from 2000 IU/day to 4000 IU/day" (p. 62).

Obana and O'Lawrence (2015) observed that communication "between men and their primary care physicians was critical in improving their awareness of PSA tests, their overall health, and ensuring that they received the proper screening" (p. 20).

For this study, such considerations went beyond the importance of patient-provider communication and discussion about screening for prostate cancer to also include discussions about screening for Vitamin D and the potential need for Vitamin D supplementation.

Summary of the Statement of the Problem

The problem that this study addressed was the need to educate Black men globally about prostate cancer and screening—and also the potential value in screening for Vitamin D level—toward the goal of increasing their level of knowledge and self-efficacy to engage in discussions about screening with their medical providers.

Summary of the Purpose of the Study

The purpose of the study was to identify significant predictors of the two study outcome variables/dependent variables, as follows: (a) study **outcome variable #1—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>prostate cancer and prostate cancer (PC) screening</u>**, after they took a new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39), as a brief online intervention; and (b) study **outcome variable/dependent variable #2—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about <u>Vitamin D (VD) screening and supplementation</u>**, also after they took the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39).

Summary of Research Questions, Survey Parts, and Data Analysis Plan

Given a global online sample of Black men (n=194) who responded to a social media campaign (i.e., "*Go to https://tinyurl.com/Black-Men-Age-40-PLUS to take the Prostate Cancer & Screening—& Vitamin D Survey for Black Men age 40 and above for a chance to win 1 of 3 $100 Amazon gift cards"*) and completed the study, the following research questions were answered:

1-What are the men's demographic and background characteristics (e.g., age, skin color, partner status, born in the United States—yes/no, living in United States or other country, annual household income, level of education, employment status)?

Part I: Basic Demographics (BD-9)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

2-How do the men rate their health status, and what is their Body Mass Index, rating of their weight status, and rating of the overall quality of care received for their health?

Part II: Brief Health Survey (BHS-5)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

3-What is the men's prevalence of a diagnosis of prostate cancer, being told they were at risk for prostate cancer, history of screening for prostate cancer by a Digital Rectal Examination (DRE) or Prostate-Specific Antigen (PSA) Test, as well as the prevalence in their family of prostate cancer diagnoses and deaths from prostate cancer?

Part III: Prostate Cancer Scale (PCS-6)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

4-What is the men's history of having a Vitamin D screening, being told they were Vitamin D-deficient, being advised to take a Vitamin D supplement, and taking a Vitamin D supplement?

Part IV: Vitamin D Scale (VDS-4)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

5- What is the men's level of knowledge for prostate cancer and screening and for Vitamin D and taking a Vitamin D supplement?

Part V: Prostate Cancer and Screening Knowledge Test (PC-S-KT-39)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

6-After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—(i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), do the men recommend the PC-S-KT-39 to other African American men as an online intervention (i.e., diffusion of the innovation)?

Part VI: Diffusion of the Innovation of the Prostate Cancer Knowledge Test (DOI-PCKT-1)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

7-After the men are told that the researchers created the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—(i.e., as a way to prepare African American men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world), how do the men rate their self-efficacy—or **item #4 after rating** for confidence to *talk to a medical provider about prostate cancer and screening*, and **item #8 after rating** confidence to *talk to a medical provider about Vitamin D screening and taking a Vitamin D supplemen*t?

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

Part VII: Pre- and Post-Knowledge Test—Ratings for Knowledge and Self-Efficacy to Talk to a Medical Provider (PRE-A-POST-KT-RF-K-SETMP-8)*, specifically, the mean for the:*

After Took PC-S-KT-39 Global Self-Efficacy Subscale #4

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

NOTE: item #4 and item #8 after ratings are the two study outcome variables/dependent variables

8-After taking the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—in order to determine if taking the PC-S-KT-39 may serve as a potential online intervention that may significantly increase knowledge and self-efficacy levels, how do the men **rate themselves for before taking the PC-S-KT-39 versus after taking the PC-S-KT-39** for (1) what they knew about prostate cancer and screening, (2) what they knew about Vitamin D screening and taking a Vitamin D, (3) confidence to talk to a medical provider about prostate cancer and screening, and (4) confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement—**and was there a significant difference in mean scores from before to after taking the PC-S-KT-39**?

Data Analysis Plan: Paired t-tests (before v. after ratings)

9-Are there any significant relationships between selected demographics and **1**-study outcome variable/dependent variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy),*** and **2**-study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)?***

Data Analysis Plan: Inferential statistics, specifically, independent t-tests and Pearson correlations

10-What are the significant predictors of **1**-study outcome variable/dependent variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #4 in survey Part VII, *i.e., POST PC Self-efficacy),*** and **2**-study outcome variable/dependent variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39—as item #8 in survey Part VII, *i.e., POST VD Self-efficacy)?***

Data Analysis Plan: Backward stepwise regression

Summary of the Research Sample and Procedures

The cross-sectional study used an online survey. Qualtrics provided the platform and secure technology to support the online survey—as the only platform deemed sufficiently secure for research use by Teachers College, Columbia University. First, before any data collection began, this study received approval from the Teachers College, Columbia University Institutional Review Board (IRB) as Protocol #19-134, with an "exempt status."

This study recruited 194 Black Men between the ages of 40 and 76 who were potentially at risk for prostate cancer. Participants were recruited to this study via a social media campaign, globally, wherein the main study recruitment message, shown below, was disseminated via Facebook, emails, text messages, and twitter:

> Go to https://tinyurl.com/Black-Men-Age-40-PLUS to take the Prostate Cancer & Screening—& Vitamin D Survey for Black Men age 40 & above for a chance to win 1 of 3 $100 Amazon gift cards.

In addition, flyers were distributed in venues frequented by African American men, including barber shops and churches, featuring the same message shown above. In addition, members of my extended social network were asked to help recruit Black males to the study using three different ways: (a) by posting the study flyer physically in their

building, (b) by distributing the flyer to their clientele (many copies were provided to that effect), or (c) by sending an email out on any listserv that they may have had (not all entities had listservs). This flyer outlined the tasks involved in the study, including: taking a 20-minute online survey. The flyer may have motivated potential participants to join the study by having photographs of Black men and inviting interested parties to take part in the study for a 3 in 250 chance of winning one of three $100 Amazon gift cards by providing their email addresses. Finally, the Principal Investigator also texted an invite to potentially interested participants.

After a period of 2 weeks, 390 participants had completed the Informed Consent and proceeded to start the survey. However, data analysis could only proceed with 194 who completed the survey to the point of providing data for at least one of this study's two outcome variables. Another 132 were eligible for study participation but did not complete the survey to the point of providing data for a study outcome variable. When comparing the group of survey completers (n=194) to the group of survey non-completers (n=132), using independent t-tests, there were no significant differences between the groups on dichotomous variables (i.e., if married, if lives in U.S., if employed), and not for continuous variables (i.e., age, skin tone, annual household income, level of education).

Although the intent was to collect up to 250 responses, only 194 respondents met the additional study inclusion criteria of providing sufficient data as survey completers on at least one of the study's outcome variables.

Once the survey was completed (N=194), participants were routed to a "thank you" page where they were thanked for study participation and invited to enter their

email address, thereby formally entering the lottery for a 1 in 3 chance to win one of three $100 gift cards for use on www.Amazon.com. As a final step, the webmaster of the RGDH, Dr. Rupananda Misra, had responsibility for the program to select the three winners. The winners received an email with the bar-coded gift certificate information. The Principal Investigator did not have access to the email addresses. Also, of note, study participants were made aware that their study information was not linked to their email addresses, thereby ensuring their confidentiality.

Summary of the Research Instrumentation

The study measure is entitled "The Prostate Cancer & Screening and Vitamin D Survey for African American Men." This survey has 7 parts, as follows:

- **Part I: Basic Demographics (BD-9)**
- **Part II: Brief Health Survey (BHS-5)**
- **Part III: Prostate Cancer Scale (PCS-6)**
- **Part IV: Vitamin D Scale (VDS-4)**
- **Part V: Prostate Cancer and Screening Knowledge Test (PC-S-KT-39)**
- **Part VI: Diffusion of the Innovation of the Prostate Cancer Knowledge Test (DOI-PCKT-1)**
- **Part VII: Pre- and Post-Knowledge Test—Ratings for Knowledge and Self-Efficacy to Talk to a Medical Provider (PRE-A-POST-KT-RF-K-SETMP-8)**

Summary of the Data Management and Data Analysis Plan

The data were transferred from the online Qualtrics platform to the latest version of SPSS: 25.0. Data analysis proceeded using SPSS 25.0. The data analysis plan included descriptive statistics (e.g. means, standard deviations, frequencies, and percentages), inferential statistics (Pearson correlation, independent t-tests), paired t-tests, and backward stepwise regression.

Summary of Results and Data Analysis

The study's global convenience sample of Black males (N=194) was mostly married (75.85, N=147) and had a mean age of 49.53 years (*min 40, max 76, SD=8.73*). The sample was well educated with 24.7% (n=48) having an Associate Degree, 20.6% (n=40) having a Bachelor's Degree, 18% (n=35) having Master's Degree, and 5.2% (n=10) having a Doctoral Degree. *The mean annual income was 4.21. for category 4 of $40,000-$49,999 (min 1, max 9, SD=1.64*). Most of the participants were employed (n=188, 96.9%) and born in the United States (n=152, 78.4%).

As a reflection of being a global sample, if not a sample of men born in Ghana (77.3%, n=194) who are **now dispersed across the globe**, **over two-thirds (77.3%) were born in Ghana,** including 78.4% (n=152) currently living in the United States and 5.5% (n=30) in Ghana—followed by 5.1 (n=10) currently living in other countries.

The **mean health status was 4.56** (Min=1-very poor, Max=6-excellent, SD=.869), or **between good and very good**. The **mean for Body Mass Index (BMI) was 23.31 for normal weight** (Min=5.94-underweight, Max=44.71, SD=7.51).
The **mean self-rated weight status** score **was 2.20 for normal weight status**

(Min=1-underweight, Max=4-obese, SD=.450). For the **quality of medical care they received, the sample's mean score was 4.41**, SD=.857, Min=2, Max=6) **for good**.

The prevalence of a diagnosis of prostate cancer in this convenience sample was 5.2% (n=10), while only 8.8% (n=17) have been told they are at risk for prostate cancer.

Regarding their Vitamin D level, 60.85% (n=118) had never had it ordered by a medical provider for laboratory testing, 82.5% (n=160) were never told it was too low, and 83.5% (n=162) had never been advised by their doctor or medical professional to take a daily Vitamin D supplement.

With regard to the men's level of knowledge for prostate cancer and screening, and for Vitamin D and taking a Vitamin D supplement, a new survey tool was created: i.e., the Prostate Cancer Knowledge Test (PC-S-KT-39)—with all TRUE answers—as an online intervention designed to prepare Black men to talk with their medical providers about taking important screening tests for prostate cancer and their Vitamin D level.

First, as a measure of men's level of knowledge for prostate cancer and screening, and for Vitamin D and taking a Vitamin D supplement, the **mean for PC knowledge score was 25.84** (Min=0, Max=37, SD=9.50), or **moderately high.**

Second, as an innovation for preparing Black men to engage in discussions with their medical providers about screening for prostate cancer and their levels of Vitamin D, 90.2% (n=175) indicated "yes" they would recommend the PC-S-KT-39 to other Black men as an online intervention.

Data supported viewing taking the PC-S-KT-39 as a brief intervention, as four paired t-tests indicated a significant increase from pre-knowledge test to post-knowledge test ($p<.000$; Bonferroni Adjustment Significance, .05/4, $p=.013$) for 1-**knowledge of**

prostate cancer and screening (*t*=-8.475, df=193, p=.000), 2-**self-efficacy for talking to doctor about prostate cancer and screening** (*t*=-9.098, df=193, p=.000), 3-**knowledge of Vitamin D screening and supplementation** (*t*=-9.748, df=193, p=.000), and 4-**self-efficacy for talking about Vitamin D screening and supplementation** (*t*=-9.384, df=193, p=.000).

Independent t-tests comparing groups on outcome variable #1 showed only one comparison was significant, with those who had prior prostate cancer screening with a Digital Rectal Exam (DRE) had a significantly higher mean self-efficacy for talking to their provider about prostate cancer and screening (mean=5.43, SD=.790) that was significantly higher than the mean self-efficacy of those who never had a DRE (t=12.782, df=192, p=.003; < Bonferroni Adjustment Significance (0.05/10, p=0.005).

Pearson correlations demonstrated, as follows**: 1-the higher the self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening,** after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39), then the higher their Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) Score (r=.226, p=.002; < Bonferroni Adjustment Significance of .004), and the higher the amount of change in Prostate Cancer Self-Efficacy (confidence to talk to a medical provider about prostate cancer and screening) from pre-knowledge test to post-knowledge test (r=.145, p=.000; < Bonferroni Adjustment Significance of .004); and 2-**the higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D screening and supplementation,** then the higher their Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) Score (r=.290, p=.000; < Bonferroni Adjustment Significance of .004), the higher the amount of change in prostate cancer

self-efficacy (confidence to talk to a medical provider about prostate cancer and screening) from pre-knowledge test to post-knowledge test (r=.234, p=.001; < Bonferroni Adjustment Significance of .004), and the higher the amount of change in Vitamin D Self-Efficacy from pre-knowledge test to post-knowledge test (r=.286, p=.000; < Bonferroni Adjustment Significance of .004).

Backward stepwise regression identified the significant predictors of study outcome variable #1—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer (PC) screening**, *after* they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) were: having had a history of screening with a Digital Rectal Exam (DRE) (b=.435, SEB=-.225, p=.003), a higher rating of quality of care (b=-.160, SEB=-.152, p=.041), and a greater Amount of Change in Prostate Cancer Knowledge from Pre-Knowledge Test to Post-Knowledge Test (b=.116, SEB=.181, p=.016). For this model, the R 2=.095, and the Adj R 2=.079, meaning 7.9% of the variance was explained by this model.

Finally, a second **backward stepwise regression** identified the significant predictors of study outcome variable #2—**a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation,** *after* they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) were: having a history of being told one had a low Vitamin D level (b=.418, SE_B=-.159, p=.038), and a greater amount of change in Vitamin D Knowledge from Pre-Knowledge Test to Post-Knowledge Test (b=.140, SE_B=.231, p=.003). For this model, the R 2=.065, and the Adj R 2=.053, meaning 5.3% of the variance was explained by this model.

Discussion of Study Results

Discussion of Demographics

This study had a global sample, if not a sample of men born in Ghana (77.3%, n=194) who are now dispersed across the globe. In contrast, within an intervention study using an e-health video on prostate cancer designed to increase awareness and screening by African American men, 80% were U.S.-born (Hall, 2018). Thus, most study findings are best compared to Hall (2018), who used many of the same measures as used in the present study, but with a smaller sample (N=41)—yet, also within an online intervention study. For Hall (2018), it was an online e-health video intervention on prostate cancer and screening.

In this study, the mean annual income was 4.21. for category 4 of $40,000-$49,999 (min=1, max=9, SD=1.64), whereas in Hall (2018) it was much higher (M=$118,048.45, Median=$74,999.50, SD=$152,626.25). Also, regarding education, in Hall (2018), 75.6% (n=31) had a Bachelor's Degree to a Doctoral Degree, whereas in this study, 43.1% (n=85) had a Bachelor's Degree to a Doctoral Degree. Thus, this study's sample both had a lower mean income and lower involvement in higher education. Also, in Hall (2018), 65.8% (n=27) were employed, while a larger percentage was employed in the present study (n=188, 96.9%). These differences may reflect the current sample, including many immigrants such as those born in Ghana (n=150, 77.3%) and those living in the United States at present (n=152, 78.4%).

Discussion of Health Status

Using the same scale, Hall (2018) found overall mean health status was 4.71 (SD=.84) closest to very good. Similarly, this study found a mean health status was 4.56 (Min=1-very poor, Max=6-excellent, SD=.869), or between good and very good. In this study, the mean for Body Mass Index (BMI) was 23.31 for normal weight (Min=5.94-underweight, Max=44.71, SD=7.51), while Hall (2018) reported a higher mean BMI of 28.45 (SD=4.72). For this study, the mean self-rated weight status score was 2.20 for normal weight status (Min=1-underweight, Max=4-obese, SD=.450), whereas in Hall (2018), it was higher with a mean of 2.46 (SD=60). For the quality of medical care they receive, this sample's mean score was 4.41, SD=.857, Min=2, Max=6) for good, while Hall (2018) reported a higher mean of 4.78 (SD=.83).

Discussion of Knowledge Test

First, as a measure of men's level of knowledge for prostate cancer and screening, and for Vitamin D and taking a Vitamin D supplement, the mean for PC knowledge score was 25.84 (Min=0, Max=37, SD=9.50), or moderately high. Comparable here is a study by Aiyedun (2014), in which both an HIV window period knowledge test and an e-health video served as a brief online intervention; first, for Aiyedun (2014), the mean of 34.496 suggested a moderate level of knowledge of the HIV window period. Second, as an innovation for preparing Black men to engage in discussions with their medical providers about screening for prostate cancer and their levels of Vitamin D using the knowledge test (PC-S-KT-39), 90.2% (n=175) indicated "yes" they would recommend the PC-S-KT-39 to other Black men as an online intervention—thereby diffusing the innovation.

Similarly, in Aiyedun (2014), the vast majority (89.6%, n=103) of the men indicated that they would recommend the avatar video.

Discussion of Improvements From Pre- to Post-Intervention

This study's data supported viewing taking the PC-S-KT-39 as a brief intervention, as four paired t-tests indicated a significant increase from pre-knowledge test to post-knowledge test (p<.000; Bonferroni Adjustment Significance, .05/4, p=.013) for 1-knowledge of prostate cancer and screening (*t*=-8.475, df=193, p=.000), 2-self-efficacy for talking to doctor about prostate cancer and screening (*t*=-9.098, df=193, p=.000), 3-knowledge of Vitamin D screening and supplementation (*t*=-9.748, df=193, p=.000), and 4-self-efficacy for talking about Vitamin D screening and supplementation (*t*=-9.384, df=193, p=.000). Aiyedun (2014) similarly found significant increases from pre- to post-intervention for stages of change for screening for HIV (p=.001), self-efficacy for screening for HIV (p=.000), stages of change for screening for HIV after an episode of unprotected sex (p=.000), and self-efficacy for screening for HIV after an episode of unprotected sex.

Of note, in Aiyedun (2014), it was difficult to discern impacts from the knowledge test alone or from watching the e-health video—whereas, by solely functioning on the impact of a knowledge test alone, this study adds something new. This study's online knowledge test emerges as a brief online intervention, suggesting the power in disseminating online such learning devices as a 39-item knowledge test, i.e., the PC-S-KT-39.

Hence, at the conclusion of the study, there is support for widely disseminating via the Internet a link to the new Prostate Cancer and Screening Knowledge Test

(PC-S-KT-39), in order to potentially replicate the promise that Baptista et al. (2018) found in Web-based decision aids. More specifically, Baptista et al. found that Internet- or Web-based decision aids have great value; they can "increase patient knowledge, make people feel clearer about their values, reduce decisional conflict, and promote an active patient role in decision making" about prostate cancer screening and treatment (p. 5). This study's new PC-S-KT-39 may similarly be viewed as having great value.

Relationships Among Study Variables

Independent t-tests comparing groups on outcome variable #1 showed only one comparison was significant, as follows: Those who responded "yes" that they had prior prostate cancer screening with a Digital Rectal Exam (DRE) had a mean self-efficacy for talking to their provider about prostate cancer and screening (mean=5.43, SD=.790) that was significantly higher than the mean self-efficacy of those who never had a DRE (t=12.782, df=192, p=.003; < Bonferroni Adjustment Significance (0.05/10, p=0.005). As per the work of Reynolds (2008), this underscores the importance of DRE for men at risk of prostate cancer, as it presents an opportunity, potentially, for discussion with one's medical provider—which may serve to increase self-efficacy for engaging in such discussions over time.

Pearson correlations showed in this study that a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) was associated with a higher mean score on the PC-S-KT-39, and a greater amount of change in Prostate Cancer Self-Efficacy (confidence to talk to a medical provider about prostate cancer and screening) from pre-knowledge test to post-knowledge test (r=.145,

p=.000; < Bonferroni Adjustment Significance of .004). Also, a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39), was also associated with a higher mean score on the PC-S-KT-39, a greater amount of change in prostate cancer self-efficacy (confidence to talk to a medical provider about prostate cancer and screening) from pre-knowledge test to post-knowledge test (r=.234, p=.001; < Bonferroni Adjustment Significance of .004), and a greater amount of change in Vitamin D Self-Efficacy from pre-knowledge test to post-knowledge test (r=.286, p=.000; < Bonferroni Adjustment Significance of .004). A pattern emerges of higher knowledge on the PC-S-KT-39 being associated with a higher self-efficacy for talking to one's medical provider.

Backward stepwise regression identified the significant predictors of study outcome variable #1—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about prostate cancer and prostate cancer screening, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) were: having had a history of screening with a Digital Rectal Exam (DRE), a higher rating of quality of care, and a greater Amount of Change in Prostate Cancer Knowledge from Pre-Knowledge Test to Post-Knowledge Test, with 7.9% of the variance explained by this model. Second, backward stepwise regression identified the significant predictors of study outcome variable #2—a higher self-rating for Self-Efficacy to Talk to a Medical Provider about Vitamin D (VD) screening and supplementation, after they took the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) were: having a history of being told one had a low Vitamin D level, and a greater amount of change in Vitamin D Knowledge from Pre-

Knowledge Test to Post-Knowledge Test, with 5.3% of the variance explained by this model. Given the low amount of variance accounted for in each model, both sets of finding suggest that future research needs to add variables, perhaps, such as stress. For example, the Perceived Stress Scale is a global measure for potential use with a global sample (Cohen, Kamarck, & Mermelstein, 1983).

Meanwhile, the overall body of findings suggests that such future global research is warranted.

Implications and Recommendations

The first implication of the study is that there is great value in contemporary times for using an online social media campaign, including the posting and distribution of flyers in community venues (e.g., barber shops, churches) in order to gather a global sample of convenience that reflects the use of snowballing. As a Ghanaian Principal Investigator living the United States, the study methods produced a global sample, if not a sample of men born in Ghana (77.3%, n=194) who are now dispersed across the globe, including two-thirds (77.3%) who were born in Ghana, while 78.4% (n=152) were currently living in the United States and another 15.5% (n=30) were currently living in Ghana, followed by another 5.1 (n=10) currently living in other countries.

This methodology allows international researchers to engage in the kind of meaningful research that captures both what is happening “back home” as well as those from “back home” who are now dispersed across the globe, including living in the United States. This study demonstrates how meaningful research can be conducted for those who

value such an approach. Future research can replicate this methodology, whether studying prostate cancer or Vitamin D screening, or any other health behavior.

A second implication of the study involves the value in designing online research studies that use the smart phone for data collection. The present research study demonstrates the power in using the smart phone in global research, as well as other computers participants might have for taking online surveys. Of note, no data were collected on whether participants used a laptop, desktop, or smart phone computer for gaining internet access. However, anecdotal evidence the Principal Investigator collected indicated that smart phone use was extremely high for completing the survey.

Focusing on the use of the smart phone in future global research may overcome some aspects of the digital divide that have been documented in prior research, as this negatively impacts Blacks, for example (Mossey, Bromberg, & Manoharan, 2019). Support for the pursuit of such future research is found in the work of Mossey et al. (2019), who emphasized the importance of harnessing the power of smart phones as mobile technology for bridging the digital divide.

As mentioned earlier, in light of the low amount of variance accounted for in the backward stepwise regression models, the findings suggest that future research needs to add variables, perhaps, such as stress. For example, the Perceived Stress Scale is a global measure for potential use with a global sample (Cohen et al., 1983).

Finally, future research can use this study's innovation of the Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) potentially as a measure of knowledge in future research, or the prostate cancer items could be extracted in future investigations. Perhaps most importantly, future research could evaluate the use of the PC-S-KT-39 as a

brief intervention with varied samples of Black men around the globe, including African Americans and Black immigrants in the United States.

With regard to health educators, there may also be an evaluation of using the PC-S-KT-39 as a tool in practice, such as for in-person use by health educators in working with clients. The tool might be used as a memory prompt for health educators and other health professionals when providing education to Black men about prostate cancer and screening as well as Vitamin D screening. This follows from the work of others who found the use of such a memory prompt was effective in significantly impacting patient behavior (Stanek, Renslow, & Kalliainen, 2015).

Limitations of the Study

Several study limitations must be kept in mind when interpreting the results of this study. First, the use of the smart phone for completing the online survey resulted in being cut off from the survey when their phones rang, and was a study limitation. Sample size may have been much larger if not for this issue.

Other study limitations included the following: being an online study which requires access to the Internet and a computer, potentially creating a sample biased toward those who enjoy such access; the use of an online sample of convenience of volunteers who were able to devote the requisite time to complete the survey, including the use of snowballing; the lack of a measure of social desirability, which could have permitted controlling for socially desirable answers in the regression analysis, but would have added to the limitation of the burden of time to participate in the study; the fact that the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39) has 39 True-False

items, with a potential burden of time, given the length of this key test. To reduce the burden of time, the new PC-S-KT-39 was reduced from 50 items to 39 items, after the first pilot indicated it took 30 minutes to complete the entire survey; other parts of the survey were also reduced by 1-3 items, where possible (e.g., eliminating questions about the prevalence of prostate cancer among friends and associates). The result of the attempt to reduce the burden of time on study participants was a survey that took about 20-30 minutes to complete.

Also, another study limitation involved the use of a study methodology where the study men were asked *at the same time* (i.e., after taking the new PC-S-KT-39 *to rate both their before* taking the PC-S-KT-39 *and their after* taking the PC-S-KT-39 levels of *knowledge* on prostate cancer and screening, and on Vitamin D screening and supplementation) and *self-efficacy* (for talking to a medical provider about prostate cancer and screening, and about Vitamin D screening and supplementation).

An alternative methodology that might be perceived as more desirable would be to assess knowledge and self-efficacy before taking the PC-S-KT-39, then again after taking the PC-S-KT-39; however, the method chosen was also deemed a way to shorten the length of the survey and reduce the burden of time on subjects. Moreover, after reading 39 true facts within the PC-S-KT-39, it was likely that the men could more accurately rate *both their before* taking the PC-S-KT-39 *and their after* taking the PC-S-KT-39 levels of *knowledge* (on prostate cancer and screening, and on Vitamin D screening and supplementation) and *self-efficacy* (for talking to a medical provider about prostate cancer and screening, and about Vitamin D screening and supplementation). Hence, there may be value in the current study's methodology.

Conclusion

Given a global online sample of Black men (n=194) who responded to a social media campaign and completed the study, the convenience sample of Black males (N=194) was mostly married (75.85, N=147) and had a mean age of 49.53 years (*min 40, max 76, SD=8.73*). The Black men were well educated with 24.7% (n=48) having an Associate Degree, 20.6% (n=40) having a Bachelor's Degree, 18% (n=35) having Master's Degree, and 5.2% (n=10) having a Doctoral Degree. *The mean annual income was 4.21. for category 4 of $40,000-$49,999 (min 1, max 9, SD=1.64*). Most of the participants were employed (n=188, 96.9%) and born in the United States (n=152, 78.4%).

As a reflection of being a global sample, if not a sample of men born in Ghana (77.3%, n=194) who are now dispersed across the globe, over two-thirds (77.3%) were born in Ghana, while 78.4% (n=152) were currently living in the United States and 15.5% (n=30) were currently living in Ghana, followed by another 5.1 (n=10) currently living in other countries.

Key findings showed that, as a brief intervention of taking the PC-S-KT-39, as per results of four paired t-tests (Bonferroni Adjustment Significance, .05/4, p=.013), this was associated with a significant increase from pre-knowledge test to post-knowledge test (p<.000; Bonferroni Adjustment Significance, .05/4, p=.013) for (a) knowledge of prostate cancer and screening (*t*=-8.475, df=193, p=.000), (b) self-efficacy for talking to doctor about prostate cancer and screening (*t*=-9.098, df=193, p=.000), (c) knowledge of Vitamin D screening and supplementation (*t*=-9.748, df=193, p=.000), and (d) self-

efficacy for talking about Vitamin D screening and supplementation (*t*=-9.384, df=193, p=.000).

The study demonstrated how there is great value in contemporary times in (a) using an online social media campaign, including the posting and distribution of flyers in community venues (e.g., barber shops, churches), in order to gather a global sample of convenience that reflects the use of snowballing; and (b) including the use of smart phones to conduct global online research.

In addition to the pursuit of future research using the PC-S-KT-39 and smart phone mobile technology, what is justified is wide dissemination via the Internet of a link to the new Prostate Cancer and Screening Knowledge Test (PC-S-KT-39). If men such as those in the present study decide to disseminate this link, the impact has the potential to be global indeed.

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Appendix A

IRB Approval Letter

TEACHERS COLLEGE
COLUMBIA UNIVERSITY

Teachers College IRB *Exempt Study Approval*

To: Peter Afram
From: Myra Luna Lucero, Research Compliance Manager
Subject: IRB Approval: 19-134 Protocol
Date: 02/04/2019

Thank you for submitting your study entitled, "*BLACK MEN'S KNOWLEDGE OF PROSTATE CANCER AND SCREENING—AND VITAMIN D SCREENING AND SUPPLEMENTATION: PREDICTORS OF HIGH SELF-EFFICACY TO TALK TO MEDICAL PROVIDERS ABOUT SCREENING* ;" the IRB has determined that your study is **Exempt** from committee review (Category **2**) on 02/04/2019.

Please keep in mind that the IRB Committee must be contacted if there are any changes to your research protocol. The number assigned to your protocol is **19-134**. Feel free to contact the IRB Office by using the "Messages" option in the electronic Mentor IRB system if you have any questions about this protocol.

Please note that your Consent form bears an official IRB authorization stamp and is attached to this email. Copies of this form with the IRB stamp must be used for your research work. Further, all research recruitment materials must include the study's IRB-approved protocol number. You can retrieve a PDF copy of this approval letter from the Mentor site.

Best wishes for your research work.

Sincerely,
Dr. Myra Luna Lucero
Research Compliance Manager
IRB@tc.edu

Attachments:
- 2-Peter Afram-REV-CONSENT FORM_FINAL.pdf

Appendix B

Recruiting Email Message

INVITING ALL BLACK MEN AGE 40 OR ABOVE ******TO TAKE A CONFIDENTIAL SURVEY********

IRB Protocol Number 19-134

The Research Group on Disparities in Health within the Department of Health and Behavior Studies at Teachers College, Columbia University, in New York, New York is conducting an online study to learn what Black men know about prostate cancer, screening for prostate cancer, and the importance of talking to their medical provider about screening. We also want to know if men have been screened by their medical providers for prostate cancer, as well as for their Vitamin D level. In addition, we are also asking study participants to help us evaluate a new online tool we designed to increase men's knowledge on the topic of screening for prostate cancer and Vitamin D level.

- Participation in this study is limited to the first 250 BLACK MEN AGE 40 OR OVER who are able to read and understand English on a 12th grade level who volunteer
- Completing the online survey takes about 20 minutes
- Those who complete the survey will have a 3 in 250 chance of winning 1 of 3 $100 bar-coded Amazon gift certificates
- Please click on the link below so you can view the informed consent, learn about your rights as a participant and proceed to the survey
- We also invite you to forward this email to other BLACK MEN—or text message, or tweet the message, below:

GO TO https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards

THANK YOU FOR YOUR PARTICIPATION! HAVE QUESTIONS?

If you have any questions or would like to have additional information about the study, please contact:

Peter Afram, MS, Doctoral Candidate, Department of Health and Behavior Studies, Teachers College, Columbia University, Box 114, 525 W. 120th Street, New York, NY 10027; psa2116@tc.columbia.edu - **OR –**

Barbara C. Wallace, Ph.D., Director, Research Group on Disparities in Health, Professor of Health Education, Clinical Psychologist, Department of Health and Behavior Studies, Teachers College, Columbia University, Box 114, 525 W. 120th Street, New York, NY 10027; bcw3@tc.columbia.edu; Study Contact Number: 267-269-7411

Appendix C

Recruiting Text Message

GO TO https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards

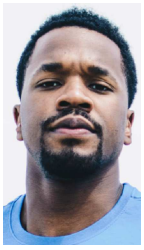
Click https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards

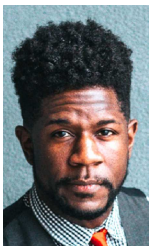
Appendix D

Recruiting Flyer

INVITING ALL BLACK MEN AGE 40 OR ABOVE
******TO TAKE A CONFIDENTIAL SURVEY********

IRB Protocol Number 19-134





The Research Group on Disparities in Health within the Department of Health and Behavior Studies at Teachers College, Columbia University, in New York, New York is conducting an online study to learn what Black men know about prostate cancer, screening for prostate cancer, and the importance of talking to their medical provider about screening. We also want to know if men have been screened by their medical providers for prostate cancer, as well as for their Vitamin D level. In addition, we are also asking study participants to help us evaluate a new online tool we designed to increase men's knowledge on the topic of screening for prostate cancer and Vitamin D level.

- Participation in this study is limited to the first 250 BLACK MEN AGE 40 OR OVER who are able to read and understand English on a 12th grade level who volunteer
- Completing the online survey takes about 20 minutes
- Those who complete the survey will have a 3 in 250 chance of winning 1 of 3 $100 bar-coded Amazon gift certificates
- Please click on the link below, or tear-off a tab below and use the link, so you can view the informed consent, learn about your rights as a participant and proceed to the survey
- We also invite you to text message, or tweet other Black men, as follows:

GO TO https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards

THANK YOU FOR YOUR PARTICIPATION! HAVE QUESTIONS?

If you have any questions or would like to have additional information about the study, please contact:

Peter Afram, MS, Doctoral Candidate, Department of Health and Behavior Studies, Teachers College, Columbia University, Box 114, 525 W. 120th Street, New York, NY 10027; psa2116@tc.columbia.edu - **OR –**

Barbara C. Wallace, Ph.D., Director, Research Group on Disparities in Health, Professor of Health Education, Clinical Psychologist, Department of Health and Behavior Studies, Teachers College, Columbia University, Box 114, 525 W. 120th Street, New York, NY 10027; bcw3@tc.columbia.edu; Study Contact Number: 267-269-7411

Tear-off a tab with the link to the survey and spread the word

GO TO https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards	**GO TO https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards**	**GO TO https://tinyurl.com/Survey-For-BLACK-MEN-Age 40+ & take survey on screening for Prostate Cancer & Vitamin D level for chance to win 1 of 3 $100 Amazon gift cards**

Appendix E

Informed Consent

Teachers College, Columbia University
525 West 120th Street
New York NY 10027
212 678 3000

INFORMED CONSENT

IRB Protocol Number 19-134

Protocol Title: Black Men's Knowledge of Prostate Cancer and Screening—And Vitamin D Screening and Supplementation: Predictors of High Self-Efficacy to Talk to Medical Providers About Screening

Principal Investigator: Peter S. Afram, MS, Teachers College, Columbia University, 347-525-4241, psa2116@tc.columbia.edu

INTRODUCTION. You are being invited to participate in this research study called "Black Men's Knowledge of Prostate Cancer and Screening—And Vitamin D Screening and Supplementation: Predictors of High Self-Efficacy to Talk to Medical Providers About Screening." You may qualify to take part in this research study if you: are a Black man age 40 or older. Approximately 250 people will participate in this study, and it will take approximately 20 minutes of your time to complete.

WHY IS THIS STUDY BEING DONE? This study is being done to to learn what Black men know about prostate cancer, screening for prostate cancer, and the importance of talking to their medical provider about screening. We also want to know if men have been screened by their medical providers for prostate cancer, as well as for their Vitamin D level. In addition, we are also asking study participants to help us evaluate a new tool we designed to increase men's knowledge on the topic of screening for prostate cancer and Vitamin D level.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY? If you decide to participate in the study, you will answer a series of questions for an online survey on the following topics: your personal background (age, education, etc.); ratings of your health status and medical care; if you or your family members have ever been diagnosed with prostate cancer; your history of screening for prostate cancer and your Vitamin D level; and, what you know about prostate cancer, prostate cancer screening and Vitamin D screening.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY? This is a minimal risk study, which means the harms or discomforts that you may experience are not greater than those you would ordinarily encounter if you were completing a test or paperwork in a school, college, or work setting. However, a participant may find questions about prostate cancer or about knowing anyone who died from prostate cancer to be uncomfortable, or stressful. Or, you may find the time it takes to answer questions to be a burden. You do not have to answer any questions or share anything you do not want to share. Participation in this study is completely voluntary. You can discontinue participation in this study at any time. Simply exit the study and delete the link to the study.

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS STUDY? There is no direct benefit to you for participating in this study.

WILL I BE PAID FOR BEING IN THIS STUDY? You will not be paid to participate. However, when you complete the survey you will be invited to enter your email address and to hit a "submit" button—so that you are officially entered into a drawing for a chance to receive a prize (i.e., there will be 3 bar coded Amazon gift certificates for $100 each). You do not have to enter the lottery drawing to complete the survey. Once you submit your email address, then it will automatically be entered into a private and secure data base that even the principal investigator cannot access. Once 250 people have completed the entire survey, you will have a 3 in 250 chance of winning one of the 3 bar coded Amazon gift certificates for $100 each. The www.Amazon.com gift certificates will be sent to three randomly chosen e-mail accounts using a secure online program. This occurs without in any way linking your identity to the survey results. The principal investigator is not able to view any of the e-mail addresses to which the gift certificates are sent. Only the 3 winners will be contacted.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS? The study is over when you have completed the online survey. However, you can discontinue answering the survey questions at any time. You can exit the study at any time and delete the link to the study.

PROTECTION OF YOUR CONFIDENTIALITY The study does not involve collecting any of your personal identifying information, such as your name or address, allowing you to remain anonymous. Teachers College, Columbia University has determined that www.Qualtrics.com provides a secure platform for the online survey you will take. The survey data files will also be saved on the primary researcher's password protected computer. Regulations require that research data be kept for at least three years.

For quality assurance, the study team, and/or members of the Teachers College Institutional Review Board (IRB) may review the data collected from you as part of this study. Otherwise, all information obtained from your participation in this study will be held strictly confidential and will be disclosed only with your permission or as required by U.S. or State law.

HOW WILL THE RESULTS BE USED? The results of this study will be published in journals and presented at academic conferences. This study is being conducted as part of the doctoral dissertation of the principal investigator.

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?
If you have any questions about taking part in this research study, you should contact the principal investigator, Peter S. Afram, MS, at psa2116@tc.columbia.edu or at 347-525-4241. You can also contact the sponsor/ supervisor of this research study, Dr. Barbara Wallace, at bcw3@tc.columbia.edu or 267-269-7411.

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-4105 or email IRB@tc.edu. Or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 10027. Box 151. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read the Informed Consent Form and have been offered the opportunity to discuss the form with the researcher.
- I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.
- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty.
- The researcher may withdraw me from the research at his or her professional discretion. I understand that if I take the survey more than once I will be eliminated from the study.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the researcher will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- I should receive a copy of the Informed Consent Form document. (I understand that I can download it.)

By checking the box below, I agree to participate in the study and I am confirming that I am a Black man age 40 or above, and I am able to read and understand English on a high school level,

☐ **I agree to participate in this study.**

Appendix F

Screening Survey

Screening Tool

Teachers College, Columbia University
Institutional Review Board (IRB) Protocol # 19-134

1) Are you a Black man who is age 40 or older?
Yes ___ No___

2) Are you able to read and understand English on a high school level?
Yes ___ No___

3) Are you able to spend about 20 minutes answering a survey—for a chance to win one of three $100 Amazon gift cards?
Yes___ No____

Appendix G

Study Survey

THE PROSTATE CANCER & SCREENING – &
VITAMIN D STUDY FOR BLACK MEN AGE 40 +

STUDY SURVEY

Teachers College, Columbia University
Institutional Review Board (IRB) Protocol # 19-134

Instructions: Please answer the following questions in each section by clicking the box next to the item of your choice, or typing your answer in the blank box.

PART I: BASIC DEMOGRAPHICS (BD-10)

1) I am: A. □ Female B. □ Male

2) My age is: _____ (USE DROP DOWN MENU OF AGES 18-85)

3) I am currently: A. □ Married B. □ Divorced C. □ Separated
D. □ Widowed E. □ Never Married F. □ In Domestic Partnership
G. □ Living with Significant Other H. □In a Committed Relationship
I. Currently Dating Other _____

4) My race/ethnicity is as follows: (Please mark all that apply)
Black (African American, of other African Descent)
Hispanic / Latino (including Puerto Rican, Mexican, Mexican American, Chicano, Cuban, other Spanish)
Asian (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or other Asian)
White / Caucasian / European American
Native American/American Indian / Alaska Native
Native Hawaiian / Pacific Islander□
Arab American / Middle Eastern□
Other group(s) (specify)

5) My skin color is
a. ___Very Dark b. ___Dark c. ____Medium to Dark
d. ___Medium to Light e. ___Light f. ____Very Light g.___ White

6) Please indicate the country that you live in NOW:
[DROP DOWN MENU WITH COUNTRIES]

7) Please indicate the country of your birth:
[DROP DOWN MENU WITH COUNTRIES]

8) My yearly household income is:
__Less than $10,000
__$10,000 to $19,000
__$20,000 to $39,000
__$40,000 to $49,000
__$50,000 to $99,999
__$100,000 to $199,999
__$200,000 to $299,000
__$300,000 to $399,000
__$400,000 or More
__I do not know
__Other – indicate the your annual household income in your country's money_____

9) My highest education level is:

- 1-Grade School (please indicate your grade completed) _____
- 2-High School
- 3-Associate Degree or Certificate Program
- 4-Bachelor's Degree
- 5-Master's Degree
- 6-Doctoral Degree
- Other Degree (please explain) _____

10) I am currently (check all that apply)
__ part-time undergraduate student
__ full-time undergraduate student
__part-time graduate student
__full-time graduate student
__unemployed
__on Welfare/government assistance
__Employed Part-time
__Employed Full-time
____receiving Social Security Income
____receiving Social Security Disability Income
__Other (please explain_____)

PART II: BRIEF HEALTH SURVEY (BHS-5)

1). I rate my overall health status as

a.___Excellent b.___Very Good c.__Good d.__Fair
e.__Poor f.__Very Poor

2). My height is _____ feet _____ inches

3). My weight is _____ pounds

4). I consider myself to be

a). ___underweight b)___normal weight c)___overweight d)____obese

5) I rate the overall quality of care I receive for my health (and any medical condition I have) as
a.___Excellent b.___Very Good c.__Good d.__Fair
e.__Poor f.__Very Poor g.___Not Applicable (I do not receive any health care)

PART III: PROSTATE CANCER SCALE (PCS-6)

1-Have you ever been told by a doctor or medical professional that you have prostate cancer?
__No __Yes __Unsure

2-Have you ever been told by a doctor or medical professional that you are at risk for prostate cancer?
__No __Yes __Unsure

3-Have you ever had a doctor or medical professional perform a digital rectal examination (DRE) on you (i.e. placing their gloved finger in your anus/rectum)?
__No __Yes __Unsure

4-Have you ever been told by a doctor or medical professional that you were going to have your PSA measured, or that you were being given a screening test for prostate cancer?

__No __Yes __Unsure

5-Do you know someone in YOUR FAMILY who has been diagnosed with prostate cancer?
__No __Yes __Unsure
If "Yes" → Please indicate the number of people you know who have been diagnosed with prostate cancer:
____0 ____1 ___2 ____3 ____4 ____5 ____6 ____7 ____8 ____9 ___10

6-Do you know someone in YOUR FAMILY who DIED from prostate cancer?
__No __Yes __Unsure
If "Yes" → Please indicate the number of people you know who have died from prostate cancer:
____0 ____1 ___2 ____3 ____4 ____5 ____6 ____7 ____8 ____9 ___10

PART IV: VITAMIN D SCALE (VDS-4)

1-Have you ever had a doctor or medical professional measure your level of Vitamin D by laboratory testing?
__No __Yes __Unsure

2-Have you ever been told by a doctor or medical professional that your level of Vitamin D was too low?
__No __Yes __Unsure

3-Have you ever been advised by a doctor or medical professional to take a daily Vitamin D supplement?
__No __Yes __Unsure

4-Have you ever taken a Vitamin D supplement?
__No __Yes __Unsure

PART V: PROSTATE CANCER AND SCREENING KNOWLEDGE TEST (PC-S-KT-39)

This section asks you questions about prostate cancer and screening tests your medical provider should perform. Please answer **True, False**, or you are **Unsure**.

Please be honest. Your answers are confidential and you are not being judged. **What is important is that you read every question and provide an answer to every question.**

1-**Black men around the world have the highest rates of prostate cancer, and Black men in America**, have the **highest death rates** from prostate cancer in the entire world
__True __False __Unsure

2-**Black men** are more likely to be diagnosed with a **late stage** of prostate cancer (cancer is caught late and more advanced)—while White men are more likely to be diagnosed with an **early stage** (caught early and less advanced)
__True __False __Unsure

3-Because the prostate cancer of **Black** men is caught (diagnosed) **much later** than it is in White/Caucasian men, **Black** American men are **more likely to die** from their prostate cancer
__True __False __Unsure

4-Screening for prostate cancer is important so it can be detected (caught, diagnosed) and treated as early as possible—and, this decreases the chances of death
__True __False __Unsure

5-Some experts recommend that the medical provider and the patient discuss screening for prostate cancer, together, so that a good decision is made about screening; and, the decision to screen is not left up to the individual patient
__True __False __Unsure

6-Some experts think Black men need to be better informed, so they can actively participate in a decision about screening with their doctor, and decide what is best for them
__True __False __Unsure

7-The American Cancer Society recommends that all men undergo a screening for prostate cancer every year—for example, as part of their annual physical examination—but only after a medical provider has explained the *risks and benefits* of prostate cancer screening
__True __False __Unsure

8-A *benefit* of prostate cancer screening is that the cancer could be found and prostate treatment could be started
__True __False __Unsure

9-A *benefit* of prostate cancer treatment is that it can prevent death from prostate cancer
__True __False __Unsure

10-A *benefit* of some prostate cancer treatments is that the cancer will not spread (metastasize) to the bones, lungs, brain, or other parts of the body
__True __False __Unsure

11-A *risk* of some prostate cancer treatments is **impotence**—meaning a man can no longer have or keep an erection, or his penis will not stay hard or firm enough to have sex
__True __False __Unsure

12-Another *risk* of some prostate cancer treatments is **incontinence**—meaning a man can no longer control when he has a bowel movement or urinates, or urine may leak out of his penis
__True __False __Unsure

13-Some researchers think **Black men** with prostate cancer are **less likel**y to receive cancer treatment where the intention is to **cure** them—while **White men** are **more likely** to receive treatment where the intention is to **cure** them
__True __False __Unsure

14-African American men have a **significantly higher risk of dying from prostate cancer** than White men—because Black men are **less likel**y to receive cancer treatment where the intention is to **cure** them
__True __False __Unsure

15-Prostate cancer treatments where the intent is to **cure** the man of prostate cancer are called radical treatments—for example, a radical prostatectomy (surgery that removes the prostate gland and surrounding tissue)
__True __False __Unsure

16-"Watchful waiting" is an example of what is **not** a cancer treatment where the intention is to **cure** the patient of prostate cancer
__True __False __Unsure

17-"Watchful waiting" involves just monitoring a man's prostate cancer, or the medical provider just watching what is going on with the prostate cancer—with no therapy being given to the man diagnosed with prostate cancer, until there is a complication from the cancer
__True __False __Unsure

18-Some experts say "watchful waiting" is definitely not the right choice for any patient who is under age 65 with a prostate cancer that could be cured with a radical treatment (e.g., a radical prostatectomy)
__True __False __Unsure

19-Other experts say that radical treatments (e.g. a radical prostatectomy, etc.) are the first choice of treatment for all patients under age 70 with localized prostate cancer (it has not spread or metastasized)
__True __False __Unsure

20-If there is **not good control** of medical conditions such as diabetes, heart disease, high blood pressure, or lung problems, then a radical prostatectomy is not a good choice
__True __False __Unsure

21- The **Prostate-Specific Antigen (PSA) Test** and the **Digital Rectal Examination (DRE)** are two ways to screen for prostate cancer, or to try to detect or catch it
__True __False __Unsure

22-The **Prostate-Specific Antigen (PSA) Test** measures levels of prostate-specific antigen, a protein made by cells of the prostate gland.
__True __False __Unsure

23-When a medical provider talks with a patient about testing their **PSA**, the goal is to determine the levels of the **Prostate-Specific Antigen (PSA)** in the patient's blood
__True __False __Unsure

24-It is normal for men to have low levels of **PSA** in their blood, and normal for **PSA** levels to increase with age—but, prostate cancer can increase a man's **PSA** levels
__True __False __Unsure

25-**PSA** levels may be higher in men with a common, noncancerous condition called benign prostatic hyperplasia (BPH), or with a condition called prostatitis, an inflammation of the prostate gland.
__True __False __Unsure

26-If a man has a high **PSA**, or the **PSA** level is rising over time, then another medical procedure may be needed to diagnose prostate cancer
__True __False __Unsure

27-A **prostate biopsy** is a medical procedure where tiny pieces of tissue are removed from the prostate and studied in a laboratory in order to diagnose cancer—and **only a biopsy** can determine the presence of cancer
__True __False __Unsure

28-A **Digital Rectal Examination (DRE)** may be performed as part of a man's regular physical examination—and, is another way that a medical provider can determine the health of a man's prostate
__True __False __Unsure

29-During the **Digital Rectal Examination (DRE),** the medical provider inserts a gloved finger into the rectum (anus) of the man—allowing the provider to detect an enlarged (swollen) prostate any anything else that feels abnormal (hard nodules, bumps)
__True __False __Unsure

30-**Black men** are **less likely** to have a **Digital Rectal Examination (DRE)** performed by a medical provider, in comparison to **White men** who receive them **more regularly**
__True __False __Unsure

31-A prostate that feels abnormal during a **Digital Rectal Examination (DRE)** and a high **PSA** level are **both possible indicators** of prostate cancer, but only a **prostate biopsy** can diagnose cancer
__True __False __Unsure

32- The Digital Rectal Examination (DRE) and the Prostate-Specific Antigen (PSA) Test are both screening tests performed during a regular physical exam—while, another screening test for your **Vitamin D** level may also be a part of that exam
__True __False __Unsure

33-Some experts recommend that Black men, in particular, need to have their **Vitamin D** level checked as a part of their regular physical exam
__True __False __Unsure

34-Some experts say that **men with dark skin (e.g. Black men)** and those who avoid the sun have the greatest need for **Vitamin D** testing—because they are **much more likely to have low levels of Vitamin D** (because they need more sunlight to get Vitamin D)
__True __False __Unsure

35-Some experts point to research showing a low level of **Vitamin D** predicts having prostate cancer, or having an aggressive form of prostate cancer (spreads fast), or prostate cancer that has spread (metastasized)
__True __False __Unsure

36-**Black men** are more likely to have **aggressive prostate cancer** (spreads fast)—and, research has found a **major link between having aggressive prostate cancer and having low levels of Vitamin D**
__True __False __Unsure

37-When the medical provider orders a **screening test for the Vitamin D level**, and if the level of **Vitamin D is too low** (i.e. Vitamin D deficiency)—then it is important to take a **Vitamin D pill every day** (daily supplement of high quality Vitamin D)
__True __False __Unsure

38-Some experts believe that avoiding **Vitamin D deficiency** (being too low) is a part of good health care to prevent having health issues
__True __False __Unsure

39-Some experts believe that everyone needs to make sure they get enough **Vitamin D**, and recommend taking 5,000 i.u. of high quality **Vitamin D** every day
__True __False __Unsure

Thank you for completing all these questions.

PART VI: DIFFUSION OF THE INNOVATION OF THE PROSTATE CANCER KNOWLEDGE TEST (DOI-PCKT-1)

We created the Prostate Cancer Knowledge Test—with all TRUE answers—as a way to prepare Black men to talk with their medical providers about taking important screening tests that may help protect them from dying from prostate cancer at a rate higher than for any other men in the entire world.

1-Would you recommend the Prostate Cancer Knowledge Test to other Black men? (For example, after this study, we will widely circulate on the internet a link to the Prostate Cancer Knowledge Test, while promoting it as a new way to educate Black men, in particular, so they are better prepared to talk to their medical providers about screening tests.)
___No ___Yes ___Unsure

PART VII: PRE- AND POST-KNOWLEDGE TEST—RATINGS FOR KOWLEDGE AND SELF-EFFICACY TO TALK TO A MEDICAL PROVIDER (PRE-A-POST-KT-RF-K-SETMP-8)

Please answer these 4 questions…

ABOUT YOU—AND PROSTATE CANCER AND SCREENING

1-BEFORE I answered the above questions, I would **rate what I knew about prostate cancer and screening for prostate cancer** (e.g. **Digital Rectal Examination, PSA**) as follows:

Very Poor	Poor	Fair	Good	Very Good	Excellent
1	2	3	4	5	6

2-AFTER I answered the above questions, I would **rate what I knew about prostate cancer and screening for prostate cancer** (e.g. Digital Rectal Examination, PSA) as follows:

Very Poor	Poor	Fair	Good	Very Good	Excellent
1	2	3	4	5	6

3-BEFORE I answered the above questions, I would **rate my level of confidence for talking to my doctor about prostate cancer and screening for prostate cancer** (e.g. **Digital Rectal Examination, PSA**) as follows:

Not confident					Extremely confident
0%	20%	40%	60%	80%	100%

4-AFTER I answered the above questions, I would **rate my level of confidence for talking to my doctor about prostate cancer and screening for prostate cancer** (e.g. **Digital Rectal Examination, PSA**) as follows:

Not confident					Extremely confident
0%	20%	40%	60%	80%	100%

Please answer these 4 questions…

ABOUT YOU—AND VITAMIN D AND SCREENING

5-BEFORE I answered the above questions, I would **rate what I knew about screening for Vitamin D level and taking a Vitamin D supplement**, as follows:

Very Poor	Poor	Fair	Good	Very Good	Excellent
1	2	3	4	5	6

6-AFTER I answered the above questions, I would **rate what I knew about screening for Vitamin D level and taking a Vitamin D supplement**, as follows:

Very Poor	Poor	Fair	Good	Very Good	Excellent
1	2	3	4	5	6

7-BEFORE I answered the above questions, I would **rate my level of confidence for talking to my doctor about screening for Vitamin D level and taking a Vitamin D supplement**, as follows:

Not confident					Extremely confident
0%	20%	40%	60%	80%	100%

8-AFTER I answered the above questions, I would **rate my level of confidence for talking to my doctor about screening for Vitamin D level and taking a Vitamin D supplement**, as follows:

Not confident					Extremely confident
0%	20%	40%	60%	80%	100%

Thank you!

Appendix H

About the Option of Using Change Scores

While the evaluation of the online knowledge test as a brief intervention may best be evaluated using paired t-tests, there is an alternative way of evaluating improvement from pre- to post-intervention. This involves the calculation of four "change scores." The change scores are created by calculating the after scores minus (-) the before scores—with the change score represented as means. A positive mean suggests improvement from before to after; and, a negative mean suggests deterioration or a decrease from before to after. The following four change scores may also be calculated:

1-Change Score for Knowledge About Prostate Cancer and Screening = after knowledge about prostate cancer and screening (item # 2) minus (-) before knowledge about prostate cancer and screening (item #1) [or, after score # 2 – before score # 1 = change score]

2-Change Score for Knowledge About Vitamin D and Taking Vitamin D Supplement = after knowledge about Vitamin D screening and taking a Vitamin D supplement (item # 6) minus (-) before knowledge about Vitamin D screening and taking a Vitamin D supplement (item #5) [or, after score # 6 – before score # 5 = change score]

3-Change Score for Self-Efficacy to Talk to a Medical Provider About Prostate Cancer and Screening = after confidence to talk to a medical provider about prostate cancer and screening (item # 4) minus (-) before confidence to talk to a medical provider about prostate cancer and screening (item #3) [or, after score # 4 – before score # 3 = change score]

4-Change Score for Self-Efficacy to Talk to a Medical Provider About Vitamin D and Taking Vitamin D Supplement = after confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement (item # 8) minus (-) before confidence to talk to a medical provider about Vitamin D screening and taking a Vitamin D supplement (item #7) [or, after score # 7 – before score # 8 = change score]