Predictors of Prostate Cancer Screening Intention Among Older Men in Jordan

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Abstract: Intention to prostate cancer screening is one of the major factors affecting the long-term success of population-based prostate cancer screening programs. The aim of this study is to explore strong factors linked to intention to prostate cancer screening among older Jordanian adults using the Health Belief Model (HBM). Data were obtained from Jordanian older adults, aged 40 years and over, who visited a comprehensive health care center within a ministry of health. A pilot test was conducted to investigate the internal consistency of the Champion Health Belief Model Scale for Prostate Cancer Screening and the clarity of survey questions. Sample characteristics and rates of participation in prostate cancer screening were examined using means and frequencies. Important factors associated with intention to prostate cancer screening were examined using bivariate correlation and standard multiple linear regression analysis. About 13% of the respondents were adherent to prostate cancer screening over the prior decade. Four out of the seven HBM-driven factors (perceived susceptibility, benefits and barriers to PSA test, and health motivation) were statistically significant. Those with greater levels of susceptibility, benefits of PSA test and health motivation and lower levels of barriers to PSA testing were having more intention to participate in prostate cancer screening. Family history, presence of urinary symptoms, age, and knowledge about prostate cancer significantly predicted the intention to prostate cancer screening. Health professionals should focus more on the four modifiable HBM-related factors to encourage older adults to participate in prostate cancer screening. Intervention programs, which lower perceived barriers to PSA testing and increase susceptibility, benefits of PSA testing and health motivation, should be developed and implemented.
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1- Introduction

Prostate cancer has emerged as a major health problem in industrialized nations, as well as in developing countries (Stewart & Wild, 2014). It was the fifth leading cause of cancer deaths worldwide in 2012, accounting for 6.6% (307,000 cases) of all cancer deaths in males (Ferlay, Soerjomataram, & Ervik, 2012). Prostate cancer incidence rates in industrial countries are higher than rates in developing countries (Stewart & Wild, 2014). However, mortality rates for prostate cancer in industrial countries are less than those in developing countries; this could be attributed to widespread prostate cancer screening in industrial countries, late stage diagnosis of cancer in developing contries, and variations in male life expectancies across countries (Ferlay, Soerjomataram, & Ervik, 2012).

In the United States in 2013, prostate cancer was the most commonly diagnosed cancer, with about 239,000 new cases and about 30,000 deaths, making it the second leading cause of death due to cancer among men in the US (Siegel, Naishadham, & Jemal, 2013).

Recent statistics have shown a significant increase in prostate cancer incidence and mortality in Arab countries. According to the International Agency for Research on Cancer (IARC), the highest age-standardized incidence rates were in Lebanon (37.2 per 100,000), South Sudan (25.5 per 100,000), and Morocco (18.5 per 100,000), while the highest mortality rates were in South Sudan (21.5 per 100,000), Lebanon (17 per 100,000), and Morocco (12.9 per 100,000) (Ferlay, Soerjomataram, & Ervik, 2012).

According to the National Cancer Registry of Jordan, CaP ranked the third highest among males (9.4%) for cancer incidence and fourth highest (7.0%) for cancer mortality (Jordan Cancer Registry [JCR], 2010). Prostate cancer incidence has dramatically increased in the last few decades in Jordan; the number of new cancer cases diagnosed among Jordanian males increased from 123 in 2000 to 218 in 2010 (JCR, 2010). Moreover, it is estimated that the cancer incidence and mortality rate has increased to 9.4% (284 cases) and 7.8% (164 cases) respectively in 2012 (Ferlay, Soerjomataram, & Ervik, 2012).

With regard to the stage of prostate cancer among men in the US, according to the Surveillance, Epidemiology, and End Results (SEER) program, 81% of prostate cancer cases were discovered at a localized stage and 4% were discovered at an advanced stage in

2010. In contrast, the SEER program indicated that among Jordanian men in 2010, 48.6% of prostate cancer cases were discovered at a localized stage and 28% at an advanced stage (Siegel, Naishadham, & Jemal, 2013). Based on this comparison, Jordanian men are more likely to be diagnosed at an advanced stage, when compared to men of the US.

Screening and early detection of prostate cancer

A diagnosis of prostate cancer can only be confirmed through a biopsy, which refers to the removal of small pieces of the prostate for microscopic examination (ACS, 2012). However, prior to a biopsy, several less invasive tests can be used to detect prostate cancer, such as a prostate specific antigen (PSA) blood test and digital rectal exam (DRE) (ACS, 2012). Recently, these have been the most commonly used screening measures for PC (American Cancer Society [ACS], 2012).

Prostate cancer survival is closely related to the clinical and pathological stage of the disease at diagnosis. Available empirical evidence suggests that surviving prostate cancer depends on early-stage detection and immediate treatment. When the cancer was identified in its early stages and treated immediately, survival rates of 100%, 98%, and 91% were found for 5-, 10-, and 15-year periods, respectively (Schröder et al., 2012). However, the five-year relative survival for men with metastatic prostate cancer dropped to 31% (Schröder et al., 2012). As a result, prostate screening measures are essential in reducing prostate cancer diagnosed at an advanced stage.

Prostate cancer screening can aid in the identification of the disease at an early stage, and permit more effective treatment, all of which will increase survival rates, reduce risk of death, and reduce the cost of care (Loeb et al., 2011; Schröder, 2012). It is believed that more than 69% of prostate cancer deaths could be prevented during the first five years through proper screening (Schröder, 2012).

Prostate cancer screening on a routine basis using PSA testing and DRE has been the issue of intense investigation and controversy in the medical community (Schröder, 2012). Recent studies have emphasized the importance of routine PSA testing and DRE in increasing reported incidence rates of prostate cancer, discovering early-stage disease, and declining death rates from prostate (Schröder, 2012; Schröder et al., 2012). However, other studies have found that routine PSA testing and DRE did not reduce deaths from PC (Ilic, O'Connor, Green, & Wilt, 2011).

Perceived factors related to prostate cancer screening

Several studies have demonstrated low screening intentions and rates for prostate cancer (Arafa, Rabah, & Wahdan, 2012; Avery et al., 2012; Nakandi et al., 2013; Odedina et al., 2011), which could potentially affect the long-term success of population-based screening programs. Given the efficacy of screening measures and the importance of adherence to screening, it is urgent to enhance intentions and rates of participation in prostate cancer screening (Arafa, Rabah, & Wahdan, 2012; Avery et al., 2012; Nakandi et al., 2013; Odedina et al., 2011).

To enhance participation intentions and rates, significant factors associated with participation in prostate cancer screening must be understood. Currently, little is known about the relationship between these factors and intention to screening (Arafa, Rabah, & Wahdan, 2012; Avery et al., 2012; Odedina et al., 2011; Oliver, Grindel, DeCoster, Ford, & Martin, 2011). Knowledge, health beliefs, and socio-demographic factors have been shown to be significant factors that affect screening intention to prostate cancer screening (Arafa, Rabah, & Wahdan, 2012; Avery et al., 2012; Odedina et al., 2011). It is believed that the level of knowledge about cancer and screening measures affects men's intention to utilize screening tests (M. M. Ahmad, 2014; Ajape, Babata, & Abiola, 2010). M. M. Ahmad (2014) highlighted that correcting the knowledge gap in a sample of Jordanian population could facilitate prevention and early detection of cancer. Increased knowledge about cancer and screening tests encourages individuals to commit to screening regimens, whereas lack of knowledge discourages individuals from participating in screening for this type of cancer. Moreover, individuals' beliefs about cancer and screening intentions are vital determinants for performance of screening, such that misconceptions and erroneous beliefs could result in poor participation (M. Ahmad, Al Gamal, Othman, & Nasrallah, 2011; Avery et al., 2012; Odedina et al., 2011).

In Jordan, few studies have examined the effect of factors influencing Jordanian men's screening intentions regarding prostate cancer (M. M. Ahmad, 2014; Arafa, Rabah, & Wahdan, 2012). Arafa, Rabah, and Wahdan (2012) examined the knowledge and attitudes of men aged forty years and older towards prostate cancer screening in Egypt, Jordan, and Saudi Arabia, and found poor knowledge and fair attitudes towards cancer, which contributed to poor participation in screening activities. Furthermore, M. M. Ahmad (2014) conducted a national survey to assess knowledge, attitudes, and practice with respect to cancer prevention and care in Jordan. Only 11% of the study sample reported participating in cancer screening, and the most stated reasons for not participating were being free from health problems or illnesses and not knowing that screening was needed. In addition, only 5% of the sample reported that they had been told to participate in screening for prostate screening (M. M. Ahmad, 2014).

Thus, this study aims to examine the predictors of prostate cancer screening intentions among older men in Jordan; more specifically, this study focuses on predictors derived from the Health Belief Model (HBM). This study offers information that can be used by health care providers to increase their understanding of the influence of Jordanian men's knowledge, and health beliefs on prostate cancer screening intentions and behaviors in order to provide relevant information, support and appropriate care. Moreover, this study adds further to the breadth of understanding of the perception in the international literature from the Jordanian population perspective as part from the Arab world.

Theoretical Framework

The current study used a researcher-modified version of the Health Belief Model (HBM) that integrated components of the HBM and prostate cancer screening intention derived from Theory of Planned Behaviors (TPB) (Figure 1). The basic components of the HBM were adopted from Champion and Skinner (2008) and adapted for prostate cancer screening. Five components of the HBM model (susceptibility, severity, benefits, barriers, and motivation) were included in the proposed model, and only one component (confidence) was excluded, because there are no screening measures that individuals can perform by themselves to diagnose prostate cancer. Both PSA testing and DRE were selected as screening measures in the current study, because they are strongly recommended when a decision is made to screen for prostate cancer (Heidenreich et al., 2011; Horwich et al., 2013; Wolf et al., 2010).

The health belief model was first developed in the 1950s by Rosenstock, Hochbaum, and Kegels to explain the causes of tuberculosis screening programs failure (Sharma & Romas, 2011). According to HBM, personal beliefs about a disease determine the individual's health behavior (Sharma & Romas, 2011). The original model is composed of four main constructs perceived susceptibility to illness, perceived severity of illness, perceived benefits of the intended action, and perceived barriers of the intended action (Sharma & Romas, 2011). Over time, confidence and health motivation constructs were integrated to the model (Sharma & Romas, 2011). The constructs of perceived susceptibility and perceived severity refer to a person's belief regarding, respectively, the chances of getting and sever consequences of a disease (Sharma & Romas, 2011). The construct of perceived barriers refers to the beliefs about adverse psychological costs that work as obstacles to take a health-related action, while the construct of perceived benefits implies the positive consequences of taking an action (Sharma & Romas, 2011). In order to enable the change of old behavior to the new desired behavior, a person should believe that benefits of adopting a new behavior should outweigh the consequences of continuing the old behavior (Sharma & Romas, 2011). Perceived barriers are the most significant construct among all the constructs of HBM in determining behavior change (Sharma & Romas, 2011). The concept of health motivation is the person's beliefs and degree of interest in his/her general health. Health motivation is considered individual characteristic that acts as a modifying factor that influence person's perceptions (Sharma & Romas, 2011).

The Theory of Planned Behavior was first introduced by Icek Ajzen in 1980 (Glanz, Rimer, & Viswanath, 2008). It proposes that intention acts as a mediator between behavioral beliefs, normative beliefs, and perceived control beliefs, and actual health behavior (Glanz, Rimer, & Viswanath, 2008). The Theory of Planned Behavior asserts that the most important determinant of behavior is behavioral intention; the stronger the intention, the more likely the occurrence of the behavior (Glanz, Rimer, & Viswanath, 2008). Actual behavior and behavioral intention were both examined in the current study. According to the TPB, behavioral intention is the individual's readiness to carry out health behaviors (Ajzen & Fishbein, 1980). Actual behaviors are the individual's visible responses in a given situation. The Theory of Planned Behavior assumes that actual behavior is a function of well-matched intentions and health perceptions (Ajzen & Fishbein, 1980). While there is not a perfect relationship between behavioral intention and actual behavior, behavioral intention may be used as a proximal measure of behavior. This principle is the most important contribution of the TPB model, in comparison to other value expectancy theories (Glanz, Rimer, & Viswanath, 2008). Therefore, using the concept of behavioral intention in the current study is justified, because actual screening behavior for prostate cancer of the Jordanian population may not be readily apparent.

2. Materials and Methods

Sample and data collection

The sample of the study was obtained from three major governorates in Jordan. A convenience sampling technique was followed in the study. The total sample size in this study was 432 participants. The data collection was conducted through self-administered questionnaires. The study population was all Jordanian men who are 40-75 years old attending the public health centers of the ministry of health in Amman, Irbid, and Zarqa cities. Given these centers provide health care to client from all over the country, results of the study can be better generalized to the society. The inclusion criteria were being Jordanian

male between the ages of 40 to 75 years old, able to read and write Arabic, and consenting to take part in the study. While the exclusion criteria were being previously diagnosed with prostate cancer, mentally ill, lack the ability to communicate with the researcher, and illiterate.

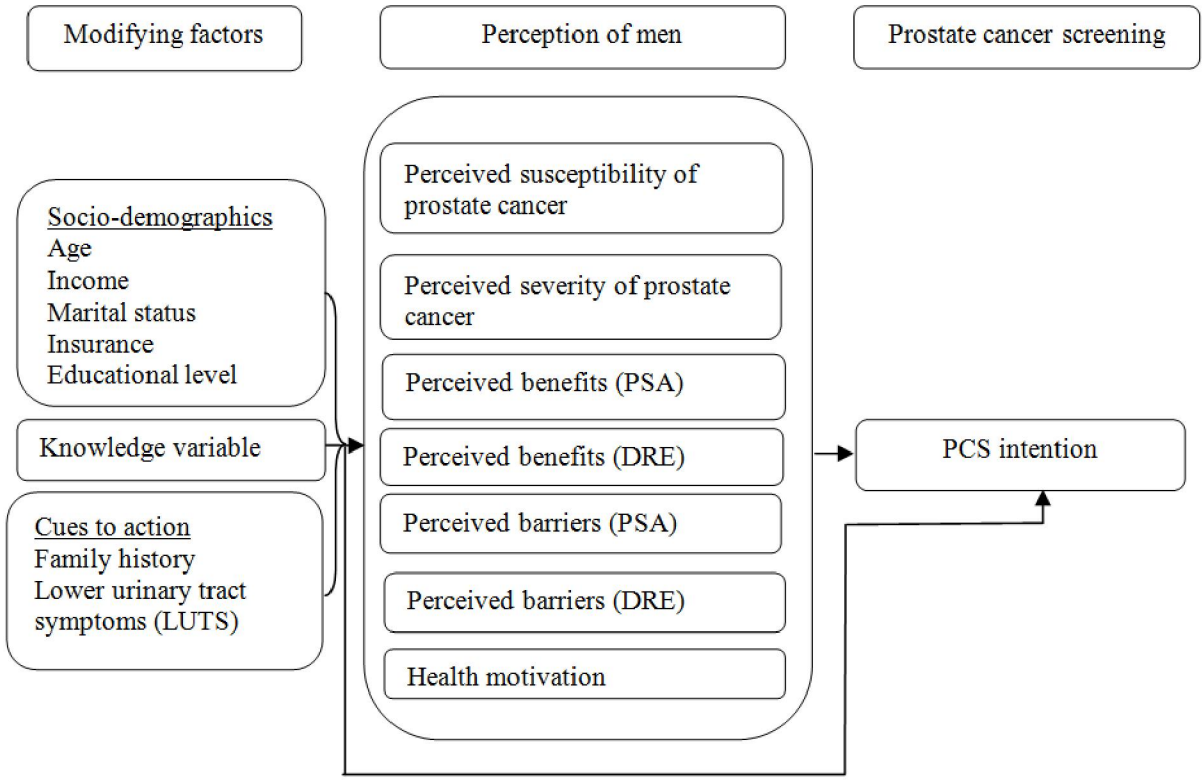

Figure 1. The modified health belief model for prostate cancer and prostate cancer screening.

Instruments

A combination of researcher-designed and existing instruments was used for data collection in this study, including socio-demographic scale, the Knowledge of Prostate Cancer Screening Scale (KPCS), and the Champion Revised Health Belief Model Scale (CHBMS) (Champion, 1993) which was translated to Arabic and modified to fit with Prostate Cancer Screening (CHBMS-PCS).

The socio-demographic scale was developed by the authors based on the literature. It contains questions about demographic variables and performance of prostate cancer screening during the last decades including both PSA testing and DRE.

Prostate cancer intention was measured using Prostate Cancer Intention Scale (PCIS) developed by authors based on Francis et al. (2004) guidelines. According to Francis et al. (2004), there are three methods of measuring intentions. The most common method that demonstrates adequate internal consistency (compared to intention performance and intention simulation) is the generalized intention method, which is used to investigate health-related behaviors. Based on the guidelines of Francis et al. (2004), the PCS intention variable was measured using the generalized intention method, which employs a 3-item scale: "I expect to be screened for prostate cancer in the next 12 months," "I want to be screened for prostate cancer in the next 12 months," and "I intend to be screened for prostate cancer in the next 12 months," presented in Arabic and measured on a 5-point Likert scale: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). The minimum and maximum scale scores are 3 and 15, respectively (Francis et al., 2004). In this study, the Cronbach's alpha coefficient (internal consistency reliability) of the PCS intention scale was 0.95**.** In addition, content validity was established by a panel of six experts who rated the 3-item scale in terms of relevance to the intention construct. The item-level content validity index (I-CVI) for all items ranged from 0.83–1.00 and the scale content validity index (S-CVI) was 0.89.

The Knowledge of Prostate Cancer Screening Scale (KPCS) contains 12 items and is used to assess the level of knowledge about prostate cancer and prostate cancer screening. Responses are scored as "True (Yes)," "False (No)," and "Don't know," with

"Don't know" responses being coded as incorrect (Weinrich et al., 2004). According to Weinrich et al. (2004), the KPCS has a Cronbach's alpha of 0.76. The maximum score for knowledge was 12 (100%) and the minimum score was 0 (0%). Knowledge levels were categorized as "low" for scores from 0 to 49%, "moderate" for scores from 50 to 79%, and "high" for scores from 80 to 100% (Weinrich et al., 2004). In this study, the Cronbach's alpha coefficient (internal consistency reliability) of the KPCS was 0.72 for the total scale.

Minimal modifications were made to CHBMS for applicability to prostate cancer screening. All subscales were included in the modified scale, except for the confidence subscale, because individuals cannot perform PCS on their own. While the benefits and barriers subscales for CHBMS referred to mammogram and BSE, these subscales referred to PSA testing and DRE for the modified CHBMS-PCS. The modified CHBMS-PCS is composed of 42 items and 7 subscales (susceptibility, severity, motivation, barriers (PSA), benefits (PSA), barriers (DRE), and benefits (DRE)). A 5-point Likert response format was used for each statement. The CHBMS-PCS was then translated from English to Arabic, and the translated version was checked if they were equivalent to the originals according to Brislin's model (Brislin, 1986). In this study, the CHBMS-PCS has established content validity by a panel of 10 experts from different health disciplines. The reliability of CHBMS-PCS in this study has Cronbach's alpha coefficients for each subscale as follows: perceived susceptibility (0.90), perceived severity (0.89), perceived benefits of PSA testing (0.83), perceived barriers to PSA testing (0.92), perceived benefits of DRE (0.91), perceived barriers to DRE (0.87), and health motivation (0.90). Finally, Cronbach's alpha coefficient for the total scale was 0.87. In addition, content validity was established by a panel of six experts who rated the 3-item scale in terms of relevance to the intention construct. The item-level content validity index (I-CVI) for all items ranged from 0.83–1.00 and the scale content validity index (S-CVI) was 0.92.

Data Processing

The Statistical Package for Social Sciences (SPSS) was used to run descriptive and inferential statistical analyses for the study variables (IBM Corporation, 2012). Descriptive statistics were calculated to describe the characteristics of the sample. The relationships between individual predictors and participation in prostate cancer screening were examined using both bivariate Pearson correlation analysis and standard multiple linear regression analysis. Bivariate correlation analysis was used to identify the relationships between each individual predictor and intention to screen. In addition, standard multiple linear regression analysis was used to identify a predictive model regarding intention to screen for prostate cancer. There were no missing values in the data.

Ethical considerations

Once the approvals from the Research Ethics Committee (IRB) at the University of Jordan and the Ministry of Health were obtained, the Health Ministries in Amman, Zarqa, and Irbid cities were approached to obtain a permission to recruit subjects from the comprehensive public health centers. The authors collected the data by themselves from the period of May 17th 2014 to August 31th 2014. The authors approached the potential participants and screened them for eligibility to participate and assured confidentiality of the data obtained. These participants were approached in the reception area of the center, where they were waiting to be escorted to physician room or waiting to take their medications. Participants who met the inclusion criteria and agreed to participate were given more information about the purpose of the study and were asked to sign an informed consent form. The participants were informed that their participation in the study was voluntary, that they could withdraw from the study at any time, and that their refusal to participate in the study would have no negative impact on the medical care they receive. The completion of the scale took about 25 to 30 min**.**

When participants were asked if they ever have been screened for prostate cancer using PSA testing, only 59 (13.6%) of participants had participated in PSA blood tests during last decades. Moreover, 45 (10.4%) of participants had received a DRE to screen for prostate cancer during the last decades. Regarding the intention of participants to screen for prostate cancer in the next 12 months, average responses to the 3-item intention scale were calculated (each was measured on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree)). The results showed that about 28% of men in the sample had an intention to screen for PC in the next twelve months, while 32% were not sure about their intention to screen for PC. Furthermore, the mean score (2.72) shows that participants tended to disagree with intention statements.

Almost 49 (11.3%) of participants had a family history of prostate cancer and about 181 (41.9%) had one or more of the lower urinary signs and symptoms (LUTS). Of those, 74.6% had difficulty maintaining a steady stream, 34.8% had dysuria, 14.4% had hematuria, and 5.5% had erectile dysfunction.

Regarding knowledge about prostate cancer, the mean knowledge score was 4.29 (SD = 2.8), which meant that correct answers were given to less than half of the questions. Moreover, 67.1% of participants had

a low level of knowledge, 29.2% had a moderate level of knowledge, and 3.7% had a high level of knowledge.

3. Results

Participants

The mean age of participants was 52.5 years (SD=8.5; range=40-75). A total of 36.6% were living in Amman, 35.2% in Zarqa, and 28.2 % in Irbid. In addition, 42.1% had a primary educational level, 29.9% had a secondary educational level, and 28% had a university education. Regarding marital status, the majority (91.4%) was married, followed by 5.6% who were single and 3% who were divorced or widowed. Furthermore, 49.5% had an intermediate income, 41.7% had a low income, and 8.8% had a high income. In total, 89.4% of participants were covered by a health insurance plan. Of those (multiple answers were allowed), 56% were covered by the governmental sector, 22.6% by the private sector, and 21.8% by the military sector.

Predictors of Prostate Cancer Screening Intention

Table 1. Bivariate Pearson Correlations of Demographic Characteristics, Cues to Action, and HBM Constructs Variables with Prostate Cancer Sscreening Intention (N = 432)

Variables	Prostate cancer screening intention
Age	0.35**
Income	- 0.10
Education	- 0.12
Knowledge variable	0.27**
Marital status	- 0.03
Insurance	0.06
Family history	0.41**
LUTS	0.43**
Susceptibility	0.30**
Severity	0.31**
Benefits (PSA)	0.42**
Barriers (PSA)	- 0.36**
Benefits (DRE)	0.35**
Barriers (DRE)	- 0.29**
Health motivation	0.39**

* $p < 0.01$; ** $p < 0.001$ (two-tailed)

Table 1 shows that the bivariate Pearson correlation analysis of HBM constructs, socio-demographics, and cues to actions variables with the prostate cancer screening intention. The analysis revealed a moderate significant relationship between all HBM constructs and intention to screen. Benefits of PSA testing had the strongest correlation ($r = 0.42$, $p < 0.01$) with intention to screen, followed by health motivation ($r = 0.39$, $p < 0.01$), barriers to PSA testing ($r = - 0.36$, $p < 0.01$), benefits of DRE ($r = 0.35$, $p < 0.01$), severity ($r = 0.30$, $p < 0.01$), susceptibility ($r = 0.30$, $p < 0.01$), and barriers to DRE ($r = - 0.29$, $p < 0.01$). The barriers to PSA testing and DRE subscales were negatively correlated with intention to screen, indicating that as perceived barriers to PSA testing and DRE increased, PCS intention decreased. Moreover, the LUTS variable had the strongest positive correlation ($r = 0.43$, $p < 0.001$) with PCS intention, followed by family history ($r = 0.41$, $p < 0.001$), age ($r = 0.35$, $p < 0.001$), and knowledge variable ($r = 0.27$, $p < 0.001$). Income, education, marital status, and insurance variables were not significantly correlated with screening intention.

Standard multiple regression was performed; that is, all predictor variables were entered in one step. Zero-order, part, and partial correlations of each predictor with intention to screen were requested, in addition to the default statistics. Table 2 summarizes the results of this standard multiple regression. The overall regression, including eight predictors, was statistically significant, $R = 0.54$, $R^2 = 0.29$, adjusted $R^2 = 0.28$, F (8, 423) = 21.48, $p < 0.001$. Total intention scores could be predicted from this set of eight variables, with approximately 29% of the variance in total intention scores accounted for by the regression. To assess the contributions of individual predictors, t-ratios for the individual regression slopes were examined. Four of the predictors were significantly predictive of total intention scores; these included having LUTS, t (423) = 6.58, $p < 0.001$, family history, t (423) = 3.88, $p < 0.001$, age, t (423) = 3.53, $p < 0.001$, and knowledge variable, t (423) = 3.40, $p < 0.001$. The nature of the predictive relation of age, knowledge, family history, and having LUTS was as expected; the positive sign of the slopes for these predictors indicated that higher scores on these variables predicted higher scores on total intention. The proportion of variance uniquely explained by each of these predictors was small (sr^2_{unique}, obtained by squaring the part correlation from the SPSS printout) were as follows: $sr^2 = 0.021$ for age, $sr^2 = 0.019$ for knowledge, $sr^2 = 0.025$ for family history, and $sr^2 = 0.073$ for having LUTS. Thus, in this sample and in the context of this set of predictors, having LUTS was the strongest predictor of total intention ($B = 0.30$, $p < 0.001$) followed by family history ($B = 0.18$, $p < 0.001$), age ($B = 0.17$, $p < 0.001$), and knowledge ($B = 0.15$, $p < 0.001$). The other four predictors (marital status, insurance, income, and education) were not significantly related to total intention when other predictors were statistically controlled; their partial slopes were not significant. Overall, total intention scores were highly predictable from this set of variables; the strongest unique predictive contributions were from having LUTS and family history variables, with a smaller contribution from age and knowledge variables.

Table 2. Results of Standard Multiple Regression to Predict Screening Intention from the Demographic Characteristics and Cues to Action Variables (N = 432)

Predictor variable	b	β	*t*	Sr^2_{unique}
Age	0.07	0.17	3.53**	0.021
Income	- 0.24	- 0.04	-1.00	0.002
Marital status	- 0.44	- 0.04	-0.91	0.001
Insurance	- 0.13	- 0.01	-0.28	<0.001
Education	- 0.17	- 0.04	-0.92	0.001
Knowledge of PC & PCS	0.18	0.15	3.40**	0.019
Family history	1.91	0.18	3.88**	0.025
LUTS	2.02	0.30	6.58**	0.073
Overall model ($R = 0.54$; $R^2 = 0.29$; Adj $R^2 = 0.28$; $F = 21.48$; $p < 0.001$)				

b, unadjusted regression slope coefficient; β, adjusted regression slope coefficient; Sr^2, squared semipartial correlation.
* $p < 0.05$; ** $p < 0.001$.

Table 3 summarizes the results of this standard multiple regression that was conducted to examine the effects of HBM constructs (perceived susceptibility, perceived severity, perceived benefits of PSA testing, perceived benefits of DRE, perceived barriers to PSA testing, perceived barriers of DRE, and health motivation) on the prediction of intention among Jordanian men; that is, all predictor variables were entered in one step. Zero-order, part, and partial correlations of each predictor with screening intention were requested, in addition to the default statistics. The overall regression, including seven predictors, was statistically significant, R = 0.49, R^2 = 0.24, adjusted R^2 = 0.23, F (7, 424) = 19.88, $p < 0.001$. Total intention scores could be predicted from this set of seven variables, with approximately 24% of the variance in total intention scores accounted for by the regression. To assess the contributions of individual predictors, the *t*-ratios for the individual regression slopes were examined. Four of the variables were significantly predictive of total intention scores; these included perceived susceptibility, t (424) = 1.98, $p < 0.05$, perceived benefits of PSA testing, t (424) = 2.05, $p < 0.05$, perceived barriers to PSA testing, t (424) = - 3.23, $p < 0.001$, and health motivation, t (424) = 2.03, $p < 0.05$. The nature of the predictive relation of perceived susceptibility, perceived benefits of PSA testing, and health motivation predictors was as expected; the positive sign for the slopes for these predictors indicated that higher scores on these variables predicted higher scores on total intention. Moreover, the nature of the predictive relation of perceived barriers to PSA testing was as expected; the negative sign for the slope of perceived barriers to PSA testing indicated that higher scores on perceived barriers to PSA testing predicted lower scores on total intention. The proportion of variance uniquely explained by each of these predictors was as follows: $sr^2 = 0.007$ for perceived susceptibility, $sr^2 = 0.007$ for perceived benefits of PSA testing, $sr^2 = 0.018$ for perceived barriers to PSA testing, and $sr^2 = 0.007$ for health motivation. Thus, in this sample and in the context of this set of predictors, perceived barriers to PSA testing was the strongest predictor of total intention (B = - 0.16, $p < 0.001$), followed by perceived benefits of PSA testing ($B = 0.14$, $p < 0.05$), health motivation ($B = 0.12$, $p < 0.05$), and perceived susceptibility ($B = 0.10$, $p < 0.05$). The other three predictors (perceived severity, benefits of DRE, and barriers to DRE) were not significantly related to total intention when other predictors were statistically controlled; their partial slopes were not significant. Overall, total intention scores were moderately predictable from this set of variables; the strongest unique predictive contributions were from perceived barriers to and benefits of PSA testing variables, with a smaller contribution from health motivation and perceived susceptibility variables.

Table 3. Results of Standard Multiple Regression to Predict Screening Intention from the HBM Constructs (N = 432)

Predictor variables	b	Beta	*t*	Sr^2_{unique}
Susceptibility	0.07	0.10	1.98*	0.007
Severity	0.05	0.09	1.78	0.006
Benefits of PSA testing	0.09	0.14	2.05*	0.007
Barriers to PSA testing	- 0.11	- 0.16	- 3.23**	0.018
Benefits of DRE	0.01	0.02	0.28	< 0.001
Barriers to DRE	- 0.03	- 0.05	- 1.00	0.002
Health motivation	0.06	0.12	2.03*	0.007
Overall model (Multiple $R = 0.49$; $R^2 = 0.24$; Adj $R^2 = 0.23$; $F = 19.88$; $p < 0.001$)				

b, unadjusted regression slope coefficient; β, adjusted regression slope coefficient; Sr^2, squared semipartial correlation.
* $p < 0.05$; ** $p < 0.001$.

3. Discussion

The main purpose of the current study was to examine the influence of Jordanian men's demographics, cues to action, knowledge, and beliefs on prostate cancer screening intentions among Jordanian older men. The demographic findings in the current study were consistent with Jordanian participant's demographic characteristics of Arafa, Rabah, and Wahdan (2012) study in which the average age was 53.7 years and the majority of Jordanian participants was married (85%) and covered by health insurance (85%). However, Arafa, Rabah, and Wahdan (2012) study reported that the majority of the participants (70%) had a university education level and asmaller percentage of the participants (8%) had a family history of PC. Moreover, Alhelih, Rabah, and Arafa (2010) reported similar demographic characteristics for Saudi population in terms of participants' mean age, marital status, insurance. In contrast, international studies reported higher mean age, educational qualifications, and income level (Avery et al., 2012; Kleier, 2010).

The literature supports the argument that regular PCS leads to early detection and influences treatment, prognosis, and survival rates (Schröder, 2012; Schröder et al., 2012). Nevertheless, only 13.6% of participants in this sample reported undergoing PSA testing, while 10.4% reported undergoing DRE in the last decades. A more disturbing finding was that less than one third of participants (28.1%) had the intention to screen for PC in the next 12 months. Similarly, Arafa, Rabah, and Wahdan (2012) reported percentages of participation in screening that ranged from 8% to 30% in KSA, Jordan, and Egypt. Surprisingly, Jordan had the highest percentage of screening activities, despite having the lowest attitude towards prostate cancer screening (Arafa, Rabah, & Wahdan, 2012). A study by Odedina et al. (2011) also indicated a higher rate of early-detection behavior by participants; 31% of men had received PSA testing, and 27% had received a DRE. Moreover, the current study findings regarding levels of prostate cancer screening are much lower than the results of Kleier (2010), who reported that 44% of Haitian-American men had undergone prostate cancer screening at some point. Furthermore, Oliver, Grindel, DeCoster, Ford, and Martin (2011) reported high early-detection behaviors for PSA testing by 83% of participants and for DRE by 66% of participants. In contrast, Ajape, Babata, and Abiola (2010) indicated a lack of participation in screening behavior among Nigerian native African men. However, the majority of Nigerian men (94%) had an intention to undergo PSA testing (Nakandi et al., 2013). From a researcher's point of view, the majority of Jordanian men who underwent PSA testing were mostly referred from urologist's clinics because of their urinary symptoms. Many urologists recommend performing PSA test for patients with mild to severe urinary signs and symptoms.

The findings of the current study indicated that Jordanian men were not well informed about prostate cancer and cancer screening since the majority (67%) of participants had a low level of knowledge about prostate cancer and cancer screening.

The effects of demographic variables, knowledge variable, and cues to action on intention were examined simultaneously using standard multiple regression analysis. The current study findings indicated that presence of LUTS ($B = 0.30$, $p < 0.001$), family history ($B = 0.18$, $p < 0.001$), age ($B = 0.17$, $p < 0.001$), and knowledge ($B = 0.15$, $p < 0.001$), and were all significantly correlated and predictive of PCS intention in the next 12 months, and explained 29% of the variance in screening intention. However, education, income, marital status, and health insurance were not significantly correlated nor predictive of screening intention. Similarly, several researchers (Anderson, 2013; Jacobsen et al., 2004; Weber et al., 2013) found significant positive associations of age and family history with PCS intention. Other investigators (Avery et al., 2012; Hevey et al., 2009) found that level of knowledge was positively and significantly associated with screening intention. Moreover, Weller, Pinnock, Silagy, Hiller, and Marshall (1998) found that having LUTS was associated with PCS intention. In contrast, the current study findings were inconsistent with those of previous research that found education, income, and health insurance were significantly associated with screening intention (Anderson, 2013; Weber et al., 2013).

An interesting finding from this study was the significant predictive effect of knowledge, LUTS, and family history for screening behavior. Therefore, it is also of vital importance to educate Jordanian men about prostate cancer and cancer screening; particularly those with family history. Public campaigns to educate men in Jordan on these topics are lacking and that which men have heard or read may not be adequate to educate them sufficiently and motivate them to screen for prostate cancer. Furthermore, knowledge about cancer and screening options will allow men to understand the potential benefits to their health and the importance of making the decision to screen.

With respect to HBM constructs, the findings are consistent with those of previous research that found susceptibility constructs (Atulomah, Olanrewaju, Amosu, & Adedeji, 2010; Kleier, 2010; Odedina et al., 2011), benefits and barriers constructs (Oliver, Grindel, DeCoster, Ford, & Martin, 2011), and the

health motivation construct (Oliver, Grindel, DeCoster, Ford, & Martin, 2011) to be significantly correlated and predictive of screening intention. These findings emphasize the need to provide correct information about factors related to susceptibility, as well as benefits of and barriers to PSA testing. Although it has been widely documented that when prostate cancer screening is performed regularly, it can be an effective means of early detection, only a small proportion of men undergo it regularly. Therefore, men must be shown that the benefits of screening outweigh the benefits of continuing with their old behavior.

Finally, this study adds to the wealth of studies that support the use of HBM to examine health behavior related to cancer screening, in order to offer an evidence-based foundation for health promotion activities. Furthermore, the current study findings converges with Carpenter (2010) mata-analyses that concludes that perceived barriers and perceived benefits constructs were consistently the strongest predictors of screening intentions and behaviors. In contrast, the current study findings diverges with Carpenter (2010) meta-analyses that concludes that perceived susceptibility construct was not predictive of screening intentions and behaviors.

In conclusion, overall, this study contributes to the understanding of factors linked to prostate cancer screening intention among Jordanian older men. Educative-counseling programs that focus on the enhancement of knowledge and health beliefs regarding cancer and screening options are required to encourage intention and participation in prostate cancer screening activities. Thus, the findings from this study can guide health professionals to better understand the extent to which different factors influence screening intention among adult Jordanian men, and may direct future research. Health professionals should focus more on the four modifiable HBM-related factors to encourage older adults to adhere to prostate cancer screening. Intervention programs, which lower perceived barriers to PSA testing and increase susceptibility, benefits of PSA testing and health motivation, should be developed and implemented. National campaigns toward increasing the awareness about prostate cancer and screening options should be launched frequently.

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