

## RESEARCH ARTICLE

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# Prevalence, Cognitive and Socio-Demographic Determinants of Prostate Cancer Screening

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### Abstract

Screening may be effective for reducing deaths due to prostate cancer. The aim of this study was determine the prevalence and determinants influencing prostate cancer early detection behaviors based on the theory planned behavior (TPB). In this cross-sectional study, conducted in the west of Iran, a total of 250 men aged 50 to 70 years old were randomly selected to participate. Of these, 200 (80%) signed the consent form and voluntarily agreed to take part. A structured questionnaire based on TPB constructs was applied for collecting data by interview. Analyses were conducted with SPSS version 16 using bivariate correlations, and logistic and linear regression. Some 26.5% of the participants demonstrated prostate cancer early detection behavior. Age higher than 60 (OR: 5.969), academic education (OR: 2.904), number of family members more than four (OR: 3.144), and knowledge about prostate cancer (OR: 3.693) were the most influential predictive factors for early detection behavior. Furthermore, among the TPB constructs, attitude (OR=1.090) and subjective norms (OR=1.280) were the most influential predictors. Attitude, subjective norms, and perceived behavioral control accounted for 43% of the variation in the outcome measure of the intention to screen for prostate cancer (adjusted R squared= 0.43, F= 49.270 and P < 0.001). Designing and implementation programs to increase positive attitudes and encourage subjective norms towards prostate cancer screening behavior may be useful for promotion of early detection.

**Keywords:** Early detection of cancer- life style- health education

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### Introduction

Prostate cancer is one of the most common and commonly reported men's health problems (Drudge-Coates and Turner, 2012). Prostate cancer is recognized as the most commonly diagnosed non-skin cancer and the second leading cause of cancer death in the United States (Brawley, 2012). Prostate cancer is the second most frequently diagnosed cancer in men world-wide (Qian et al., 2017). The long-term side effects of the treatment such as urinary incontinence, impotence, and irradiation-induced rectal inflammation have very adverse effects on the quality of life of patients with prostate cancer (Grubb 3rd and Kibel, 2007). Existing studies show that there is 40% risk of developing latent prostate cancer among 50-year-old men over the course of their lives, which is 9.5% for clinically obvious prostate cancer and 2.9% for resulting death (Stangelberger et al., 2008). In other hand, it is predicted that by 2025, the incidence of cancer raises 45% in developing countries (Pakzad et al., 2016). High body mass indexes, obesity, physical inactivity, dietary factors,

smoking are strongly associated with increased risk of prostate cancer (Peisch et al., 2017). It has also been shown that the risk level varies with the level of familial relationship and the age of the disease manifestation (Albright et al., 2017). There is clear evidence that early diagnosis of cancer is one of the most effective solutions to reduce the incidence of cancer deaths (Katz et al., 2008). Prostate-Specific Antigen (PSA) and Digital Rectal Examination (DRE) can help detect prostate cancer before the onset of clinical symptoms and these methods are used for screening detect prostate cancer (Smeenge et al., 2012). Furthermore, prostate-Specific Antigen (PSA) testing for prostate cancer has been reported to avert one prostate cancer death per 27 additional cases detected during 13 years (Mamawala et al., 2017). Several characteristics of these methods such as easy to use, low price and availability, and extraordinary results in reducing the incidence of cancer and reducing the severity of cancer during the diagnosis phase show the importance of these examinations (Shafi et al., 2013). These facts clarify the necessity of intervention for at risk group to improve prostate cancer screening behaviors; on the other hand,

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health planning programs needs to identify the effective and predictive determinants of behavior (Steinmetz et al., 2016; Mirzaei-Alavijeh et al., 2016a; Jalilian et al, 2016; Mirzaei-Alavijeh et al 2016b).

In cancer screening behavior promotion research, it would be beneficial to know how perceptual related factors, such as attitude, subjective norms, self-efficacy, or perceived behavior control are responsible to predict intention and consequently behavior (McClenahan et al., 2006; Iyigun et al., 2016). The objective of this study was to determine the determinants related to undergoing prostate cancer early detection behaviors among sample of Iranian men middle age and young elderly based on the TPB.

## Material and Methods

### *Participants and procedure*

The study was a part of a project conducted among male in the Paveh city, Kermanshah Province in the western of Iran, during 2016, with the goal of providing knowledge for the promotion of prostate cancer early detection behaviors.

To enroll the participants and collect data the following stages were done. A simple random sampling method was used to select participants by referring to health records of each household and the interviewer later referred to the home of the eligible subjects to collect their required information. Data was collected by interview. Research subjects were explained regarding the study procedure and confidentiality of information as well as the purpose of this study and all of them were enrolled in the study based on their consent.

The sample size was calculated at 95% significant level according to the results of a pilot study and a sample of 250 was estimated. Of the population of 250, 200 (80%) signed the consent form and voluntarily agreed to participate in the study, which has been approved by the Institutional Review Board at the Abadan University of Medical Sciences. Inclusion criteria were including willingness to participate in the study, age 50 and higher than 50 years, and no history of prostate cancer. However, exclusion criteria were unwillingness to participate in this study and lack of consent knowingly during any time of the study. This study has been approved by the institutional review board at the Abadan school of medical sciences, Abadan, Iran (IR.ABADANUMS.REC.1395.70).

### *Measures*

Prior to conducting the main project, a pilot study was conducted to assess the utility of the instrumentation. The pilot study participants were 30 male, similar to those who participated in the main study. The pilot study was conducted to obtain feedback about the clarity, length, comprehensiveness, and completion time of the various instruments, as well as collecting data to estimate the internal consistency of the measures.

### *Demographics determinants*

Background data collected were: age (years), level of education (elementary, secondary, high school, or

university), marital status (single or married), economic status (very weak, weak, average, good, very good), number of family (number), have a health insurance (yes, no), family history of prostate cancer (yes, no), and knowledge about prostate cancer (yes, no).

### *Prostate cancer early detection behaviors*

To assess whether or not the participant's prostate cancer early detection behaviors, we used their responses 3 questions about the type of prostate cancer early detection behaviors which included "have you ever doing sonography for detection prostate cancer"?, "have you ever doing rectal examination for detection prostate cancer"?, and "have you ever doing PSA test for detection prostate cancer"?. For which the response category was yes or no.

### *TPB Theoretical Variables*

The items which assessed constructs of the TPB were derived from the scales of prostate cancer early detection behaviors related intention to the doing prostate cancer early detection behaviors (McClenahan et al., 2006; Iyigun et al., 2016). There were 15 items which measured the four constructs of 1) attitude, 2) subjective norms, 3) perceived behavioral control, and 4) behavioral intention. Specifically, five items measured attitudes towards the doing prostate cancer early detection behaviors (e.g., doing prostate cancer early detection behaviors for me is useful). Four were four items which measured the subjective norms towards the doing prostate cancer early detection behaviors (e.g., if I doing prostate cancer early detection behaviors, my family will confirm it). Four items measured the perceived behavioral control to doing prostate cancer early detection behaviors (e.g., I am confident that I can talk with others about doing prostate cancer early detection behaviors). The behavioral intention to doing prostate cancer early detection behaviors was measured by two items (e.g., I intend doing prostate cancer early detection behaviors in the next year). A five-point Likert type scaling, ranging from 1 (strongly disagree) to 5 (strongly agree), was used. The reliability coefficients for the abovementioned constructs were as follows: attitude ( $\alpha=0.89$ ); subjective norms ( $\alpha=0.85$ ), perceived behavior control ( $\alpha=0.80$ ), and behavioral intention ( $\alpha=0.63$ ), attesting to the internal consistency of the measures.

### *Analysis plan*

The statistical package for the social sciences (SPSS) version 16 was used for the purpose of data entry, manipulation, and analysis. Quantitative variables were expressed as means with SDs, and qualitative/categorical ones as frequencies and percentages. Bivariate correlations were computed to ascertain the magnitude and direction of the associations between the TPB variables. Multivariable logistic regression models were performed to predict TPB variables and socio-demographic variables on prostate cancer early detection behaviors. In addition, liner regression analysis was performed to explain the variation of behavioral intention on the basis of 1) attitude, 2) subjective norms, and 3) perceived behavioral

control. Furthermore, Cronbach's Coefficient Alpha was used to estimate the internal consistency of the various measures.

## Results

The subjects ranged in age from 50 to 69 with the mean of the 57.76 (SD: 4.79) years. All of participants were married. Regarding the economic status, 21.5%, 52.5%, and 16% of the respondents reported that weak, middle, and good, respectively. In addition, 43.5%, 31.5%, and 25% of the respondents reported that under diploma, diploma, and academic education, respectively. Almost, 52% of participants report his family includes four and fewer than four people, and 48% reported higher than four people. All of participants had health insurance. Furthermore, 7% of participants reported positive family history of prostate cancer. About 36.5% of respondents knew what prostate cancer was. About 26.5% of the participants had doing prostate cancer early detection behaviors. In addition, 4%, and 10% of the respondents reported that doing rectal examination and doing prostate-specific antigen, respectively.

Logistic regression (backward stepwise method) building procedure was conducted and finally on 3th step the procedure was stopped and the best model was selected. Among the socio-demographic characteristics, age, education level, number of family member, and knowledge about prostate cancer were the most influential

predictive factors for doing prostate cancer early detection behaviors Table 1.

Table 2 shows the bivariate associations among the predictor variables, which were all statistically significant at either .05 or .01 level. For example, intention towards the doing prostate cancer early detection behaviors was associated with the positive attitudes towards the doing prostate cancer early detection behaviors ( $r= 0.226$ ), subjective norms ( $r= 0.528$ ), and perceived behavioural control ( $r=0.540$ ). Additionally, perceived behavioural control to doing prostate cancer early detection behaviors was significantly related to the positive attitudes towards the doing prostate cancer early detection behaviors ( $r= 0.171$ ), and subjective norms ( $r= 0.352$ ). In addition, positive attitudes towards the doing prostate cancer early detection behaviors was associated with the subjective norms ( $r= 0.177$ ).

A Backward step-wise model building procedure was conducted and finally on 3rd step the procedure stopped and the best model was selected, among the TPB constructs: attitude (OR=1.090) and subjective norms (OR=1.280) were the more influential predictors on prostate cancer early detection behaviors Table 3.

As can be seen in Table 4, TPB variables were statistically significant for predicting prostate cancer early detection behaviors intention, which they were accounted for 43% of the variation in intention to the prostate cancer early detection behaviors (Adjusted R squared= 0.43, F= 49.270 and P < 0.001).

Table 1. Multiple Logistic Regression Analysis for Socio-Demographic Characteristics Related to Prostate Cancer Early Detection Behaviors (Final Model. Step 3)

Variables	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
<b>Age</b>				
50 -55 Years Old	1	-	1	-
56- 60 Years Old	2.111 (0.881 – 5.059)	0.094	1.116 (0.417 – 2.983)	0.827
61-69 Years Old	4.798 (2.002 – 11.501)	< 0.001	5.969 (2.082 – 17.115)	0.001
<b>Education</b>				
Under Diploma	1	-	1	-
Diploma	0.391 (0.169 – 0.907)	0.029	0.695 (0.251 – 1.923)	0.484
Academic	1.320 (0.631 – 2.760)	0.461	2.904 (1.133 – 7.441)	0.026
<b>Number of Family</b>				
1-4 n	1	-	1	-
5-8 n	1.976 (1.042 – 3.747)	0.037	3.144 (1.448 – 6.827)	0.004
<b>Knowledge about Prostate Cancer</b>				
No	1	-	1	-
Yes	2.829 (1.483 – 5.396)	0.002	3.693 (1.777 – 7.675)	< 0.001

Table 2. Correlation Between Different Components of TPB

Component	Mean (SD)	Range	X1	X2	X3
X1. Attitude	17.45 (4.35)	5 - 25	1		
X2. Subjective norms	12.13 (3.24)	4-20	0.177*	1	
X3. Perceived behavioural control	12.82 (2.95)	4-20	0.171*	0.352**	1
X4. Intention	7.18 (1.61)	2-10	0.226**	0.528**	0.540**

\* Correlation is significant at the 0.05 level (2-Tailed); \*\* Correlation is significant at the 0.01 level (2-Tailed)

Table 3. Logistic Regression Analysis for TPB Variables Related to Prostate Cancer Early Detection Behaviors

Variables	B	S.E.	Odds Ratio	95% Confidence Intervals		P-value
				Lower	Upper	
Final Model, Step 3						
Attitude	0.086	0.041	1.090	1.005	1.182	0.037
Subjective norms	0.247	0.059	1.280	1.140	1.437	<0.001

Table 4. Predictors of the Attitude, Subjective Norms and Perceived Behavioral Control in Prostate Cancer Early Detection Behaviors Behavioural Intention Based on Linear Regression Analysis

Variable	B	SE B	Beta	T	P-value
Attitude	0.034	0.020	0.093	1.686	0.093
Subjective norms	0.186	0.029	0.373	6.430	<0.001
Perceived behavioral control	0.214	0.032	0.392	6.763	<0.001

SE, Standard Error; Adjusted R squared, 0.43; F, 49.270 ; P < 0.001

## Discussion

According to the results, 26.5% of the participants underwent prostate cancer early detection behaviors. Javadzade et al carried out a research on men in Isfahan, Iran and reported that 30% of the participants had PSA (Javadzade et al., 2012). Also, Sargazi et al., (2014) reported that 21% of the subjects in their study doing prostate cancer early detection behaviors. Furthermore, Balajadia et al., (2008) stated that 20.3% of men in Island had taken PSA. Our findings indicated cancer screening behavior among Iranian men low. These finding can be warning to health policy makers in Iran; and should be the focus of special attention.

One of the findings of the study was that subjects aged over 60 were more likely to perform prostate cancer screening behaviors. Several studies point to the fact that younger people tend to be slightly vulnerable to the dangers of their own surroundings; in other words, they assume themselves immune against dangers and health threats and do not need to adopt preventive behaviors (Mirzaei Alavijeh et al., 2015). In fact, the term “immortality” or “non-vulnerability” describes one’s perception of the fact that I am at lower risk than complications compared with others and this kind of belief undermines the adoption of any preventive behavior. Given that 50-year-old men are recommended to perform prostate cancer screening, it is essential to provide educational programs in the early sixties.

Another finding from the present study is the increased chance of performing prostate cancer screening behaviors among participants with a higher education and having knowledge about prostate cancer. Sargazi et al., (2014) showed that level of education, income and occupations with low social value directed affected non-compliance with screening tests. In their review study of the relationship between socioeconomic status and the use of cancer screening tests Pruitt et al., (2009) also reported that 58.3% of the studies showed a positive statistical relationship in this regard so that patients showed more tendency to perform cancer screening examinations with an increase in social and economic indicators. Concerning the relationship between education level

and screening behaviors, Cavdar et al., (2007) stated in their study that lack of information is one of the factors affecting neglecting screening behaviors. In general, higher education levels are predictors of the probability of performing screening behaviors more frequently (Secginli and Nahcivan, 2006). According to these findings, it seems that particular attention must be paid to people with lower education level while designing educational programs.

Also, more crowded households is another factor affecting frequency of the prostate cancer screening behaviors in the present study so that households with more than four people had a higher chance of performing prostate cancer screening behaviors. Many studies have pointed to the effective role of family support in carrying out health-related behaviors (Noohi, et al., 2016); and patient-family interaction is a promising route towards receiving health-care service of high quality and ultimately improving health status at the societal level (Carman, et al., 2013). Therefore, it is recommended to consider ways to attract family support in educational programs to increase frequency of screening behaviors.

However, studies have referred to high costs and lack of easy access as reasons for failure to implement health promotion behaviors in adults (Albert, et al., 2004). Also, mental disability is a major obstacle to performing health promotion behaviors in the elderly, because people forget when they should come to the clinic or they cannot implement health recommendations based on instructions due to their mental problems (Scarinci, et al., 2003). Therefore, it is recommended to carry out more accurate studies in the future using behavioral analysis theories in this regard.

The main aim of this study was to determine factors related to doing prostate cancer early detection behaviors among men aged 50 to 69 years old based on the TPB. The results of the present study indicated that attitude and subjective norms were the most influential predictors on doing prostate cancer early detection behaviors. Furthermore, our finding indicated TPB variables were accounted for 43% of the variation in intention to prostate cancer early detection behaviors. Several studies have reported TPB variables’ predictability to explain behavioral health screening such as prostate cancer screening (McClenahan et al., 2006; Lechner, et al., 2002). In this regards, Lechner et al., (2002) reported a significant relationship between social norm, and self-efficacy with prostate cancer early detection behaviors intention among Dutch adolescent in Netherlands. In addition, McClenahan et al., (2006) carried out a research on 195 undergraduates aged 18–39 years and indicated TPB variables explained 50% of the variance in intention testicular self-examination. Our results show Iranian men to doing prostate cancer early detection behaviors are



influenced by other people (subjective norms) such as their friends, wife, health workers and doctors, so educational programs for health care providers is necessary to encourage men to doing prostate cancer early detection behaviors.

Considering the high prevalence of this cancer among the age group examined, this issue seems to affect quality of life of remaining years of life and must be considered as a potential health issue. Considering the positive attitude towards prostate cancer screening behaviors and the importance of subjective norms in performing these behaviors, it is recommended to design and implement educational interventions based on these cognitive constructs.

#### Limitations

The findings reported in this study have certain limitations. First, the information is based on self-reporting, which always faces the risk of recall bias and we do not know how it could have affected the results. Second, the high rejection rate is another limitation of our study. Third, the internal consistency the questionnaire was relatively low ( $\alpha=0.63$ ) for assessing behavioral intention.

In conclusion, our findings indicated prostate cancer early detection behaviors were low among Iranian men. In addition, subjective norms, and attitude were strong predictors for prostate cancer early detection behaviors.

#### Author's Contributions

Mehdi Mirzaei-Alavijeh and Farzad Jalilian developed the original idea, the protocol study, study design and data analyzed. Touraj Ahmadi-Jouybari and Masoumeh Vaezi participated in writing manuscript. All authors provided comments and approved the final manuscript.

#### Conflict of interest statement

The authors declare that they have no conflict of interest.

#### Statement of Human Rights

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional. This study has been approved by the institutional review board at the Abadan school of medical sciences, Abadan, Iran (IR.ABADANUMS.REC.1395.70).

#### Informed consent

Research subjects were explained regarding the study procedure and confidentiality of information as well as the purpose of this study and all of them were enrolled in the study based on their consent.

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