

# Evaluating a Theory-based Health Education Intervention to Improve Awareness of Prostate Cancer among Men in Western Jamaica

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## ABSTRACT

**Objective:** To evaluate the impact of a theory-based health education intervention on awareness of prostate cancer and intention to screen among men in Western Jamaica.

**Methods:** One hundred and eighty-eight men attending outpatient clinics in a hospital in Western Jamaica completed an interviewer-administered pretest survey. Following the pretest, participants received a health education intervention related to prostate cancer and an immediate post-test survey.

**Results:** There were statistically significant increases in the percentage of correct responses between the pretest and post-test ( $p < 0.05$ ). The greatest improvement was among items measuring knowledge of prostate cancer screening tests. Participants moved across the Stages of Change theoretical constructs indicating intention to screen.

**Conclusion:** The sample was receptive to information about prostate cancer and the use of a theory-based educational intervention positively influenced knowledge of prostate cancer risk factors, symptoms, and types of screenings.

**Practice implications:** This theory-based patient education programme can be replicated to promote awareness of prostate cancer and informed screening methods including potential risk associated with screening behaviours.

**Keywords:** Cancer screening, health education, Jamaica, prostate cancer

# Evaluación de una Intervención de Base Teórica en Educación para la Salud con el Fin de Desarrollar una Mejor Concientización con Respecto al Cáncer de Próstata entre los Hombres de la Región Occidental de Jamaica

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## RESUMEN

**Objetivo:** Evaluar el impacto de una intervención de base teórica en educación para la salud sobre la conciencia acerca del cáncer de próstata y la disposición de los hombres en la región occidental de Jamaica, a someterse a pruebas de detección.

**Métodos:** Ciento ochenta y ocho hombres que asistían a las clínicas de consulta externa en un hospital en el occidente de Jamaica llenaron una encuesta de entrada administrada por el entrevistador. Tras la prueba de entrada, los participantes recibieron una intervención de educación para la salud en relación con el cáncer de la próstata e inmediatamente una encuesta de salida.

**Resultados:** Hubo aumentos estadísticamente significativos en el porcentaje de respuestas correctas entre la prueba de entrada y la prueba de salida ( $p < 0.05$ ). La mayor mejora se observó en los ítems que medían el conocimiento acerca de las pruebas de detección del cáncer de próstata. Los participantes se movieron a través de los constructos teóricos de las etapas de cambio, indicando la intención de tamizaje.

**Conclusión:** La muestra fue receptiva a la información sobre el cáncer de próstata, y el uso de una intervención educativa de base teórica tuvo una influencia positiva sobre el conocimiento acerca de los factores de riesgo, síntomas y tipos de pruebas de detección del cáncer de próstata.

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**Palabras claves:** Pruebas de detección de cáncer, educación para la salud, Jamaica, cáncer de próstata

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## INTRODUCTION

Men of African descent are at increased risk of developing prostate cancer [PCa] (1–5) which is the second most common cause of cancer death among African American men (1). It is the leading cause of cancer death among men in Jamaica (6, 7). Data from the 2008 Globocan database reports age-standardized incidence rates of PCa in Jamaica at 51.1 cases per 100 000 men and mortality rates at 20.6 per 100 000 (6). Gibson and colleagues report age-adjusted incidence of PCa in Jamaica at 56.4 cases per 100 000 (7). In a study of 1121 men screened for PCa in Kingston, Jamaica, Glover and colleagues (8) found that 42% of men had an abnormal prostate on rectal examination, with 80% pathologically confirmed.

Health education interventions including raising awareness of PCa have been shown to increase attendance to screenings by African American men (9–11). Salami and colleagues (4) encouraged health educators to promote awareness, knowledge, and PCa screening behaviours for all black men considering their elevated risk of developing PCa. Given the high burden of PCa among Jamaican men, and evidence that Jamaican men may present with more clinically significant PCa (8), the research team developed an intervention. The aim of this study was to evaluate the efficacy of a theory-based health education intervention to promote PCa awareness and intention to screen among a sample of Jamaican men with low levels of educational attainment.

## SUBJECTS AND METHODS

This was a cross-sectional study with a pretest/post-test design. The study was conducted at the Cornwall Regional Hospital and select, non-randomized health centres in the parish of St James, Jamaica. The Cornwall Regional Hospital is a public, government operated hospital affiliated with the Western Regional Health Authority (WRHA) which comprises 82 health centres and four hospitals. Nearly half a million people are served at WRHA each year. Men ages 40 years and older were eligible to participate in the study if they presented at out-patient clinics at the study site, gave informed consent, and were well enough to complete the educational intervention. The Institutional Review Board (IRB) of the University of Alabama at Birmingham, the Advisory Panel of Ethics and Medico-Legal Affairs in the Ministry of Health, Jamaica and the WRHA approved the study protocol prior to its implementation.

Participants were approached in waiting rooms at out-patient clinics and enrolled in the study after providing informed consent. Participants completed a 25-item interviewer-administered pretest questionnaire. Two interviewers read all of the questions and recorded each answer. The

questionnaire was based on a reading level below 8<sup>th</sup> grade. The interviewer-administered questionnaire was pretested with a sample of Jamaican men (n = 15) aged 40 years and older for comprehension and understandability prior to data collection. The revised questionnaire was pretested again with an additional sample of Jamaican men (n = 5) to be sure men understood the questions. Question stems and response options were considered culturally appropriate and easy to follow during pretesting. Questions were related to socio-demographic information which included age, marital status, educational attainment, income, religious affiliation and race. Participants were asked about their attitudes, knowledge, perceptions and behaviours regarding PCa risk factors, symptoms and screenings. Some questions were adapted from the Prostate Health Questionnaire (12). Following the completion of the pretest questionnaire, a health education intervention was administered by interviewers using a PowerPoint® presentation displayed on a laptop computer. The intervention sessions were attended by groups of one to fifteen men approximately. The average number of men attending an intervention session was about four. Each intervention session lasted approximately forty-five minutes including the pre and post-tests. The study was open for enrolment for three months.

The educational intervention was based on constructs from the Transtheoretical Model [TTM] (13) and the Health Belief Model (14). The TTM is an individual level theoretical model based on the idea that behaviour change unfolds as a process over time through a set of stages called Stages of Change. There are five stages in the TTM – precontemplation, contemplation, preparation, action, and maintenance. People in the precontemplation stage have not yet started thinking about behaviour change, while those in the contemplation stage have started thinking about behaviour change. People in preparation have taken steps to change their behaviours within six months, and those in action have begun a change but have maintained the change for less than six months. People in maintenance have been consistent at a new behaviour for more than six months. The assumption in the TTM is that populations at high risk of negative health outcomes benefit from efforts to create awareness and cues to prompt them to think about health behaviour change, and move from stages of precontemplation and contemplation to action-oriented stages like preparation and action (13, 15, 16).

The TTM includes ten Processes of Change constructs (15). These Processes of Change are hypothesized to create awareness and prompt people to start thinking about behaviour change. Consciousness raising and dramatic relief are two of the Processes of Change constructs from the TTM.

Both constructs were operationalized in the intervention to raise awareness of PCa risk factors, symptoms and screening tests. Consciousness raising and dramatic relief may be used to promote awareness when people have not yet started to think about changing their behaviours. Proschaska *et al* (16) suggested that incorporating consciousness raising and dramatic relief could be effective in moving people from a stage of unawareness (precontemplation) to awareness of the need for behaviour modification (contemplation and preparation). The closer a person gets to the stage of action, the more likely he will be to perform a behaviour such as screening for PCa.

The Health Belief Model (HBM) is an individual level theory that was developed to understand barriers and facilitators that influence uptake of health-related behaviours (14). Constructs from the HBM may be operationalized to answer questions about why some people use preventive health services and others do not, among other questions (17). The perceived barriers construct from the HBM (14) was operationalized in the educational intervention to decrease participants' perception of barriers constraining their future health-seeking behaviours and intention to screen for PCa. Essentially, emphasizing the health benefits of PCa screenings minimized perceived barriers among the study sample. Behavioural scientists and public health practitioners have used the TTM and HBM widely to promote health behaviours including preventive cancer screenings (18–20).

The computer-based health education intervention comprised general information about the prostate and its function, and included simple pictures of the gland and where it is located in a man's body. The intervention included messages about risk factors for PCa, signs and symptoms of PCa, and screening tests for the disease. Nine months prior to the intervention, two male graduate students conducted a study among Jamaican men ( $n = 253$ ) who had never been screened for PCa to identify barriers and facilitators to early detection of PCa. The unpublished findings were used to develop the intervention and related intervention messages.

Culturally, relevant multimedia were incorporated into the intervention to promote awareness of PCa and provide a dynamic tool for health promotion. Media also included symbols of Jamaican culture like the flag and the national colours to increase interest and relevance when presenting statistics about PCa among Jamaicans.

The intervention included 21 slides, and was facilitated by a graduate research assistant from the University of Alabama at Birmingham. The intervention was designed using nontechnical, simple language to account for low levels of literacy and low educational attainment among the participants. The intervention included some discussion about potential screening risks associated with the prostate specific antigen (PSA) examination. Copies of the educational intervention in PowerPoint® are available from the authors. All intervention materials were pilot-tested and revised using input from Jamaican men ages 40 years and older with

health-seeking behaviours similar to those of the study population.

A post-test questionnaire was administered and read by the research assistant to participants immediately following the computer-based educational intervention. Questions on the post-test assessed participants' knowledge of PCa screening tests, risk factors and intention to screen.

## Measures

### *Previous PCa experiences*

Previous PCa experiences were measured using three items. Participants were asked, "Does your father, brother, or son have prostate cancer?" Awareness of screening tests was measured by asking, "Are you aware of any tests available for prostate cancer check-ups?" Previous PCa screening was measured by asking, "Have you ever been checked for prostate cancer?"

### *Knowledge of PCa screening tests*

Knowledge of PCa screening tests was measured using four items. Participants were asked to correctly identify the recommended frequency of PCa screenings for men age 40 years and older. Three additional items asked participants to select "each PCa test that you know about" and included PSA, digital rectal exam (DRE) and screening using the ultrasound device.

### *Knowledge of PCa risk factors*

Knowledge of PCa risk factors was assessed by asking participants, "Do you think any of the following risk factors may make ANY man's chance of getting PCa go up?" Participants could respond "no" "yes" or "not sure" to four items: 1) being over 40 years old, 2) being a black man of African descent, 3) having a family history of PCa, and 4) eating a high fat diet.

### *Knowledge of PCa symptoms*

Knowledge of PCa symptoms was measured by asking participants to identify from a list of six items those that may be symptoms or signs of PCa. Symptoms included: 1) frequent urination (peeing), especially at night; 2) trouble starting or holding back urination/pee; 3) a weak flow of urine or pee that starts and stops; 4) painful or burning urination; 5) blood in urine/pee or semen; and 6) pain in lower back, groin, between the scrotum and rectum or upper thighs.

### *Stages of Change*

Stages of Change constructs from the TTM were measured by two items on both the pre and post-test to assess whether participants not previously screened for PCa moved from precontemplation or contemplation to preparation after exposure to the intervention. Participants were asked, "Have you ever seriously thought about being checked for prostate cancer?" Participants who responded "no" were coded as

“precontemplation”. Participants who respond “yes” to this question were asked a follow-up that assessed whether they had in fact moved beyond contemplation to preparation to take action. This was measured by asking, “Are you thinking of being screened/checked for prostate cancer in the next six months?” Participants who responded “no” to the follow-up were coded as “contemplation” and those who responded “yes” were coded as “preparation”. This measure was created only for those participants who had not been previously screened for PCa and who completed both the pre and post-test ( $n = 97$ ).

The original sample comprised 207 participants. Of the participants enrolled in the study, 13 completed the pre-test but failed to complete the post-test. Additionally, six participants completed the post-test but did not complete the pretest. The 19 participants who did not complete both the pre and post-tests were excluded from data analysis. The final study sample was restricted to participants who completed the pre and post-tests ( $n = 188$ ).

Statistical analyses focus on the pretest/post-test assessment of differences in knowledge of PCa screening tests, risk factors, symptoms and Stage of Change. Univariate analyses of sociodemographic and previous PCa experiences are presented in Table 1. The percentage of responses to key variables measuring knowledge of PCa screening tests, risk factors, symptoms, and intention to screen are presented in Table 2. The Figure lists the proportion of participants at each Stage of Change at pre and post-test. McNemar’s test is used to determine whether the percentage of responses to items differs significantly between pre and post-test (due to the intervention). Finally, a summated index of correct responses to questions about PCa screening tests, risk factors and symptoms was created. Due to the non-normal distribution of scores at pre and post-test, a Wilcoxon signed-rank sum test was used to determine if there was a significant increase in knowledge due to the intervention. All statistical analyses were conducted using Stata version 10 (21).

## RESULTS

The descriptive statistics of the sample are presented in Table 1. The sample ranged in age from 40 to 89 years with a mean age of 58.7 years. The largest proportion of men was aged 50–59 years (35.6%), married (48.4%), with a primary level education (46.0%), and working as manual labourers (56.2%). Ninety-eight per cent identified their race as “black.” Seventeen per cent reported having a father, brother, or son with PCa. About one third (36.3%) of the sample had been previously screened for PCa and 37.4% said they were aware that tests were available for PCa screenings.

The pretest and post-test results of the percentage and number of correct responses to knowledge items of screening tests and intention to screen for PCa are presented in Table 2. The  $p$ -values of the McNemar’s test indicate statistically significant differences in the percentage of correct responses

Table 1: Sociodemographic characteristics ( $n = 188$ )

	%	$n^a$
<i>Age (years)<sup>b</sup></i>		
40–49	22.9	43
50–59	35.6	67
60–69	20.2	38
70 and older	21.3	40
<i>Race</i>		
Black	98.4	184
Other	1.6	3
<i>Marital status</i>		
Single	32.3	60
Married	48.4	90
Living together	8.6	16
Divorced or separated	7.0	13
Widower	3.7	7
<i>Highest education level</i>		
No formal education	22.5	42
Primary (1–6 grade)	46.0	86
Secondary (7–11 grade)	23.0	43
Some college, vocational, or 4-year degree	8.5	16
<i>Occupation</i>		
Manual work	56.2	104
Non-manual work	11.9	22
Self-employed or other type of work	8.7	16
Unemployed	7.0	13
Retired	16.2	30
<i>Previous prostate cancer experience</i>		
Father, brother or son with prostate cancer?	16.6	30
Aware of tests for prostate cancer?	37.4	67
Previously screened for prostate cancer?	36.3	65

<sup>a</sup> Totals may not equal 188 due to missing values

<sup>b</sup> Mean age = 58.7 years

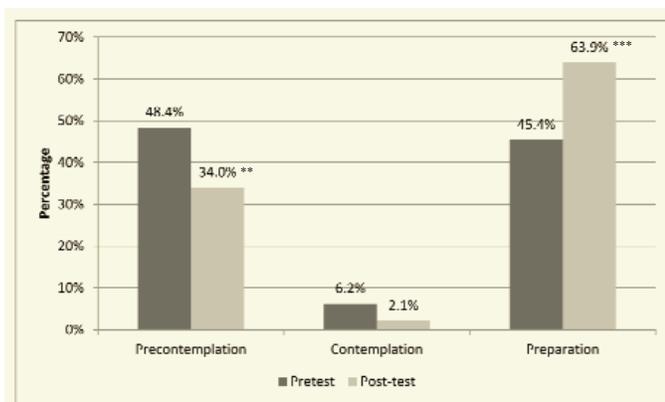
between the pretest and post-test ( $p < 0.05$ ). In the pretest, knowledge of PCa screening tests was relatively low compared to knowledge of risk factors and symptoms. About half of the sample (51.0%) knew the recommended frequency of PCa screenings for men over 40 years of age. Of three screening tests, 24.5% indicated that they knew of DRE, 9.8% knew of PSA, and 2.7% knew of the ultrasound.

A greater proportion of men correctly identified items measuring knowledge of PCa symptoms than types of screening tests at pretest. A weak urine flow was correctly identified by the largest proportion of men (68.4%) with about two-thirds of the sample correctly identifying blood in urine, painful or burning urination, pain in the lower back or groin, and difficulty starting or stopping urination as symptoms of PCa. Less than half the sample (45.0%) correctly identified frequent urination as a symptom.

The greatest proportion of correctly identified items in the pretest was for measures associated with knowledge of PCa risk factors. About three-fourths of the sample correctly identified a family history of PCa (76.9%), being over 40

Table 2: Participants' knowledge of screening tests, risk factors, symptoms and intention to screen

	<i>Pretest</i>		<i>Post-test</i>		<i>Difference</i>	<i>p-value</i>
	%	<i>n</i>	%	<i>n</i>	%	
<i>Knowledge of PCa screening tests</i>						
Recommended frequency of screening	51.0	76	93.3	139	42.3	$p < 0.0001$
PSA – prostatic specific antigen	9.8	18	83.2	153	73.4	$p < 0.0001$
DRE – digital rectal examination	24.5	45	82.1	151	57.6	$p < 0.0001$
Ultrasound	2.7	5	63.0	116	60.3	$p < 0.0001$
<i>Knowledge of PCa risk factors</i>						
Over 40 years old	76.6	134	89.1	156	12.5	$p = 0.0003$
Black race or African descent	54.7	93	82.9	141	28.2	$p < 0.0001$
Family history of prostate cancer	76.9	133	85.5	148	8.7	$p = 0.0135$
High fat diet	74.0	128	86.7	150	12.7	$p = 0.0009$
<i>Knowledge of PCa symptoms</i>						
Frequent urination	45.0	81	66.1	119	21.1	$p < 0.0001$
Difficulty starting or stopping urination	64.2	113	86.4	152	22.2	$p < 0.0001$
Weak urine flow	68.4	119	89.7	156	21.3	$p < 0.0001$
Painful or burning urination	65.7	115	89.1	156	23.4	$p < 0.0001$
Blood in urine	64.2	113	89.8	158	25.6	$p < 0.0001$
Pain in lower back or groin	65.9	110	88.6	148	22.7	$p < 0.0001$
<i>Intention to screen</i>						
Precontemplation	48.4	47	34.0	33	-14.4	$p = 0.0043$
Contemplation	6.2	6	2.1	2	-4.1	$p = 0.2188$
Preparation	45.4	44	63.9	62	18.5	$p = 0.0003$



\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

Figure: Percentage of respondents by stages of change, pretest and post-test (n = 97).

years old (76.6%), and a high fat diet (74.0%) as risk factors. Black race or African descent was correctly identified by 54.7% of the sample.

For all 13 knowledge items, there were statistically significant increases in the percentage of correct responses between the pretest and post-test. The greatest improvement was among items measuring knowledge of PCa screening tests. The percentage of respondents who knew the recommended frequency of screening increased from 51.0 to 93.3% ( $p < 0.0001$ ). Knowledge of DRE, ultrasound, and PSA increased by 57.6, 60.3 and 73.4 percentage points,

respectively ( $p < 0.0001$ ). Knowledge of PCa symptoms increased by about 21–26 percentage points and knowledge of risk factors increased between 9 and 28 percentage points.

The mean number of correct knowledge items (not shown in Table 2) was 7.5 at pretest (min/max range 0–13) and 11.7 at post-test (min/max range 4–14). The median score at pretest was 8 (interquartile range 6 to 10) and at post-test was 12 (interquartile range 11 to 13). Results from the Wilcoxon signed-rank sum test indicate a significant, positive increase in the number of knowledge items correctly identified by participants between the pretest and post-test, due to the intervention ( $p < 0.0001$ ).

There were significant changes in the proportion of participants at two of three Stages of Change (14) assessed in this study. Participants in the precontemplation stage decreased from 48.4% in the pretest to 34.0% at post-test ( $p = 0.0043$ ). Participants in the preparation stage increased from 45.4% at pretest to 63.9% ( $p = 0.0003$ ). Few participants were in the contemplation stage in either the pretest or post-test and there was no statistically significant change due to the intervention ( $p = 0.2188$ ).

## DISCUSSION

This was the first computer-based health education intervention on PCa awareness conducted among Jamaican men living in Jamaica. Prior to exposure to the educational intervention, men had some knowledge of PCa, about 45–77% of participants were able to correctly identify PCa risk factors and symptoms. However, participants were less likely to be

knowledgeable about the types of PCa screening tests before exposure to the intervention, even though 36.3% of the sample had previously been screened for PCa. In light of the significant improvements in PCa awareness, knowledge of screening tests and stated intentions to be screened within six months of the study, this approach appears to be a favourable health education mechanism for Jamaican men at risk for PCa. The educational intervention seems to have had a positive impact on participant's future intention to screen for PCa. Although this sample of men had low levels of educational attainment, 68.5% had less than a secondary education, they were able to retain computer-based intervention messages about PCa screenings.

The findings reveal that a brief theory-based educational intervention can significantly improve PCa awareness, a finding similar to Hevey *et al* (22). The current findings also suggest that Jamaican men at high risk for PCa expressed a greater intention to screen for PCa after exposure to the educational intervention. Our findings regarding increases in intention to screen for PCa are consistent with other studies describing the relationship between knowledge and awareness and screening behaviours among black men at high risk for PCa (23).

Interestingly, Jamaican men have strong perceptions of masculinity and stigma related to homophobia (24–25). Gutzmore (24) revealed that strong anti-homosexual sentiments are pervasive in Jamaican culture. Men have been stoned to death and ostracized by their communities for suspicions of homosexual behaviours, particularly behaviours related to disease acquisition and transmission (25). Cultural perceptions of homophobia among Jamaican men may compound their aversion to the DRE for early detection of PCa. Spence and colleagues (26) also report that fear of impotence may be a barrier to screening and treatment for PCa. Reynolds (23) reported similar issues regarding the DRE among African American men. Alternative screenings, including PSA, may initially be more acceptable among Jamaican men. However, it will be important to provide men with information on the risks and benefits of screening with the PSA and DRE tests to promote culturally acceptable informed decision-making.

The study is not without limitations. First, budget and time limitations did not allow for long-term follow-up with participants to test recall of knowledge gained during the intervention or the effect on screening behaviour. Second, the effectiveness of the educational intervention needs to be evaluated against other health education interventions for comparison of efficacy. Third, modifications to standardized scale measures to accommodate participants with low levels of educational attainment and diverse cultural backgrounds, do not allow the results to be compared across studies using similar scales. Fourth, self-reported intentions to screen for PCa when screening tests were not immediately available may not have accurately reflected participant's intentions had they been given an actual opportunity to be screened. Addi-

tionally, self-reported intentions may have been biased due to social desirability; using an audio computer assisted self-interviewing method may be one way to address this issue in the future. However, participants expressed concerns about literacy, and 97% of the sample preferred that pretest and post-tests were interviewer-administered and completed based on participants' verbal responses. Undoubtedly, this concern was related to the low educational attainment of the sample.

In conclusion, this health education programme can serve as an example for future attempts to promote awareness of PCa and related screening behaviours. By delivering a brief, multimedia intervention using laptop computers, researchers were able to reach participants across outpatient settings. Researchers used simple language to discuss the prostate gland and related urinary organs to educate men about symptoms associated with PCa. The use of basic illustrations of PCa screenings and culturally relevant media including pictures that reflected Jamaican culture may have increased attention to the educational intervention. The use of culturally relevant media was particularly useful for engaging a sample of men with particularly low levels of literacy and educational attainment. Clinicians advocating PCa screening may have to address concerns regarding homophobia and stigma related to the DRE for Jamaican men. Future studies should facilitate informed PCa screening options along with best practice intervention strategies to promote behaviour change.

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