CURRENT ONCOLOGY

ORIGINAL ARTICLE

Risk perception and psychological morbidity in men at elevated risk for prostate cancer

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ABSTRACT

Objective As prostate-specific antigen (PSA) makes prostate cancer (PCa) screening more accessible, more men are being identified with conditions that indicate high risk for developing PCa, such as elevated PSA and high-grade intraepithelial neoplasia (HGPIN). In the present study, we assessed psychological well-being and risk perception in individuals with those high-risk conditions.

Methods A questionnaire consisting of a psychological symptom survey, a trait risk-aversion survey, and a cancer-specific risk perception survey was administered to 168 patients with early-stage localized PCa and 69 patients at high risk for PCa ($n = 16$ HGPIN, $n = 53$ PSA > 4 ng/mL). Analysis of variance was used to examine differences in psychological well-being and appraisal of risk between the groups.

Results Compared with the PCa group, the high-risk group perceived their risk of dying from something other than PCa to be significantly lower ($p = 0.007$). However, PCa patients reported significantly more clinically important psychological symptoms.

Conclusions The identification of prostate conditions that predict progression to cancer might not result in the psychological symptoms commonly experienced by PCa patients, but does appear to be related to a distorted perception of the disease's mortal risk. Patients with PCa experience reduced psychological well-being, but better understand the risks of PCa recurrence and death. Education on the risks and outcomes of PCa can help at-risk men to view health assessments with reduced worry.

Key Words Prostate cancer, elevated PSA, HGPIN, risk perception, psychological well-being

Curr Oncol. 2015 Dec;22(6):e462-e469 www.current-oncology.com

INTRODUCTION

Prostate cancer (PCa) is the 2nd most common cancer in men worldwide, representing 14% of new global cancer cases in 2008[1]. High incidence rates in developed countries are attributed to screening for prostate specific antigen (PSA)[1,2]. Research has demonstrated that elevated PSA is associated with a risk of PCa, and risk of PCa increases as PSA increases[3]. Values of PSA exceeding 4 ng/mL have conventionally been used to identify men who require further investigation, such as by prostate biopsy[3].

Identification of high-grade prostatic intraepithelial neoplasia (HGPIN) on prostate biopsy has also been associated with an elevated risk of PCa[4]. High-grade prostatic intraepithelial neoplasia is a premalignant condition characterized by the presence of aberrant cells, which are detected by histopathologic examination of a biopsy specimen[5]. Approximately 115,000 cases of HGPIN are diagnosed each year in North America[6,7]. Diagnosis of HGPIN has been found to be highly predictive of PCa[4,8]. Approximately one third of men who test negative for cancer but positive for HGPIN upon prostate biopsy eventually develop prostate adenocarcinoma[8,9].

The aim of following patients with elevated PSA or HGPIN is to allow health care professionals to identify PCa in its least invasive form. Treatment at the earliest stage of the disease has been the presumed advantage of early detection[10]. To learn the limits of early detection, researchers have been investigating the potential negative effects of screening on the physical and psychological well-being of patients.

Screening for PCa is subject to a high rate of false-positive results that increase in likelihood with each additional screening[11–14]. In terms of physical risk, a large proportion

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of screened individuals can thus be undergoing biopsies for nonexistent or indolent cancers[15,16], raising their likelihood of infectious complications and erectile and urinary side effects[16–18]. Psychologically, anxiety frequently co-occurs with biopsies and PSA screening[19–21]. Macefield and collaborators[22] reported that approximately 20% of screened men experienced high levels of tension and anxiety at the time of biopsy, as well as clinically significant distress. Prostate-specific antigen tests were also positively associated with anger, depression, and confusion in a smaller proportion of men participating in PCa screening[22]. Considering that most patients with elevated PSA and HGPIN actually have benign conditions that will not progress to PCa, there are reasons to believe that those patients might undergo unnecessary psychological distress as a result of screening.

Fowler and colleagues[23] compared the psychological, socio-behavioural, and medical care outcomes in men with benign prostate biopsies and in unbiopsied men with normal PSA levels (operationalized as PSA < 2.5 ng/mL). The authors determined that men with benign biopsies more often reported thinking and worrying about PCa; they also felt that their chances of developing PCa were higher than those for men with normal PSA levels. The men also reported spending a greater amount of time researching PCa and talking with their significant others about PCa. In addition, they had more PSA tests and biopsies than did men with normal PSA levels. Correspondingly, interviews with individuals at hereditary risk for PCa have revealed that patient-directed research, screening appointments and prior experience with cancer all contribute to a distorted risk perception[24]. In a study of men with a family history of PCa, Bratt *et al.*[25] found that most participants reported worrying about their susceptibility to PCa and that approximately one third reported that worry affected their daily life. Pervasive worry has been shown to manifest behaviourally in use of preventive measures such as supplements marketed as promoters of prostate health[26].

Not all research has pointed to clinically significant distress. In a subsequent study involving a subset of their participants who underwent regular screening[25] (including digital rectal examinations and PSA testing), Bratt *et al.*[27] observed that screening was not associated with an increase above baseline in psychological morbidity as measured by standardized anxiety and depression assessments. That finding could be in conflict with the aforementioned research that showed worry affecting daily thoughts and behaviours in patients. However, knowing that patient worries lie somewhere between mild and significantly pervasive opens up the possibility of investigating more precise dimensions of distress.

The success of early detection is its ability to catch cancer at its most operable stage. By precisely defining the areas of distress that screening might aggravate, a decoupling of screening from the apprehensions that make the process psychologically invasive might be possible, thereby helping men to more clearly view screening in a positive light. Generalized elevation of risk perception is one dimension of cognitive distress that has been linked to at-risk identification in several forms of cancer[28–30], and it is therefore a sound starting point for exploring screening-specific distress.

Unaffected men with family histories of PCa have been found to perceive that, compared with the general population, they have an elevated risk of developing PCa, with greater risk perception being related to more-pervasive daily worry and more frequent screenings[25,26]. The authors who made that observation noted a paucity of information about PCa-related risk perception despite many efforts to define risk perception as it pertains to breast cancer. Thus, we set out to contribute to this research area by examining differences in the risk perception of PCa patients and individuals with markers of high risk for the disease.

Rakovitch *et al.*[28] conducted research with a similar design in the domain of breast cancer, finding that women treated for ductal carcinoma *in situ* (DCIS)—a focal condition at risk for becoming invasive—perceive elevated risks of disease recurrence and death for themselves that are equal to those for patients with invasive breast cancer. In addition, the two groups corresponded in their reporting of heightened anxiety and depression. To obtain those data, Rakovitch *et al.*[28] devised a questionnaire to capture psychological morbidity and risk perception in patients with invasive breast cancer or DCIS. Converting that questionnaire to apply to PCa, our investigation sought to compare risk perception and psychological morbidity in PCa patients and in men at risk of PCa as determined during screening.

METHODS

Participants

Patients attending the clinics of two surgical oncologists at an urban cancer centre in Toronto, Ontario, were approached for participation in the study. From February to June 2006, all clinic patients were pre-screened for study eligibility by chart review. Patients were deemed eligible if they had been diagnosed with early-stage PCa (stage T1 or T2, Gleason 6 and below, PSA < 10 ng/mL) or with elevated PSA (PSA > 4.0 ng/mL) or HGPIN. In comparing an at-risk group with a PCa group, we did not aim simply to examine whether identification of a cancer risk indicator put an individual at greater-than-average psychological discomfort, but also to establish whether that identification poses as substantial a challenge to mental health as PCa does.

Eligible patients were approached during regularly scheduled clinic visits, and informed consent was obtained from all participants. Study questionnaires were completed before participants saw their physician. The University Health Network Research Ethics Board approved the procedures.

Questionnaire

A questionnaire devised by Rakovitch *et al.*[28] was adapted for the present study. The 4-part questionnaire consisted of questions measuring the patient's awareness of his diagnosis, the patient's perception of PCa risk, the psychological implications of the diagnosis, and risk-aversion traits.

To measure awareness of diagnosis, participants were first instructed to select their diagnosis from a list of three options: prostate cancer, HGPIN, or elevated PSA. In the second section, 3 questions assessing risk perception were presented to participants in each group. The wording of 2 of

the 3 questions differed slightly for at-risk and PCa patients. At-risk patients were presented with these questions:

- In your opinion, how likely is it that you will eventually develop prostate cancer?
- In your opinion, if you were to develop prostate cancer, how likely would it be that you would eventually die from prostate cancer?
- In your opinion, how likely is it that you will die from something other than prostate cancer?

To assess risk perception in PCa patients, these 3 questions were posed:

- In your opinion, how likely is it that prostate cancer will appear somewhere else in your body?
- In your opinion, how likely is it that you will eventually die from prostate cancer?
- In your opinion, how likely is it that you will die from something other than prostate cancer?

In all cases, participants responded by circling 1 of 5 probability ranges for each question: 0%–10%, 11%–30%, 31%–50%, 51%–75%, or 76%–100%.

The third part of the questionnaire consisted of a list of 7 psychological symptoms. Participants were asked to report the frequency with which they experienced those symptoms as a result of their thoughts or feelings about their prostate condition. The 7 symptoms included trouble sleeping, unhappiness or depression, nervousness or anxiety, withdrawing from others, difficulty meeting commitments, strained personal relationships, and worrying that a close relative could develop cancer. Patients responded by choosing a number on a scale of 1–5, where 1 indicated "not at all" and 5 indicated "very often."

To control for potential differences in risk-aversive tendencies, the fourth part of the questionnaire included 4 statements unrelated to PCa. Patients were instructed to respond to a set of statements designed to determine how people view various health- and lifestyle-related risks. The risk aversion inquiries were these:

- I worry that I may be in a car accident.
- I worry that I may have a stroke in the future.
- I worry that my medical care may do more harm than good.
- In your opinion how likely is it that that the average man will develop prostate cancer?

Patients responded to the first 3 questions by choosing a number on a scale of 1–5, where 1 indicated "not at all" and 5 indicated "very often." For the 4th question, the scale of 1–5 signified a scale from "not at all likely" to "very likely."

The reliability and validity of this questionnaire have not been reported. However, it was designed under the supervision of experts in breast cancer care[28], and our modifications were approved by oncologists who specialize in PCa.

Data Analysis

To determine the percentage of patients who correctly understood their diagnosis, participant responses to the self-diagnosis question were compared with the diagnosis obtained from chart review. Discrepancies were addressed with classification of patients into high-risk or PCa groups. Chi-square tests and analysis of variance were used to test for differences in patient characteristics (such as recent PSA, age, time since diagnosis, family history of cancer and PCa, and ethnicity) between the groups.

The mean and median scores for responses to the 3 risk-perception questions were tabulated for both groups. For descriptive purposes, responses were also recategorized into 1 of 3 groups[28]. Responses in categories 0%–10% and 11%–30% were labelled "unlikely"; those in the 31%–50% category were labelled "likely"; and those in the 51%–75% and 76%–100% were labelled as "very likely." Of the 3 questions presented to each patient, only "In your opinion, how likely is it that you will die from something other than prostate cancer" was presented to both groups. Analysis of variance was used to determine differences in the response to that question for the two groups.

Mean and median values for the 7 psychological symptoms and the 4 risk-aversion questions were calculated, and analysis of variance was used to determine differences. For descriptive purposes, participant responses on both sets of scales were labelled as follows: 1–2 were labelled "not often"; 3 was labelled "often"; and 4–5 were labelled "very often"[28].

RESULTS

Of the 396 patients approached to participate, 276 completed the questionnaire (69.7% response rate). Patients who did not respond were not systematically queried for their refusal reason. Chart reviews for all patients who completed the questionnaire were conducted to confirm eligibility and collect data for analysis. After the chart review, 39 of the responders were deemed ineligible. Most of the ineligible patients (n = 32) were excluded because they had advanced PCa (either metastatic or treated with chemotherapy or hormonal therapy). Other reasons for ineligibility included history of psychological counselling (n = 1), a prior non-prostate malignancy within the preceding 5 years (n = 2), ineligible diagnosis (n = 1), answered only 1 question (n = 1), and completion of the questionnaire twice (n = 2). Of all the eligible patients who completed the questionnaire (n = 237), 69 belonged to the high-risk group, and 168 belonged to the PCa group.

Descriptive Statistics

Overall, 94.4% of the patients were able to correctly identify their diagnosis. Three patients did not answer the question. Only 3 patients with PCa and 1 patient with elevated PSA incorrectly identified their diagnosis. Of the 16 patients with HGPIN, 9 identified elevated PSA as their diagnosis. Because patients with HGPIN often had a PSA level exceeding 4.0 ng/mL, their diagnosis allowed for classification in either high-risk category. Consequently, we opted to categorize the patients into two groups: those with a diagnosis of PCa and those at high risk of PCa (elevated PSA and HGPIN). All subsequent descriptive statistics and analyses are based on those group assignments.

Patient Characteristics

Table I summarizes the characteristics of the eligible responding patients. Notably, high-risk patients had been diagnosed with their conditions for a significantly longer time than the PCa patients had (40.30 months vs. 23.03 months, $p < 0.001$). Patients with PCa were also more likely than at-risk patients to report a family history of cancer: 57.6% versus 43.5% ($p = 0.026$). Average and median recent PSA levels were significantly higher in the high-risk patients than in the PCa patients: an average of 6.35 ng/mL and a median of 4.90 ng/mL in the high-risk patients compared with an average of 3.14 ng/mL and a median of 0.05 ng/mL in the PCa patients ($p = 0.007$). No other differences in characteristics were statistically significant.

PCa Risk Perception

Table II presents responses to the questions pertaining to PCa risk perception. Of those responses, only the responses to the question "In your opinion, how likely is it that you will die from something other than prostate cancer" could be compared between the two groups, because all patients answered that question. The likelihood of dying from something other than PCa was rated significantly lower by the at-risk participants than by the PCa participants ($p = 0.007$).

Psychological Symptoms

Patients with PCa reported significantly more trouble sleeping ($p = 0.016$), more unhappiness or depression ($p = 0.002$), more withdrawing from others ($p = 0.008$), more difficulty meeting commitments ($p = 0.019$), more strained personal relationships ($p = 0.006$), and more worry that a close relative might develop cancer ($p = 0.002$). Table III presents those psychological symptom responses.

Risk-Aversion Traits

We observed no statistically significant differences in 3 of the 4 statements pertaining to risk aversion (Table IV). However, the "average man's" risk of PCa was rated significantly higher by PCa patients than by high-risk patients ($p < 0.001$).

DISCUSSION

The two participant groups were comparable in most demographic characteristics, but average PSA values were higher in at-risk patients just before questionnaire administration. That difference was expected, because men who are successfully treated for PCa often have very low or undetectable PSA levels unless their disease recurs[31]. Additionally, significantly more PCa patients reported a family history of cancer. That difference could reflect a hereditary susceptibility to PCa, but it could also reflect differences in knowledge or interest about family medical history after a diagnosis of cancer.

The two groups did not differ in health-related risk aversion, including worry over car accidents, stroke, or medical care causing harm. That finding suggests that the groups did not differ in terms of risk-aversive tendencies. The resulting assumption might be that at-risk participants who had undergone screening represent a group that is hypervigilant to health concerns (a selection bias) and, as such, they are not characteristic of the general population. In fact, the overall spectrum of responses in both groups suggests that the participants do not represent a particularly risk-oriented sample. However, with respect to PCa, the at-risk group overestimated and the PCa group greatly overestimated the average incidence rate: 29% and 46% of them respectively estimated PCa to be a highly likely event (the *World Cancer Report 2008*[32] estimate of PCa incidence

TABLE I Patient characteristics by diagnosis

Characteristic	Patient group		*p* Value
	High-risk[a]	Prostate cancer	
Patients (*n*)	69	168	
Mean age (years)	63.75±7.87	62.52±7.55	0.259
Mean months since diagnosis	40.30±25.73 (*n*=57)	23.03±25.08 (*n*=163)	<0.001
Positive family history [*n*/*N* (%)]			
Of cancer	30/69 (43.5)	97/166 (58.4)	0.026
Of prostate cancer	13/69 (18.8)	49/167 (29.3)	0.064
Ethnicity (%)			0.448
Asian	13	8.3	
Black	4.3	8.3	
White	81.2	80.4	
Other	1.4	3.0	
Average recent PSA (ng/mL)	6.35±5.13 (*n*=63)	3.14±8.72 (*n*=163)	0.007

[a] Includes patients with elevated prostate-specific antigen ($n = 53$) or with high-grade prostatic intraepithelial neoplasia ($n = 16$).
PSA = prostate-specific antigen.

TABLE II Risk-perception responses by diagnosis

Variable	Patient group	
	High-risk	**Cancer**
Question	In your opinion, how likely is it that you will eventually develop prostate cancer?	In your opinion, how likely is it that prostate cancer will appear somewhere else in your body?
Mean value	2.36±1.20 (*n*=66)	1.56±1.00 (*n*=151)
Answer choice [*n* (%)]		
Unlikely (0%–30% likelihood)	36 (54.5)	131 (86.8)
Likely (31%–50% likelihood)	18 (27.3)	9 (6.0)
Very likely (51%–100% likelihood)	12 (18.2)	11 (7.3)
Question	In your opinion, if you were to develop prostate cancer, how likely would it be that you would eventually die from prostate cancer?	In your opinion, how likely is it that you will eventually die from prostate cancer?
Mean value	1.88±0.99 (*n*=63)	1.59±1.06 (*n*=153)
Answer choice [*n* (%)]		
Unlikely (0%–30% likelihood)	49 (77.8)	130 (85.0)
Likely (31%–50% likelihood)	9 (14.3)	10 (6.5)
Very likely (51%–100% likelihood)	5 (7.9)	13 (8.5)
Question	In your opinion, how likely is it that you will die from something other than prostate cancer?	
Mean value (respondents)	3.66±1.31[a] (*n*=64)	4.15±1.14[a] (*n*=152)
Answer choice [*n* (%)]		
Unlikely (0%–30% likelihood)	11 (17.2)	12 (7.9)
Likely (31%–50% likelihood)	10 (15.6)	23 (15.1)
Very likely (51%–100% likelihood)	43 (67.2)	117 (77.0)

[a] $F = 7.304$, $p = 0.007$.

is 20.2%). In comparison, research examining the risk perception of white American men neither at risk for nor affected by PCa found that 4.6% of participants considered the average man's risk of developing PCa to be "very likely"[33]. The overestimates of our study participants invoke the finding by Katz *et al.*[34] that abnormal PSA is correlated with increased worry and probably reflect a PCa-specific hypervigilance resulting from identification of high risk or diagnosis of the disease. Thus, for both high-risk and affected patients, increased education about the PCa incidence could help to reduce risk distortion and the associated psychological distress.

Overall, in examining participant risk perception specific to PCa, participant responses suggested that the risk perception is increased among at-risk participants compared with participants who had PCa. Approximately 45% of at-risk participants believed it likely or very likely that they would eventually develop PCa, and 22% believed that they would die from the disease. Compared with PCa patients, at-risk patients rated their susceptibility to dying from something other than PCa significantly lower: 67% compared with 77%. The risk distortion in the at-risk group is evident and substantial. Their overall sense of heightened PCa and mortality risk reflects a poor understanding of the actual course of the disease and current treatment success. In comparison, the relatively low risk perception among PCa participants might be explained by the increased likelihood that those participants had met with oncology specialists to discuss treatment options and survival rates. Given that the reported 5-year relative survival rates for treated localized PCa is 96%[35], diagnosed patients could have a better understanding of the actual PCa mortality threat. Thus, for patients identified as being at elevated risk for PCa, health care practitioners might consider providing patient education specific to long-term survival rates and the effectiveness of current PCa treatment and follow-up.

In contrast to the risk-perception outcomes, the experience of psychological morbidity was modest in the at-risk group compared with the PCa group. The PCa group experienced significantly more trouble sleeping, more unhappiness, more social withdrawal, less ability to meet commitments, more strain in personal relationships, and more worry that a close relative could develop cancer. Distress in the PCa patients was evidently multimodal and included behavioural components (trouble sleeping, for instance), social components (withdrawal and isolation), and cognitive–emotional components (worry thoughts)[36–38]. The finding of low distress in the high-risk group is likely accurate, because the questionnaire was sensitive enough to identify psychological morbidities in more than 40% of women with DCIS, a condition analogous to that of the at-risk group in our study[28]. It is helpful to know that identifying patients at high PCa risk does not appear to result in psychological harm, and thus screening can be performed without significantly affecting psychological well-being.

Nevertheless, it appears that, given their elevated risk perception, high-risk patients should be experiencing more intense psychological distress than they report. That

TABLE III Psychological symptom responses by diagnosis

Symptom	Patient group		*p* Value
	High-risk	Cancer	
Trouble sleeping [mean value (respondents)]	1.36±0.641 (*n*=69)	1.69±1.03 (*n*=166)	0.016
Answer choice [*n* (%)]			
Not often (score 1–2)	65 (94.2)	133 (80.1)	
Often (score 3)	3 (4.3)	21 (12.7)	
Very often (score 4–5)	1 (1.4)	12 (7.2)	
Unhappiness or depression [mean value (respondents)]	1.41±0.69 (*n*=69)	1.84±1.05 (*n*=164)	0.002
Answer choice [*n* (%)]			
Not often (score 1–2)	65 (94.2)	125 (76.2)	
Often (score 3)	2 (2.9)	25 (15.2)	
Very often (score 4–5)	2 (2.9)	14 (8.5)	
Nervousness or anxiety [mean value (respondents)]	1.69±0.83 (*n*=68)	1.92±1.07 (*n*=165)	0.113
Answer choice [*n* (%)]			
Not often (score 1–2)	60 (88.2)	125 (75.8)	
Often (score 3)	4 (5.9)	24 (14.5)	
Very often (score 4–5)	4 (5.9)	16 (9.7)	
Withdrawing from others [mean value (respondents)]	1.14±0.46 *n*=69)	1.42±0.80 (*n*=164)	0.008
Answer choice [*n* (%)]			
Not often (score 1–2)	66 (95.7)	147 (89.6)	
Often (score 3)	3 (4.3)	11 (6.7)	
Very often (score 4–5)	0 (0)	6 (3.7)	
Difficulty meeting commitments [mean value (respondents)]	1.10±0.43 (*n*=69)	1.34±0.80 (*n*=163)	0.019
Answer choice [*n* (%)]			
Not often (score 1–2)	68 (98.6)	151 (92.6)	
Often (score 3)	0 (0.0)	4 (2.5)	
Very often (score 4–5)	1 (1.4)	8 (4.9)	
Strained personal relationships [mean value (respondents)]	1.19±0.46 (*n*=69)	1.50±0.88 (*n*=164)	0.006
Answer choice [*n* (%)]			
Not often (score 1–2)	67 (97.1)	142 (86.6)	
Often (score 3)	2 (2.9)	15 (9.1)	
Very often (score 4–5)	0 (0.0)	7 (4.3)	
Worrying that a close relative may develop cancer [mean value (respondents)]	1.32±0.78 (*n*=69)	1.81±1.21 (*n*=164)	0.002
Answer choice [*n* (%)]			
Not often (score 1–2)	62 (89.9)	127 (77.4)	
Often (score 3)	4 (5.8)	18 (11.0)	
Very often (score 4–5)	3 (4.3)	19 (11.6)	

impression is supported by Rakovitch *et al.*[28], who showed elevation of both risk perception and psychological distress in DCIS patients. We suggest that, although DCIS and HGPIN are both masses of aberrant pre-cancerous cells, DCIS is perceived as more severe because of its invasive character and its surgical treatment. Treating DCIS results in long-term distress about body image[39] and an inflated perception of risk of disease recurrence[7]—concerns that are shared by patients with PCA and invasive breast cancer[28,38]. Men with HGPIN and elevated PSA do not undergo treatments any more invasive than a biopsy and therefore do not experience their condition as viscerally. Furthermore, in their comparisons of risk perception in breast cancer and PCA, Zajac and colleagues[40] found that the type of risk perception explored in the present study (absolute risk, rather than risk in comparison with others) is more predictive of worry behaviour in women. Sex might therefore have factored into why perception of high risk did not translate into psychological morbidity among the high-risk participants in the present study.

Researchers should consider examining risk perception and psychological morbidity in a sample exclusive to HGPIN patients. Discovery of HGPIN comes by invasive extraction of a biopsy sample taken because of suspicion

TABLE IV Risk aversion responses by diagnosis

Statement	Patient group		*p* Value
	High-Risk	Cancer	
I worry that I may be in a car accident in the future [mean value (respondents)]	1.42±0.63 (*n*=69)	1.38±0.78 (*n*=165)	0.673
Answer choice [*n* (%)]			
Not often (score 1–2)	66 (95.7)	151 (91.5)	
Often (score 3)	2 (2.9)	9 (5.5)	
Very often (score 4–5)	1 (1.4)	5 (3.8)	
I worry that I may have a stroke in the future [mean value (respondents)]	1.80±1.01 (*n*=69)	1.68±0.95 (*n*=167)	0.384
Answer choice [*n* (%)]			
Not often (score 1–2)	53 (76.8)	141 (84.4)	
Often (score 3)	11 (15.9)	14 (8.4)	
Very often (score 4–5)	5 (7.2)	12 (7.2)	
I worry that my medical care may do more harm than good [mean value (respondents)]	1.46±0.82 (*n*=69)	1.31±0.65 (*n*=166)	0.136
Answer choice [*n* (%)]			
Not often (score 1–2)	64 (92.8)	153 (92.2)	
Often (score 3)	2 (2.9)	11 (6.6)	
Very often (score 4–5)	3 (4.3)	2 (1.2)	
In your opinion, how likely is it that the *average man* will develop prostate cancer? [mean value (respondents)]	3.04±0.92 (*n*=69)	3.54±0.95 (*n*=164)	<0.001
Answer choice [*n* (%)]			
Not often (score 1–2)	22 (31.9)	20 (12.2)	
Often (score 3)	27 (39.1)	69 (42.1)	
Very often (score 4–5)	20 (29.0)	75 (45.7)	

for PCA[4], making the experience of the biopsied men much more similar to that of preoperative PCA patients than to that of men with elevated PSA and no biopsy. Given the semantic association between "neoplasm" and "tumour" (as occurs with DCIS[41]), HGPIN can also carry the connotation of cancer. Only 16 of our study's 69 at-risk participants had HGPIN, and thus the HGPIN experience might not be well represented in our sample. Additionally, our cohort was enrolled in 2006, and although our data support the literature on PCA-related risk perception, the literature has not been appreciably updated since about 2010[24,42]. Researchers should consider devising risk-perception studies with current samples to learn whether patient education is as relevant a concern for the population of today.

CONCLUSIONS

In the present study, we found that a sample of patients with elevated PSA and HGPIN lacked the psychological morbidities reported by PCA patients, but that their perception of risk was inflated. Those results provide a good indication that individuals at high risk for PCA can maintain healthy screening behaviour without incurring psychological damage. However, the relatively greater perception of cancer-specific risk in at-risk patients does suggest that PCA patients receive better education about the true risks of the disease. Screening programs should improve risk and disease education to align the risk perception of patients with realistic expectations.

CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology*'s policy on disclosing conflicts of interest, and we declare that we have none.

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