

Economic conditions and marriage quality of men with prostate cancer

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OBJECTIVE

To explore the predictors of the quality of marriage of men with prostate cancer, as being diagnosed with prostate cancer affects the quality of life of the man and his partner, and while some aspects are known about the impact of the disease and its treatments on the man's quality of life, less is known about the marriage quality (MQ) in this new situation.

PATIENTS AND METHODS

We followed 591 men from Stockholm County (Sweden) who had been diagnosed with prostate cancer in 1999, and who were 50–80-years old and alive on 1 October 2002. The men completed a questionnaire

asking about their MQ, and several other sociodemographic, medical and economic characteristics.

RESULTS

Of 426 men who provided information and who had a spouse or partner, 168 (39.4%) reported having a lower MQ due to their disease. Increased expenditure (46.2% vs 30.9%; relative risk, 1.5; 95% confidence interval, 1.1–2.0) and decreased income (55.4% vs 36.5%; 1.5, 1.1–2.0) as a consequence of prostate cancer reduced their MQ. Patients who had erectile dysfunction had a lower MQ (46.3% vs 11.8%; 3.9; 2.0–7.6). There was also a lower MQ in men who were depressed or had urinary leakage as a consequence of prostate cancer. Younger

men (50–69 years old) with prostate cancer had a lower MQ than older men (70–80 years; 51.9% vs 33.1%; 1.6; 1.2–2.0).

CONCLUSIONS

Men whose economic situation is worsened by prostate cancer reported having a reduced MQ. There was also such an effect for men with erectile dysfunction, urinary leakage and depression, and among men diagnosed with prostate cancer when young.

KEYWORDS

prostate, cancer, economic conditions, marriage, spouse, quality of life

INTRODUCTION

Being diagnosed with prostate cancer affects the quality of life (QoL) of the man and his partner [1–3]. While some aspects are known about the impact of the disease and its treatments on the man's QoL, less is known about his marriage quality (MQ) in this new life situation. In the present follow-up study, we hypothesized that sociodemographic factors, use of different treatment strategies, presence of different symptoms, and economic conditions, might be predictors for the MQ of men with prostate cancer.

PATIENTS AND METHODS

We identified 931 men who had been diagnosed with prostate cancer in 1999 in Stockholm County, Sweden. Of these men, 591 were aged 50–80 years and alive on

1 October 2002, and they were included in the study. After receiving a letter of introduction and being contacted by telephone, those who agreed to participate were mailed a questionnaire, a registration form and two prepaid envelopes. The registration form was returned separately from the questionnaire, to ensure anonymity. Patients who had not returned the registration form within 2 weeks were reminded by telephone contact. The study was approved by the Regional Ethics Committee at the Karolinska Institute.

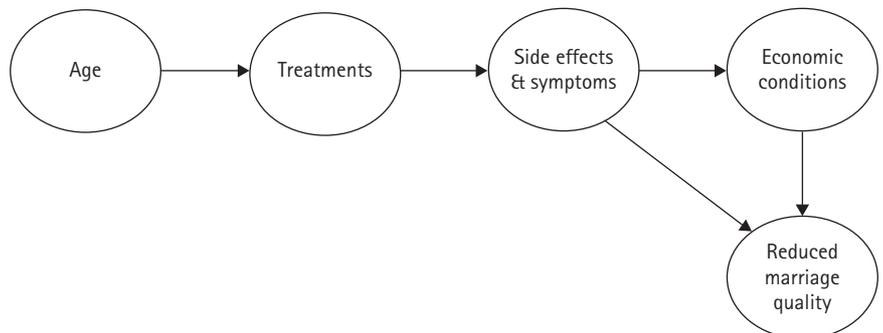
Data were collected with a study-specific questionnaire based on instruments used previously by our group [4–6]. In-depth interviews were carried out, followed by a test for face-to-face validity on 30 men. The outcome variable 'MQ' was measured as follows: 'How has your relation to your spouse or partner been influenced as a result of your disease?' There were five response

categories: 'Very negatively', 'Somewhat negatively', 'Not at all', 'Somewhat positively' and 'Very positively'. We combined the first two response categories and cite these as 'reduced MQ'. We used five questions for measuring economic conditions; (i) 'Has your income decreased as a consequence of prostate cancer?' (five response categories: 'No, not at all', 'Yes, a little', 'Yes, moderately', 'Yes, a lot' and 'Not applicable, I am not employed'). (ii) 'Has your expenditure increased as a result of your prostate cancer?' (four response categories: 'No, not at all', 'Yes, a little', 'Yes, moderately' and 'Yes, a lot'). (iii) 'Has your standard of living gone down because of increased expenditure/reduced income as a result of your prostate cancer?' (four response categories: 'No, not at all', 'Yes, a little', 'Yes, moderately' and 'Yes, a lot'). (iv) 'Has your spouse or partner had increased expenditure as a result of your prostate cancer?' (three response categories: 'I have no

spouse or partner', 'Yes, my spouse or partner has had increased expenditure' and 'No, my spouse or partner has not had increased expenditure'). (v) 'What is your average additional expenditure during the last year as a result of your prostate cancer?' (four response categories: '0–2000 SEK', '2000–4000 SEK', '4000–6000 SEK' and '>6000 SEK'; SEK = Swedish krona). The response categories were combined into appropriate groups for analysis.

For the outcome 'reduced MQ', we calculated the percentage of patients in each category of the independent variable. To compare the influence of different categories of the independent variables in explaining the outcome, we first calculated the relative risk (RR) as the ratio of the percentages, together with a 95% CI for the RR (using the Mantel-Haenszel formula for the variance) [7]. Multivariate logistic models were then constructed to determine the odds ratios (ORs) for different categories of the independent variables in explaining the outcome. We first grouped the independent variables into four groups according to their nature (Fig. 1); the first group consisted of sociodemographic characteristics of the patients, the second of treatment characteristics, the third of symptoms, and the fourth of economic characteristics of the patients. We prepared four different final models, one for each of these four groups. We used both forward selection and backward elimination of variables to construct the final model. For forward selection, we started with one bivariate model for each independent variable and outcome. The independent variable with the highest chi-square value was then introduced into trivariate models with the remaining independent variables, and the remaining independent variable with the highest chi-square value was introduced into four-variate models. We continued in this manner as long as all independent variables in all the four models had a chi-square value that corresponded to $P < 0.05$. For backward elimination, we started with all independent variables, the variables with the lowest chi-square values were eliminated, one by one, until $P < 0.05$ for all remaining independent variables corresponding to the four models. Finally, we used multivariate logistic models to determine adjusted ORs, i.e. for the association between an independent variable and an outcome (e.g. reduced MQ). In respective groups of independent variables, we adjusted for the

FIG. 1. Possible links in a causal chain between independent variables and reduced MQ.



variables remaining in the final model after forward selection.

RESULTS

Of the 591 men included in the study, 511 (86.5%) returned a completed questionnaire, 16 refused to participate, 27 agreed to participate but did not return the questionnaire and for 39 we had no contact information. Of the 511 men who responded to the questionnaire, 426 (83.4%) reported having a spouse or partner. The mean (SD) age of the 426 patients was 70.7 (6.7) years. In all, 377 (88.5%) were born in Sweden, 354 (83.1%) were Lutheran, 127 (29.8%) had university education and 309 (72.5%) were retired (Table 1). In all, 87 (20.4%) had had radical prostatectomy (RP), 132 (31.0%) had had radiation therapy and the rest had been given hormone therapy and other treatments or no treatment. Three years after the diagnosis 348 (81.7%) men had erectile dysfunction (ED), 112 (26.3%) had urinary leakage, 101 (23.7%) had depression and the rest had other symptoms (Table 1). In all, 266 (62.4%) of the patients reported increased expenditure and 56 (13.2%) reported a decrease in income due to their prostate cancer (Table 1).

Table 2 shows the results of the multivariate analysis of data for the sociodemographic characteristics of 426 patients with prostate cancer who provided information on their MQ. Of these 426 patients, 168 (39.4%) reported a reduced MQ. The RRs (as a ratio of percentages) were >1.0 with 95% CIs not including 1.0 for some categories of the variables with age of the patients at the time of survey (50–69 vs 70–80 years) and source of income (from employment). By forward selection, we obtained a final logistic

regression model for the sociodemographic characteristics with age of the patients at the time of survey as the only independent variable ($P < 0.001$). The same final model was obtained by the procedure of backward elimination. The crude ORs shown in Table 2 were adjusted for age in the final model. None of the other sociodemographic factors had statistical significance after adjusting for age. Young men (50–69 years) living with prostate cancer had a reduced MQ more often than older men (70–80 years; OR, 2.2).

Table 2 also shows the results of a multivariate analysis of data for the treatment characteristics of 426 patients. The RRs were >1.0 with 95% CIs not including 1.0 for none of the categories of the variables for treatment. By forward selection, we obtained a final logistic regression model for the treatment characteristics including RP ($P = 0.008$), radiation therapy ($P = 0.007$), and androgen receptor-blocking treatment ($P = 0.026$). The same final model was obtained by the procedure of backward elimination. The crude ORs shown in Table 2 were adjusted for the three independent variables in the final model; the ORs for the three variables in the final model were adjusted for the two other variables. The highest adjusted OR (1.9) with a CI not including 1.0 was for RP.

Table 3 shows the results of the multivariate analysis of data for the symptom characteristics of the 426 patients. The RRs were >1.0 and with 95% CIs not including 1.0 for some categories of the symptoms, e.g. anxiety, depression, urinary leakage, ED and fecal leakage. By forward selection, we obtained a final logistic regression model for the symptoms with ED ($P < 0.001$), depression ($P < 0.001$) and urinary leakage ($P = 0.029$) as significant factors. The same final model was

TABLE 1 The sociodemographic, clinical and economic characteristics of the 426 patients with prostate cancer and who had a spouse or partner

Characteristic	N (%) of cases	Characteristic	N (%) of cases
Age, years, mean (SD)	70.7 (6.7)	Anxiety	
50–69	163 (38.3)	No	329 (77.2)
70–80	257 (60.3)	Yes	90 (21.1)
Not stated	6 (1.4)	Not stated	7 (1.6)
Place of birth		Depression	
Sweden	377 (88.5)	No	320 (75.1)
Not Sweden	47 (11.0)	Yes	101 (23.7)
Not stated	2 (0.5)	Not stated	5 (1.2)
Level of education		Urination problem	
Elementary school	108 (25.4)	No	206 (48.4)
2-year vocational school	115 (27.0)	Yes	214 (50.2)
Junior college	69 (16.2)	Not stated	6 (1.4)
University	127 (29.8)	Urinary leakage	
Not stated	7 (1.6)	No	308 (72.3)
Marital status		Yes	112 (26.3)
Married	368 (86.4)	Not stated	6 (1.4)
Partner, but not married/not living together	58 (13.6)	ED	
Source of income		No	69 (16.2)
Pension	309 (72.5)	Yes	348 (81.7)
Employment	52 (12.2)	Not stated	9 (2.1)
Self-employed	29 (6.8)	Fecal leakage	
Other sources	29 (6.8)	No	364 (85.5)
Not stated	7 (1.6)	Yes	55 (12.9)
Housing		Not stated	7 (1.6)
Apartment, owned	121 (28.4)	Economic	
Apartment, rented	105 (24.7)	Has your income decreased as a consequence of your prostate cancer?	
House	193 (45.3)	No	222 (52.1)
Nursing home	7 (1.6)	Yes	56 (13.2)
Religious affiliation		No employment	135 (31.7)
Not religious	55 (12.9)	Not stated	13 (3.1)
Swedish church (Lutheran)	354 (83.1)	Has your expenditure increased as a result of your prostate cancer?	
Others	15 (3.5)	No	154 (36.2)
Not stated	2 (0.5)	Yes	266 (62.4)
Degree of religious faith		Not stated	6 (1.4)
None at all	195 (45.8)	Has your economic standard of living decreased as a result of your prostate cancer?	
Little	95 (22.3)	No	316 (74.2)
Moderate	110 (25.8)	Yes	104 (24.4)
Strong	17 (4.0)	Not stated	6 (1.4)
Not stated	9 (2.1)	Has your spouse or partner had increased expenditure as a result of your prostate cancer?	
Clinical		No	385 (90.4)
Treatment received (as reported by the patients)		Yes	32 (7.5)
RP	87 (20.4)	Not stated	9 (2.1)
Radiation therapy	132 (31.0)	Average additional expenditure per year as a result of your prostate cancer	
Orchidectomy	9 (2.1)	≤2000 SEK	260 (61.0)
GnRH therapy	86 (20.1)	>2000 SEK	133 (31.2)
Androgen receptor-blocking	55 (12.9)	Not stated	33 (7.8)
TURP	57 (13.4)		
Symptoms after treatment			
Pain from the prostate			
No	365 (85.7)		
Yes	56 (13.2)		
Not stated	5 (1.2)		

obtained by the procedure of backward elimination. The crude ORs shown in Table 3 were adjusted for the three independent variables in the final model; the ORs for the three variables in the final model were adjusted for the two other variables. The highest adjusted OR (5.8) with a CI not including 1.0 was for ED.

Table 3 also shows the results of the multivariate analysis of data for the economic characteristics of the 426 patients. The RRs were >1.0 and 95% CIs not including 1.0 for some categories of the variables, e.g. decrease in income because of prostate cancer, increased expenditure due to prostate cancer and lowered economic standard of living as a result of prostate cancer. By forward selection, we obtained a final logistic regression model for the economic characteristics with decrease in income ($P = 0.038$) and lowered economic standard of living ($P = 0.006$) because of prostate cancer. The same final model was obtained by the procedure of backward elimination. The crude ORs shown in Table 3 were adjusted for the two independent variables in the final model; the ORs for the two variables in the final model were adjusted for each other. The highest adjusted OR (1.8) with a CI not including 1.0 was for increased expenditure due to prostate cancer.

DISCUSSION

In men living with prostate cancer, the greater expenditure and lower income due to the disease adversely affected their MQ. ED, urinary leakage and depression also reduced the MQ, and this outcome was more common in younger than in older men. The healthcare costs and loss of income resulting from work limitations can compromise the economic situation of men with prostate cancer. Compared to other European countries, Swedish health services are moderately priced; they are readily accessible to all citizens, provide good medical outcomes, and have good effects on health [8]. This might be why a decreased income more often affects the economy of Swedish men with prostate cancer than do the healthcare costs. We have no data, but can speculate, that the career situation changes due to a cancer diagnosis. A Medline search on 30 September 2006, with the MeSH-terms, 'prostate neoplasms' and 'economics, medical', gave 14 references, but none that dealt with the impact of the economic consequences of prostate cancer on

TABLE 2 RRs, ORs, and adjusted ORs for the reduced MQ according to the sociodemographic and treatment characteristics of patients with prostate cancer; the data are based on 426 patients who had a spouse or partner. Whenever the denominators do not add up to 426, data are missing for the independent variable. When appropriate, ORs were adjusted for age (sociodemographic) or for RP, radiation therapy and androgen receptor-blocking treatment (treatments)

Characteristic	Reduced MQ, n/N (%)	Unadjusted RR (95% CI)	OR	
			Unadjusted	Adjusted (95% CI)
Sociodemographic				
Age, years				
70–80	83/251 (33.1)	1.0	1.0	1.0
50–69	84/162 (51.9)	1.6 (1.2–2.0)	2.2	2.2 (1.5–3.3)
Level of education				
Elementary school	35/105 (33.3)	1.0	1.0	1.0
2-year vocational school	48/114 (42.1)	1.3 (0.9–1.8)	1.5	1.3 (0.7–2.3)
Junior college	33/69 (47.8)	1.4 (1.0–2.1)	1.8	1.7 (0.9–3.1)
University	50/125 (40)	1.2 (0.9–1.7)	1.3	1.3 (0.7–2.2)
Marital status				
Married	139/361 (38.5)	1.0	1.0	1.0
Have partner but not married/ not living together	29/57 (50.9)	1.3 (1.0–1.8)	1.7	1.4 (0.8–2.5)
Religious affiliation				
Not religious	23/55 (41.8)	1.0	1.0	1.0
Swedish church (Lutheran)	139/346 (40.2)	1.0 (0.7–1.3)	0.9	0.9 (0.5–1.7)
Others	6/15 (40.0)	1.0 (0.5–1.9)	0.9	1.1 (0.3–3.6)
Source of income				
Pension	110/301 (36.5)	1.0	1.0	1.0
Employment	29/52 (55.8)	1.5 (1.2–2.0)	2.2	1.4 (0.7–2.7)
Self-employed	13/29 (44.8)	1.2 (0.8–1.9)	1.4	1.0 (0.5–2.3)
Other sources	15/29 (51.7)	1.4 (1.0–2.1)	1.9	1.6 (0.7–3.5)
Treatment received (as reported by the patients)				
RP				
No	124/323 (38.4)	1.0	1.0	1.0
Yes	41/85 (48.2)	1.3 (1.0–1.6)	1.5	2.0 (1.2–3.4)
Radiation therapy				
No	105/279 (37.6)	1.0	1.0	1.0
Yes	61/130 (46.9)	1.2 (1.0–1.6)	1.5	1.8 (1.2–2.9)
Orchidectomy				
No	163/401 (40.7)	1.0	1.0	1.0
Yes	3/8 (37.5)	0.9 (0.4–2.3)	0.9	1.3 (0.3–6.1)
GnRH therapy				
No	126/321 (39.3)	1.0	1.0	1.0
Yes	39/85 (45.9)	1.2 (0.9–1.5)	1.3	1.4 (0.8–2.6)
Androgen receptor-blocking treatment				
No	137/349 (39.3)	1.0	1.0	1.0
Yes	27/55 (49.1)	1.3 (0.9–1.7)	1.5	2.0 (1.1–3.8)
TURP				
No	145/349 (41.6)	1.0	1.0	1.0
Yes	20/56 (35.7)	0.9 (0.6–1.2)	0.8	0.8 (0.4–1.4)

QoL, or that investigated links between the changed economic situation and the relationship between patients with prostate cancer and their spouses or partners. Thus at present we only have the present data suggesting that the economic burden due to a

diagnosis of prostate cancer compromises the relationship to the patient's spouse or partner. Possibly, it is self-evident that a strained economic situation on average has a negative influence on marital satisfaction. Nevertheless, relevant reports are sparse.

TABLE 3 RRs, ORs, and adjusted ORs for the reduced MQ according to the symptoms and economic characteristics of patients with prostate cancer; the data are based on 426 patients who had a spouse or partner. Whenever the denominators do not add up to 426, data are missing for the independent variable. When appropriate, ORs were adjusted for depression, urinary leakage, and ED (symptoms), or for 'decrease in income as a consequence of prostate cancer', and 'increased expenditure as a result of prostate cancer'

Characteristic	Reduced MQ, n/N (%)	Unadjusted RR (95% CI)	OR	
			Unadjusted	Adjusted (95% CI)
Symptoms after treatment				
Pain from the prostate				
No	143/361 (39.6)	1.0	1.0	1.0
Yes	25/55 (45.5)	1.1 (0.8–1.6)	1.3	0.9 (0.5–1.7)
Anxiety				
No	120/323 (37.2)	1.0	1.0	1.0
Yes	47/90 (52.2)	1.4 (1.1–1.8)	1.8	0.8 (0.4–1.4)
Depression				
No	105/314 (33.4)	1.0	1.0	1.0
Yes	62/101 (61.4)	1.8 (1.5–2.3)	3.2	2.8 (1.7–4.5)
Urination problem				
No	74/203 (36.5)	1.0	1.0	1.0
Yes	92/211 (43.6)	1.2 (0.9–1.5)	1.3	1.0 (0.6–1.6)
Urinary leakage				
No	106/302 (35.1)	1.0	1.0	1.0
Yes	61/112 (54.5)	1.6 (1.2–2.0)	2.2	1.7 (1.1–2.7)
ED				
No	8/68 (11.8)	1.0	1.0	1.0
Yes	158/341 (46.3)	3.9 (2.0–7.6)	6.5	5.8 (2.6–12.6)
Fecal leakage				
No	136/358 (38.0)	1.0	1.0	1.0
Yes	31/55 (56.4)	1.5 (1.1–1.9)	2.1	1.7 (0.9–3.2)
Economic				
Has your income decreased as a consequence of your prostate cancer?				
No	80/219 (36.5)	1.0	1.0	1.0
Yes	31/56 (55.4)	1.5 (1.1–2.0)	2.2	1.8 (1.0–3.4)
No employment	55/132 (41.7)	1.1 (0.9–1.5)	1.2	1.1 (0.7–1.8)
Has your expenditure increased as a result of your prostate cancer?				
No	47/152 (30.9)	1.0	1.0	1.0
Yes	121/262 (46.2)	1.5 (1.1–2.0)	1.9	1.8 (1.1–2.7)
Has your economic standard of living decreased as a result of your prostate cancer?				
No	114/311 (36.7)	1.0	1.0	1.0
Yes	54/103 (52.4)	1.4 (1.1–1.8)	1.9	1.2 (0.7–2.1)
Has your spouse or partner has had increased expenditure as a result of your prostate cancer?				
No	151/380 (39.7)	1.0	1.0	1.0
Yes	17/32 (53.1)	1.3 (0.9–1.9)	1.7	1.2 (0.6–2.6)
Your average additional expenditure per year as a result of your prostate cancer				
≤2000 SEK	95/255 (37.3)	1.0	1.0	1.0
>2000 SEK	62/132 (47.0)	1.3 (1.0–1.6)	1.5	1.0 (0.6–1.7)

Conger *et al.* [9] studied a sample of 76 white middle-class couples from a rural county in the Midwestern USA, and found that economic pressures were indirectly associated with how the couple evaluated their marriage. The pressures fostered hostility between the partners, and reduced

the amount of warmth and mutual support between them. In a review, Voydanoff [10] found that four components of economic distress (employment instability, employment uncertainty, economic deprivation, and economic strain) negatively influenced family relationships.

We found that ED reduced the MQ; again, this might be perceived as logical, as waning erectile function might cause sexual dysfunction that in turn might lead to marital dissatisfaction, although data are scarce. Litwin and Penson [11] found a statistically significant correlation between sexual function and 'marital interaction' ($r = -0.33$, $P = 0.01$). Mullar *et al.* [12] studied a sample of 105 men and their partners, and found a statistically significant correlation between erectile function and 'tenderness' as well as 'togetherness' in both the patients and their partners. They also reported a statistically significantly better 'quality of partnership' when ED was treated, compared with untreated controls. For some men, erectile function is closely linked with masculinity. Bokhour *et al.* [13] conducted a focus-group study including 48 men treated for early prostate cancer, finding that ED affected the patient's daily relationship with women and their masculinity. Anything that threatens sexual potency can affect other, more general aspects of QoL, including self-confidence and self-esteem. Clark *et al.* [14] studied a large sample of 540 men with prostate cancer and 658 men without prostate cancer as the reference group. In their study, patients with diminished sexual function expressed a diminished quality of sexual intimacy ($\beta = -0.48$, $P < 0.001$), sexual confidence ($\beta = -0.33$, $P < 0.001$) and masculinity ($\beta = -0.17$, $P = 0.003$), but sexual dysfunction did not influence feeling of affection within the marriage ($\beta = -0.05$, $P = 0.485$).

In the present men, urinary leakage predicted a reduced MQ. Several earlier studies correlated urinary leakage and depressive mood in men, as well as depressive mood and marital dissatisfaction. Stewart *et al.* [15] conducted a nested case-control study on a sample of 5204 adults representative of the USA population by age, sex and geographical area. In that study, men who had an overactive bladder with or without urge incontinence scored significantly worse on all outcome measures of QoL (including physical, mental, depression and sleep scores) than did age-matched controls who did not have an overactive bladder. Nuotio *et al.* [16] conducted a longitudinal study in a Finnish population with 171 men and 227 women aged ≥ 70 years, finding that urinary incontinence in men was significantly associated with higher levels of depressive mood (OR 2.69; 95% CI 1.1–6.3). Ko *et al.* [17]

conducted a large-scale study in the USA on 141 815 men and women aged >65 years to investigate the impact of urinary incontinence on QoL. In that study, 28% of the population with urinary incontinence felt depressed, whereas only 15% of those who did not report urinary incontinence felt depressed; multiple regression analysis indicated that the presence of urinary incontinence significantly ($P < 0.05$) reduced mental summary scores. Helgason *et al.* [18] investigated 431 patients with prostate cancer and an age-stratified sample of 435 randomly selected men. In that study, patients reporting distress due to urine symptoms reported lower psychological well-being than patients who were not disturbed by urinary symptoms.

Among the present men depression was related to a reduced MQ. In theory, an observed association can reflect an effect of depression on marital dissatisfaction or an effect of marital dissatisfaction on depression, as well as a bidirectional pattern of causation. Banthia *et al.* [19] conducted a longitudinal study including 154 men who were recently diagnosed with prostate cancer, and their spouses or partners (all female). In that study, the couples' dyadic functioning predicted spousal distress ($\beta = -0.791$, $P < 0.001$). Johnson and Jacob [20] studied marital interactions in 50 couples where the husband was depressed, 41 couples where the wife was depressed, and 50 control couples who were not depressed, and found that couples with a depressed partner showed greater disturbance in marital interaction than control couples ($P < 0.001$). Heene *et al.* [21] investigated a sample of 415 heterosexual couples and found that marital adjustment and the level of depressive symptoms were significantly associated for both men ($r = -0.63$, $P < 0.001$) and women ($r = -0.44$, $P < 0.001$). In a study by Carlson *et al.* [22] depression was significantly correlated to 'profile of mood' states ($r = 0.75$, $P = 0.002$) and with total mood disturbance in couples where the husband had prostate cancer ($r = 0.74$, $P = 0.002$).

RP and radiotherapy can cause ED and urinary leakage [23–28], and young men more often have their cancer treated with these strategies than do older men. Thus, the relation between age and reduced MQ is partly explained by the relation between ED and reduced MQ.

We conducted our population-based study in Sweden and the general applicability of our results to other populations, considering the economic conditions and marriage problems, might be compromised by effect-modifying factors such as cultural attitudes to marriage, type of medical system and the economic status of the country. The study might also have selection-induced systematic errors that would influence the association obtained between economic conditions and reduced MQ, if the association differs among the 165 men who did not answer the questionnaire compared with those who did [29]. A major challenge is to disentangle possible causal links, deciding which factors can be considered as part of a mechanism (and thus not as possible confounders) and which should be considered as possible confounders when we assess the association between economic conditions and reduced MQ. The pathways depicted in Fig. 1 might be completely erroneous; data are scarce on the suggested associations. To avoid losing important information, we divided the independent variables in the questionnaire into different groups and used multivariate regression analysis within these subsets. For example, young age predicts RP, RP predicts ED, and ED predicts a reduced MQ; none of these variables should be adjusted for each other, as they are links in a causal pathway. However, we need more data to finally decide on such pathways.

For clinical practice, couples seeking advice might possibly benefit from knowing about the associations reported here. Perhaps interventions and coping strategies can be implemented to reverse or prevent the reduction in MQ in men who have prostate cancer.

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CONFLICT OF INTEREST

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Abbreviations: **QoL**, quality of life; **MQ**, marriage quality; **ED**, erectile dysfunction; **RP**, radical prostatectomy; **RR**, relative risk; **OR**, odds ratio.