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ORIGINAL RESEARCH

Quality of Life of Prostate Cancer Patients Undergoing Prostatectomy and Affective Temperament

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Purpose: Prostate cancer (PC) is one of the most common malignancies in men. The population of PC survivors is growing, and understanding the roles of different factors that affect quality of life (QoL) is important. We investigated the effects of affective temperament on the QoL of PC patients.

Patients and Methods: All subjects (n=100) underwent medical evaluation [including demographic data, medical history, physical examination, biochemical tests, and assessment of urinary incontinence (ICIQ-UI SF scale) and erectile dysfunction (ED) (IIEF-5 and subjective ED scale)] and psychological evaluation [including assessment of affective temperament using the TEMPS-A scale, depression and anxiety (using HADS), and QoL (EORTC-QLQ-C30 and EORTC-PR25)]. The relationships between individual variables were examined.

Results: Erection quality after treatment was associated with better QoL in most parameters. Similar strong relationships were observed between the urinary incontinence scale and QoL. Depressive, cyclothymic, irritable, and anxious temperaments were associated with decreased QoL. On the EORTC-PR25 scale, associations were observed between a depressive temperament and worse sexual function and urinary symptoms, between a cyclothymic temperament and worse urinary symptoms, and between an irritable temperament and worse sexual functioning. Multivariate analysis identified the severity of anxiety and depression symptoms measured by HADS as the most important psychological factors affecting QoL.

Conclusion: QoL in PC survivors depends on many factors, including age, interval since diagnosis, tumor stage, treatment, complications, and affective temperament profile. Depressive, cyclothymic, irritable, and anxious temperaments were associated with poorer QoL in selected domains, which was not observed for a hyperthymic temperament. The temperament profile of patients was associated with mood and anxiety level, which were important determinants of a poorer QoL.

Keywords: quality of life, prostate cancer, complications, prostatectomy, affective temperament

Introduction

Prostate cancer (PC) is one of the most common malignancies in men.[1] Advances in screening, early detection, and effective therapies have resulted in an increase in the population of patients with PC. This population includes a) people with a slow and indolent course of disease who are undergoing watchful waiting, and b) people who have been successfully treated (PC survivors).[2,3] Both groups require specific care tailored to the problems they face. PC survivors struggle with long-term complications such as urinary dysfunction (narrowing of the urethra, urinary incontinence, urinating problems, hematuria), sexual difficulties, and erectile dysfunction (ED).[4–8] A diagnosis of PC and its subsequent treatment are sources of stress and anxiety, which affect not only the patients' health, but also their daily functioning and social life. In addition, mood and cognitive disorders may develop.[9,10] Both physical and psychological

symptoms can negatively affect the quality of life (QoL) of PC survivors.[11–13] The QoL of cancer survivors depends on the progression of the disease, the course of treatment, and the occurrence of complications after treatment; however, the psychological predisposition of the patient is another important factor affecting QoL.[14–16]

Temperament refers to core personality traits linked to behavioral and emotional reactivity to environmental stimuli. It is thought to be biologically determined and to remain relatively stable throughout life. Akiskal, drawing inspiration from Kretschmer and Kraepelin, proposed the existence of five types of affective temperament (cyclothymic, dysthymic, irritable, hyperthymic, and anxious) and referred to them as subclinical manifestations of mood disorders. Although over time they became viewed as normal personality domains and studied in non-clinical populations, their extremes are presumed to carry the risk of psychopathology.[17,18] Temperament modulates stress reactivity and the coping strategies people use in the face of stressful life events. Temperamental traits can be adaptive or maladaptive according to the circumstances. There is a paucity of literature on affective temperament types in cancer patients, and it remains undetermined whether and to what extent affective temperament is linked to QoL in cancer survivors. Relationships between temperamental traits and the course of the disease and QoL were previously described for various disease entities including metabolic syndrome,[19] psoriasis,[20] Parkinson's disease,[21] post-traumatic stress disorder,[22] and breast cancer.[23] However, these studies were based on different definitions and scales of QoL and temperament. Few reports include the assessment of affective temperament using the Temperament Evaluation of Memphis, Pisa, and San Diego Autoquestionnaire (TEMPS-A) in correlation with QoL.[24–26] To the best of our knowledge, this is the first study investigating the effects of affective temperament on the QoL of patients with PC.

In this study, the concept of affective temperament provides a framework to investigate the adaptation of PC survivors. We hypothesize that temperament type may be associated with mood, anxiety, postoperative complications, and subjective health-related QoL in men who underwent treatment for PC.

Materials and Methods

Participants

The study included 100 Caucasian men of Polish nationality who underwent radical prostatectomy for PC. The patients were recruited from the University Hospital/University-Affiliated Urology Clinic. Table 1 lists the demographic and clinical characteristics of the studied population. All participants provided written informed consent to participate in the study. The inclusion criteria were as follows: histopathologically confirmed diagnosis of prostate adenocarcinoma and subsequent treatment with radical prostatectomy, the ability to understand the purpose of the study and perform tests, and no incapacitation. The exclusion criteria were dementia and/or diagnosed serious somatic, psychiatric, or neurological diseases. In the study group, there were no patients with complications on the level of Clavien 3 and higher. There were 23 patients with additional oncological treatment: (21 pts radiotherapy (RTx); 9 pts androgen deprivation therapy (ADT); 7 pts ADT + RTx).[27] The study was approved by the Bioethics Committee of the Nicolaus Copernicus University, Collegium Medicum in Bydgoszcz (Approval No 476/2017) and complies with the Declaration of Helsinki.

Methods

All subjects underwent medical and psychological evaluations.

The medical evaluation included demographic data (age, education), medical history, physical examination, and biochemical tests (free testosterone level and prostate-specific antigen determined by immunoenzymatic methods).

Medical history included detailed information on disease symptoms, time of onset, disease progression, grade group according to the International Society of Urological Pathology classification,[28] previous therapies, comorbidities, and the occurrence of postoperative complications, taking into account Clavien-Dindo Classification. The following instruments were used to measure various aspects of complications: urinary incontinence, scale ICIQ-UI SF; ED, IIEF-5 and subjective ED scale.

Table 1 Demographic and Clinical Data in Subgroups with Age >65y and < 65y

Parameter		All Group (n=100, 100%)	< 65 y (n=48; 48%)	> 65 y (n=52; 52%)	p
Age (y)		66.0 (60.0–70.0)	60.0 (58.0–63.0)	70.0 (68.0–73.0)	**<0.00001**
Months from surgery (m)		19.0 (12.0 −39.0)	19.0 (11.0–32.0)	19.0 (14.0–43.5)	0.43
BMI (kg/m^2)		27.1 (25.1–29.6)	27.5 (25.8–29.4)	26.6 (24.7–30.0)	0.39
Education	Basic (n,%)	5 (5%)	2 (4%)	3 (6%)	0.09
	Vocational (n,%)	28 (28%)	18 (37.5%)	10 (19%)	
	Secondary (n,%)	34 (34%)	16 (33.5%)	18 (34.5%)	
	Higher (n,%)	33 (33%)	12 (25%)	21 (40.5%)	
ICIQ		3.0 (0.0–8.0)	2.0 (0.0–9.0)	3.5 (0.0–8.0)	0.97
IIEF-5		0.0 (0.0–7.0)	0.0 (0.0–16.0)	0.0 (0.0–4.5)	0.21
HADS_A		3.0 (1.0–7.0)	5.0 (1.0–9.0)	3.0 (1.0–5.0)	**0.03**
HADS_D		3.0 (1.0–6.0)	3.0 (1.0–8.0)	2.5 (1.0–4.0)	0.28
PSA (ng/mL)		0.003 (0.003–0.03)	0.003 (0.003–0.037)	0.003 (0.003–0.026)	0.69
Free testosterone (pg/mL)		4.6 (3.1–6.3)	4.8 (3.5–7.2)	4.5 (3.1–6.1)	0.32
TEMPS_D		0.33 (0.23–0.47)			
TEMPS_C		0.28 (0.14–0.42)			
TEMPS_H		0.52 (0.42–0.66)			
TEMPS_I		0.15 (0.05–0.25)			
TEMPS_A		0.19 (0.11–0.46)			
GRADE	I	58 (58%)	29 (60.5%)	29 (56%)	0.54
	2	32 (32%)	16 (33.5%)	16 (31%)	
	3	4 (4%)	1 (2%)	3 (5%)	
	4	3 (3%)	1 (2%)	2 (4%)	
	5	3 (3%)	1 (2%)	2 (4%)	

Notes: Data are shown as median (25th – 75th quartile) or number (%). The significance of differences between groups was assessed using U Mann Whitney's Test. Statistically significant values are marked in bold.
Abbreviations: BMI, body mass index; ICIQ, International Consultation on Incontinence Modular Questionnaire; IIEF-5 The International Index of Erectile Function; HADS_A, Hospital Anxiety and Depression Scale – anxiety scale; HADS_D, Hospital Anxiety and Depression Scale – depression scale; PSA, prostate-specific antigen; TEMPS_D, depressive temperament; TEMPS_C, cyclothymic temperament; TEMPS_H, hyperthymic temperament; TEMPS_I, irritable temperament; TEMPS_A, anxious temperament; GRADE, group of grading system classification.

ICIQ-UI SF: The International Consultation on Incontinence Questionnaire-Urinary Incontinence (ICIQ-UI SF) is a short and simple tool to screen for incontinence and its impact on QoL.[29] It consists of four questions, of which three address the prevalence, severity, and impact on QoL and the fourth addresses the patient's perception of the cause and type of leakage. A higher score indicates a greater severity of symptoms.

IIEF-5: The International Index of Erectile Function - 5 (IIEF-5) consists of five questions assessing the prevalence and severity of ED and sexual intercourse satisfaction.[30] Fewer points indicate worse erectile function, and zero means no erection.

In the *subjective assessment of the quality of erection*, the patient's task was to assess, on a scale of 1 to 5, the quality of erection after surgery. A higher score indicates a better subjective quality of the erection.

The psychological examination included the assessment of affective temperament (using a Polish adaptation of the TEMPS-A scale), symptoms of anxiety and depression (HADS), and QoL (EORTC-QLQ-C30 and EORTC-PR25).

TEMPS-A: The Affective Temperament Rating Scale (TEMPS-A) is used to assess the individual dimensions of the affective temperament as described by Akiskal (depressive, TEMPS_D; cyclothymic, TEMPS_C; hyperthymic, TEMPS_H; irritable, TEMPS_I; and anxious temperament scale, TEMPS_A).[31] The questionnaire contains 110 items for women and 109 for men, all of which are yes or no questions. The scale is divided into five parts, each dedicated to a different affective temperament (dimension). The number of points scored on each scale reflects the level at which the specific temperament dimension is expressed in the patient.

HADS: The Hospital Anxiety and Depression Scale (HADS) is a questionnaire composed of 14 questions and divided into two sections: anxiety (HADS-A) and depression (HADS-D).[32] In each section, the patient answers seven questions regarding his well-being in the last week by selecting the answer that best suits him. The number of points indicates the severity of the disorder, namely, a higher value indicates a higher severity of anxiety and/or depression.

The *EORTC-QLQ-C30* questionnaire was created by the European Organization for Research and Treatment of Cancer (EORTC) to assess the QoL of patients diagnosed with cancer.[33] It contains five functional scales (addressing physical functioning, social role, emotional functioning, cognitive functioning, and social functioning); three scales assessing disease symptoms (fatigue, nausea/vomiting, and pain); and six individual questions assessing loss of appetite, dyspnea, insomnia, constipation, diarrhea, and financial difficulties. It also includes a general health scale. A low score in a functional scale represents a high/healthy level of functioning, whereas a low score for a symptom scale or item represents a lower level of symptomatology or problems. In the global health status scale, a higher score indicates a better health status.

The *EORTC-PR25* is a PC-specific module of the EORTC questionnaire for assessing the health-related QoL of PC patients.[34] It has six domains: bowel and urinary symptoms, sexual activity, sexual functioning, and the side-effects of hormonal treatment and incontinence aid. A higher score in the sexual activity domain indicates a better health status, whereas lower scores in the other domains indicate better health status.

Statistical analyses were performed using the STATISTICA 13.1 statistical package.

Because of the distribution of variables that do not meet the criteria of normal distribution, non-parametric tests were used. The Spearman's rank correlation test was used to assess the relationships between variables. Differences between groups were analyzed using the Mann-Whitney *U*-test. Multivariate analysis was performed using a regression model. A p value of <0.05 was accepted as the cut-off point for statistical significance.

Results

The analysis of differences in the QoL parameters in the general EORTC scale and the subscales dedicated to patients after prostatectomy (EORTC-PR25) was performed in the age subgroups <65 years and >65 years (Table 2). The subgroups differed significantly only in the reported pain (EORTC-QLQ) and sexual functioning (EORTC-PR25). In both areas, younger patients had worse results.

Analysis of the relationship between EORTC-QLQ and EORTC-PR25 parameters and demographic and clinical factors (Table 3) revealed that the quality of erection after treatment was associated with better QoL in most parameters assessed. Similarly strong relationships were observed between the urinary incontinence scale and QoL.

Depressive, cyclothymic, irritable, and anxious temperaments were correlated with decreased QoL on the general EORTC scales (Table 4). A hyperthymic temperament was not significantly correlated with QoL in this analysis. On the EORTC-PR-25 scale, a depressive temperament was associated with worse sexual functioning and urinary symptoms, a cyclothymic temperament was associated with worse urinary symptoms, and an irritable temperament was associated

Table 2 Quality of Life Dimensions in Subgroups with Age >65y and < 65y

	All Group (n=100, 100%)	< 65 y (n=48; 48%)	> 65 y (n=52; 52%)	p
EORTC QLQ				
Global health status	10.0 (9.0–12.0)	10.0 (9.0–12.0)	10.0 (9.0–12.0)	0.68
Physical functioning	5.0 (5.0–7.0)	6.0 (5.0–7.0)	5.0 (5.0–7.0)	0.46
Role functioning	2.0 (2.0–3.0)	2.0 (2.0–3.0)	2.0 (2.0–3.0)	0.46
Emotional functioning	5.0 (4.0–7.0)	6.0 (4.0–7.0)	4.0 (4.0–6.5)	0.16
Cognitive functioning	2.0 (2.0–4.0)	3.0 (2.0–4.0)	2.0 (2.0–3.0)	0.25
Social functioning	2.0 (2.0–3.0)	2.0 (2.0–4.0)	2.0 (2.0–3.0)	0.44
Fatigue	3.0 (3.0–6.0)	4.0 (3.0–6.0)	3.0 (3.0–5.0)	0.13
Nausea and vomiting	2.0 (2.0–2.0)	2.0 (2.0–2.0)	2.0 (2.0–2.0)	0.46
Pain	2.0 (2.0–3.0)	3.0 (2.0–3.0)	2.0 (2.0–2.5)	**0.009**
Dyspnoe	1.0 (1.0–1.0)	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.78
Insomnia	1.0 (1.0–2.0)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	0.70
Apetite loss	1.0 (1.0–1.0)	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.95
Constipation	1.0 (1.0–1.0)	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.96
Diarrhoea	1.0 (1.0–1.0)	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.25
Financial diffculties	1.0 (1.0–1.5)	1.0 (1.0–2.0)	1.0 (1.0–1.0)	0.28
EORTC PR25				
Sexual activity	2.0 (2.0–3.0)	2.0 (2.0–4.0)	2.0 (2.0–3.0)	0.28
Sexual functioning	3.0 (2.0–14.5)	4.0 (3.0–16.0)	3.0 (2.0–4.0)	**0.01**
Urinary symptoms	11.0 (9.0–14.0)	11.0 (9.0–14.0)	11.0 (8.0–14.0)	0.48
Bowel symptoms	4.0 (4.0–5.0)	4.0 (4.0–6.0)	4.0 (4.0–4.0)	0.45
Hormonal treatment-related sympoms	8.0 (7.0–9.0)	8.0 (7.0–10.0)	7.5 (7.0–9.0)	0.73
Intontinence aid	1.0 (0.0–2.0)	1.0 (0.0–3.0)	1.0 (0.0–2.0)	0.74

Notes: The significance of differences between groups was assessed using U Mann Whitney's test. Statistically significant values are marked in bold. Data are shown as median (25th – 75th quartile).
Abbreviations: EORTC QLQ, European Organization for Research and Treatment of Cancer questionnaire; EORTC PR25, prostate cancer-specific module of European Organization for Research and Treatment of Cancer questionnaire.

with worse sexual functioning. On the other hand, a hyperthymic temperament was significantly correlated with better incontinence aid results.

Another analysis examined the correlation of affective temperaments and selected clinical parameters with the HADS scales, IIEF-5 scale, erection quality, and ICIQ (Table 5). These analyses showed strong relationships between individual dimensions of affective temperament and anxiety and depression, and the occurrence of the most common postoperative complications such as urinary incontinence or ED. The conducted analyzes did not reveal a significant influence of adjuvant therapy on the study of the relationship between affective temperaments and quality of life in the study group.

Table 3 R-Spearman Correlations of Clinical Factor and Parameters of EORTC QLQ and EORTC P25

	Age	BMI	Months From Surgery	Post Surgery Erection	GRADE	ICIQ-UI
EORTC QLQ						
Global health status	−0.029; p=0.77	0.176; p=0.078	−0.076; p=0.22	**−0.239; p=0.016**	**0.245; p=0.013**	**−0.416; p=0.00001**
Physical functioning	0.061; p=0.54	−0.091; p=0.36	**0.281; p=0.002**	**0.536; p<0.00001**	**−0.317; p=0.001**	**0.243; p=0.014**
Role functioning	−0.044; p=0.66	0.059; p=0.55	−0.085; p=0.19	**−0.276; p=0.005**	**0.216; p=0.03**	**0.423; p=0.00001**
Emotional functioning	0.073; p=0.46	**0.212; p=0.033**	−0.039; p=0.34	**−0.310; p=0.001**	0.078; p=0.43	**0.292; p=0.003**
Cognitive functioning	−0.114; p=0.25	0.063; p=0.52	−0.105; p=0.14	**−0.304; p=0.002**	0.151; p=0.13	**0.270; p=0.006**
Social functioning	−0.137; p=0.17	−0.003; p=0.97	0.176; p=0.078	−0.068; p=0.49	0.074; p=0.46	**0.321; p=0.001**
Fatigue	−0.029; p=0.77	−0.042; p=0.67	0.067; p=0.25	**0.327; p=0.0008**	−0.135; p=0.17	**0.336; p=0.0006**
Nausea and vomiting	0.061; p=0.54	0.121; p=0.22	−0.117; p=0.24	**−0.317; p=0.001**	0.149; p=0.13	−0.024; p=0.81
Pain	−0.044; p=0.66	0.138; p=0.17	−0.073; p=0.46	**−0.306; p=0.001**	**0.227; p=0.022**	0.181; p=0.07
Dyspnoe	0.073; p=0.46	0.066; p=0.50	−0.140; p=0.16	**−0.266; p=0.007**	0.174; p=0.083	−0.039; p=0.70
Insomnia	−0.114; p=0.25	0.008; p=0.93	−0.070; p=0.48	**−0.303; p=0.002**	**0.230; p=0.02**	**0.206; p=0.039**
Apetite loss	−0.137; p=0.17	−0.012; p=0.90	−0.172; p=0.085	**−0.227; p=0.022**	0.146; p=0.14	**0.237; p=0.017**
Constipation	−0.029; p=0.77	0.174; p=0.082	−0.110; p=0.27	**−0.393; p=0.00005**	**0.265; p=0.02**	**0.060; p=0.55**
Diarrhoea	0.061; p=0.54	0.100; p=0.32	**−0.197; p=0.048**	−0.158; p=0.11	0.061; p=0.54	−0.002; p=0.98
Financial diffculties	−0.044; p=0.66	0.066; p=0.51	**−0.199; p=0.046**	**−0.272; p=0.006**	0.094; p=0.35	0.184; p=0.06
EORTC PR25						
Sexual activity	−0.114; p=0.25	0.118; p=0.24	−0.126; p=0.20	**−0.283; p=0.004**	0.054; p=0.58	**0.306; p=0.001**
Sexual functioning	−0.137; p=0.17	0.009; p=0.92	−0.153; p=0.12	−0.138; p=0.17	**0.254; p=0.01**	−0.077; p=0.44
Urinary symptoms	−0.029; p=0.77	0.002; p=0.97	−0.082; p=0.41	−0.140; p=0.14	−0.030; p=0.76	**0.659; p<0.000001**
Bowel symptoms	0.061; p=0.54	0.128; p=0.20	−0.007; p=0.93	−0.107; p=0.28	0.050; p=0.62	**0.322; p=0.001**
Hormonal treatment-related symptoms	−0.044; p=0.66	0.005; p=0.95	**−0.326; p=0.0009**	**−0.201; p=0.045**	0.044; p=0.65	**0.258; p=0.009**
Intontinence aid	0.073; p=0.46	0.073; p=0.46	**−0.232; p=0.02**	**−0.304; p=0.002**	0.048; p=0.63	**0.745; p<0.000001**

Note: Statistically significant values are marked in bold.
Abbreviations: EORTC QLQ, European Organization for Research and Treatment of Cancer questionnaire; EORTC PR25, prostate cancer-specific module of European Organization for Research and Treatment of Cancer questionnaire; BMI, body mass index; post-surgery erection, subjective assessment of the quality of erection; GRADE, group of grading system classification; ICIQ-UI, International Consultation on Incontinence Modular Questionnaire.

Table 4 R-Spearman Correlations of TEMPS Dimensions and Parameters of EORTC QLQ and EORTC P25

	TEMPS_D	TEMPS_C	TEMPS_H	TEMPS_I	TEMPS_A
EORTC QLQ					
Global health status	**0.303; p=0.002**	0.251; p=0.011	−0.116; p=0.11	**0.244; p=0.014**	**0.319; p=0.001**
Physical functioning	−0.146; p=0.14	0.001; p=0.99	0.030; p=0.24	−0.055; p=0.58	**0.402; p=0.00003**
Role functioning	**0.330; p=0.0008**	0.263; p=0.008	−0.118; p=0.23	0.140; p=0.16	0.126; p=0.21
Emotional functioning	0.140; p=0.16	0.189; p=0.059	−0.014; p=0.88	**0.233; p=0.019**	0.063; p=0.53
Cognitive functioning	0.126; p=0.21	0.151; p=0.13	−0.045; p=0.65	**0.208; p=0.037**	0.193; p=0.053
Social functioning	**0.266; p=0.007**	**0.201; p=0.044**	−0.015; p=0.87	0.084; p=0.40	**0.213; p=0.033**
Fatigue	**0.284; p=0.004**	**0.249; p=0.012**	−0.051; p=0.61	0.082; p=0.41	0.167; p=0.095
Nausea and vomiting	0.190; p=0.057	0.094; p=0.34	−0.085; p=0.39	0.153; p=0.12	0.078; p=0.43
Pain	**0.302; p=0.002**	**0.327; p=0.0008**	−0.111; p=0.26	**0.239; p=0.016**	**0.277; p=0.005**
Dyspnoe	**0.268; p=0.006**	**0.348; p=0.0003**	−0.026; p=0.79	**0.308; p=0.001**	**0.317; p=0.001**
Insomnia	**0.398; p=0.00004**	**0.289; p=0.003**	−0.189; p=0.058	**0.230; p=0.021**	**0.217; p=0.029**
Apetite loss	**0.233; p=0.019**	**0.314; p=0.001**	−0.189; p=0.059	0.078; p=0.43	**0.219; p=0.028**
Constipation	**0.342; p=0.0004**	**0.234; p=0.018**	−0.122; p=0.22	**0.288; p=0.003**	**0.201; p=0.044**
Diarrhoea	−0.009; p=0.92	0.086; p=0.39	−0.187; p=0.06	0.004; p=0.96	−0.112; p=0.26
Financial diffculties	**0.252; p=0.011**	0.135; p=0.17	−0.086; p=0.39	0.098; p=0.33	0.066; p=0.51
EORTC PR25					
Sexual activity	0.043; p=0.66	−0.049; p=0.62	−0.063; p=0.53	0.071; p=0.48	0.0008; p=0.99
Sexual functioning	**0.251; p=0.011**	0.171; p=0.087	−0.098; p=0.33	**0.209; p=0.036**	0.149; p=0.13
Urinary symptoms	**0.226; p=0.023**	**0.325; p=0.0009**	−0.152; p=0.15	0.113; p=0.25	0.195; p=0.051
Bowel symptoms	0.059; p=0.55	0.044; p=0.66	0.092; p=0.35	0.064; p=0.52	−0.041; p=0.68
Hormonal treatment-related sympoms	0.091; p=0.36	0.133; p=0.66	−0.077; p=0.44	0.050; p=0.61	−0.047; p=0.63
Intontinence aid	0.193; p=0.053	0.145; p=0.14	**−0.290; p=0.003**	0.177; p=0.076	0.037; p=0.70

Note: Statistically significant values are marked in bold.
Abbreviations: EORTC QLQ, European Organization for Research and Treatment of Cancer questionnaire; EORTC PR25, prostate cancer-specific module of European Organization for Research and Treatment of Cancer questionnaire; TEMPS_D, depressive temperament; TEMPS_C, cyclothymic temperament; TEMPS_H, hyperthymic temperament; TEMPS_I, irritable temperament; TEMPS_A, anxious temperament.

Multivariate analysis confirmed that depressive, cyclothymic, irritable, and anxious temperaments were associated with sexual activity. Nevertheless, the most important psychological elements in this analysis were the severity of anxiety and depression symptoms measured by HADS (Table 6).

Discussion
Assessment of Quality of Life
The QoL of PC patients depends on many factors.[35,36] The use of hormone therapy, a low education level, and older age are associated with reduced QoL.[37,38] In this study, age was not correlated with any of the dimensions of the QoL scale (Table 3); however, slight differences were observed between the groups of patients younger and older than 65 years. Younger participants had a higher level of anxiety and were more likely to report pain and sexual functioning problems

Table 5 R-Spearman Correlations of TEMPS Dimensions and Clinical Factors

	HADS_A	HADS_D	IIEF-5	Erection	ICIQ
TEMPS_D	−0.157; p=0.11	**0.329; p=0.0008**	**0.294; p=0.002**	**0.374; p=0.0001**	−0.180; p=0.071
TEMPS_C	−0.150; p=0.13	**0.303; p=0.002**	**0.389; p=0.00006**	**0.401; p=0.00003**	−0.109; p=0.27
TEMPS_H	−0.036; p=0.71	0.064; p=0.52	−0.047; p=0.63	−0.073; p=0.46	0.025; p=0.80
TEMPS_I	−0.136; p=0.17	0.168; p=0.094	**0.199; p=0.046**	**0.326; p=0.0009**	−0.017; p=0.86
TEMPS_A	**0.309; p=0.001**	**0.266; p=0.007**	**0.460; p=0.000001**	**0.496; p<0.00001**	**0.428; p<0.00001**
Months from surgery	**0.287; p=0.003**	0.101; p=0.31	−0.085; p=0.39	−0.092; p=0.36	**0.268; p=0.006**
GRADE	−0.159; p=0.11	0.153; p=0.12	0.063; p=0.53	0.081; p=0.42	−0.192; p=0.054

Note: Statistically significant values are marked in bold.
Abbreviations: HADS_A, Hospital Anxiety and Depression Scale – anxiety scale; HADS_D, Hospital Anxiety and Depression Scale – depression scale; IIEF-5 The International Index of Erectile Function; Erection, subjective assessment of the quality of post-surgery erection; ICIQ, International Consultation on Incontinence Modular Questionnaire; TEMPS_D, depressive temperament; TEMPS_C, cyclothymic temperament; TEMPS_H, hyperthymic temperament; TEMPS_I, irritable temperament; TEMPS_A, anxious temperament; GRADE, group of grading system classification.

(Tables 1 and 2). This is consistent with the results of previous studies.[39] Sexual dysfunction is not as important for QoL in patients with advanced cancer as in patients with localized cancer. This population faces the possibility of imminent death, and sexual function may have a lower priority.[35,36] A similar mechanism may be present in older people, which would explain the differences between groups, as sexual function is not as important in the elderly as in the younger population.

QoL also depends on the time interval since diagnosis and treatment and the stage of the cancer.[35] In this study, longer time intervals were significantly associated with better overall physical functioning (Table 3). However, in the assessment of individual symptoms, it was negatively correlated only with the severity of diarrhea. Similarly, the discomfort associated with hormonal treatment and the need to use incontinence aids or experience of financial difficulties decreased over time. Previous studies reported that urination problems (such as urinary incontinence and urgency) disappear over time, whereas sexual problems (such as poor erection quality and low sexual desire) tend to persist.[35,40] In this study, cancer progression affected certain QoL dimensions, such as global health status and physical functioning, as well as physical symptoms such as constipation, insomnia, and pain sensation. Consistently, Odeo and Degu in their review noted that cancer progression, as indicated by a higher clinical stage, higher Gleason score, and greater cancer severity, is a major predictor of poor health-related QoL among PC patients.[38]

In this study, the most prominent clinical factors associated with QoL were urinary incontinence and quality of erection after treatment (Table 3). These dysfunctions were strongly correlated with most QoL parameters, which is consistent with the results of previous studies.[35,41,42] Sexual dysfunction and urinary incontinence are also the most frequently impaired health-related QoL domains in patients with localized PC.[35] All types of treatments, as well as untreated disease itself, can lead to these dysfunctions.[35] However, their severity and impact on QoL depend on the treatment method used.[40,43,44] Removing the prostate gland is associated mostly with sexual and urinary dysfunction.[35] Unlike surgery, radiotherapy is associated with bowel dysfunction and, to a lesser extent, with urinary incontinence. Adjuvant androgen-deprivation therapy increases the incidence of fatigue. Despite these differences in individual domains, prospective evaluation shows that global health-related QoL in men does not differ according to treatment modality.[35,42]

Assessment of the Relation Between Quality of Life and Temperament

Most of the aspects of QoL examined and included in the general EORTC-QLQ scale were significantly correlated with the individual dimensions of temperament (Table 4). Only nausea, vomiting, and diarrhea did not show such correlations. In the detailed scale of EORTC-PR25, none of the temperament types was correlated with bowel symptoms (Table 4). The specificity of the cohort may have influenced the results because gastrointestinal complications are not common in

Table 6 Multivariate Analysis – Regression Model for Quality of Life Scores Dedicated to Patients After Prostatectomy

	EORTC QLQ-PR25 Sexual Activity				EORTC QLQ-PR25 Urinary Symptoms				EORTC QLQ-PR25 Bowel Symptoms				EORTC QLQ-PR25 Hormonal Treatment-Related Symptoms			
	Value of Model	P	Odds Ratio	CI [95% CI] −95%	Value of Model	P	Odds Ratio	CI [95% CI] −95%	Value of Model	P	Odds Ratio	CI [95% CI] −95%	Value of Model	P	Odds Ratio	CI [95% CI] −95%
Age	0.04	0.20	1.04	3.12	0.02	0.48	1.02	2.03	0.001	0.96	1.001	1.004	0.008	0.82	0.99	0.78
TEMPS-D	−4.54	**0.001**	0.01	0.03	−2.61	0.11	0.07	0.13	−1.6	0.26	5.04	3.4	0.59	0.71	1.80	1.56
TEMPS-C	−2.83	**0.008**	0.05	0.11	0.10	0.92	1.11	1.08	−1.7	0.11	5.6	3.7	0.58	0.64	1.80	1.57
TEMPS-H	1.22	0.26	3.4	3.03	1.75	0.17	5.8	4.9	0.27	0.81	1.31	1.27	0.33	0.80	1.39	1.35
TEMPS-I	−2.52	**0.04**	0.08	0.11	0.75	0.58	0.75	1.90	−1.29	0.31	3.64	3.0	−0.16	0.91	0.85	0.87
TEMPS-A	−0.88	**0.014**	0.41	0.06	0.13	0.72	1.14	1.54	0.079	0.83	1.08	1.28	0.02	0.96	1.02	1.06
HADS-A	−0.29	**<0.000001**	0.74	0.004	−0.13	**0.045**	0.87	0.09	−0.12	**0.019**	0.87	9.6	−0.04	0.50	0.95	0.45
HADS-D	−0.35	**<0.000001**	0.70	0.003	−0.25	**0.002**	0.77	0.016	−0.17	**0.004**	0.82	15.1	−0.16	**0.046**	0.84	0.007
TIME from surgery	0.008	0.40	1.0	2.21	0.005	0.56	1.005	1.77	0.0002	0.98	1.001	1.022	0.009	0.36	1.0	2.5
GRADE	−0.52	**0.027**	0.59	0.12	−0.68	**0.042**	0.50	0.064	0.24	0.28	1.28	2.6	−0.33	0.29	0.71	0.26
Testosterone	0.23	**0.009**	1.26	19.5	0.033	0.71	1.03	1.51	−0.10	0.25	0.90	0.27	−0.06	0.53	0.93	0.44
PSA	−0.69	0.11	0.49	0.0	−0.22	0.44	0.79	0.000	0.05	0.11	1.05	159.7	−0.028	0.57	0.97	0.06
BMI	−0.12	0.88	0.88	0.14	−0.087	0.23	0.91	0.24	−0.14	**0.04**	0.85	9.77	0.11	0.12	1.12	6.5
Education	0.40	0.08	1.49	3.3	0.71	**0.012**	2.04	8.59	0.54	**0.03**	1.43	0.19	−0.004	0.98	0.99	0.98

Note: Statistically significant values are marked in bold.
Abbreviations: TEMPS_D, depressive temperament; TEMPS_C, cyclothymic temperament; TEMPS_H, hyperthymic temperament; TEMPS_I, irritable temperament; TEMPS_A, anxious temperament; HADS_A, Hospital Anxiety and Depression Scale – anxiety scale; HADS_D, Hospital Anxiety and Depression Scale – depression scale; GRADE, group of grading system classification; PSA, prostate-specific antigen; BMI, body mass index; EORTC QLQ-PR25, prostate cancer-specific module of European Organization for Research and Treatment of Cancer questionnaire.

patients after radical prostatectomy.[42] The results could also be attributed to the rarity of these symptoms among the present cohort.

The other dimensions of the QoL scale, namely, fatigue, pain, dyspnea, insomnia, appetite loss, constipation, and financial difficulties, as well as physical, role functioning, emotional functioning, cognitive, and social functioning and global health status, showed strong correlations with the affective temperament profile (Table 4). These correlations were mostly observed for depressive, cyclothymic, irritable, and anxious temperaments, whereas they were not present for the hyperthymic temperament subscale. The reason for this is not entirely clear. The association between temperament type and the QoL subscales was mostly negative for the hyperthymic temperament and mostly positive for the other temperament types, suggesting that the predisposition to a poorer QoL induced by most temperaments is reduced by the hyperthymic temperament. Kesebir et al observed a relation between the hyperthymic temperament and resilience in depression.[45] In Italian cancer patients, traits associated with the hyperthymic temperament are correlated with better health-related QoL.[46] Carta et al reported that in individuals with a hyperthymic temperament, the increased energy resulting from increased stimulation may be advantageous.[47] This genetically determined type of response may therefore be an adaptive response to the difficulties associated with the cancer diagnosis and treatment. Patients with this type of temperament may experience a state of high agitation, which is not suitable for adaptation in other types of temperament. As reported by Carta et al, the lifestyle of people with a predominant hyperthymic temperament, which includes sleep and biorhythm disruptions related to life choices, can severely affect metabolic pathways, thereby increasing the risk of prostate and breast cancer.[47]

We found a strong correlation between an anxious temperament and the severity of anxiety and depression symptoms, erection quality (assessed objectively and subjectively), and urinary incontinence (Table 5). Depressive and cyclothymic temperaments were correlated with depressive symptoms and the quality of erection. An irritable temperament was only associated with the quality of erection. Consistent with the results of previous analyses, there was no correlation between these parameters and the hyperthymic temperament (Table 5). Symptoms of anxiety are likely to occur in patients with PC, and it is estimated that this problem affects 20–60% of patients.[36] Similarly, the occurrence of depressive disorders is common among patients who have undergone prostatectomy.[36,48] De Sousa et al noted the important distinction between anxiety as a "trait," which may be present as a basic characteristic of the patient, and anxiety as a "state," which is a situational response to a stressor. Anxiety as a state may appear while awaiting results at the time of diagnosis or treatment. Meanwhile, anxiety as a trait is not related to the external situation and corresponds to anxiety temperament.[36] Anxious and depressive temperaments predispose to the development of anxiety and mood disorders.[49] This correlation is markedly modified by stress exposure.[50] The positive correlation between the severity of these features of the affective temperament (TEMPS_D, TEMPS_A) and anxiety and depression symptoms (HADS-A and HADS-D) may also support these results (Table 5).

In this study, the anxious temperament was strongly correlated with urinary incontinence and sexual dysfunction, which are the symptoms of PC that are strongly associated with QoL (Table 5). There are no studies on such a relationship in the literature. However, there are works on the implications of both anxiety and depressive symptoms (understood as a state and not a trait) on these complications.[13] An earlier retrospective analysis of a large cohort showed that patients with preoperative depression or anxiety are at a higher risk of postoperative urinary incontinence after prostatectomy.[51] Similarly, the presence of anxiety and depression may contribute to the occurrence of sexual dysfunction.[52–54]

In the next stage of the study, we performed a multivariate analysis of the EORTC-PR25 subscales and examined psychological and clinical parameters, which confirmed the significance of anxious, depressive, cyclothymic, and irritable temperaments in terms of sexual activity. Nevertheless, the most important psychological factor in this analysis was the severity of anxiety and depression symptoms measured by HADS. These factors were important not only for sexual function, but also for the other EORTC-PR25 subscales. These results confirm our observations and indicate that the type of temperament plays an important role in the development of depression and anxiety symptoms as well as in QoL.

Limitations

The present study had limitations such as the small number of participants (throughout the study and in subgroups), and the nature of the study (although we used validated questionnaires, there are still the biases involved with self-reporting questionnaires); however, the findings provide insight into the role of affective temperaments in the QoL of PC survivors.

Another limitation of the study is that factors, such as mood, may also affect the self-description of the respondents. Although temperament is generally stable, it can also change slightly throughout life.

Conclusion

The QoL of patients after radical prostatectomy depends on many factors, including age, interval since diagnosis, the stage of the cancer, treatment, and complications. There is also a clear relationship between the individual dimensions of affective temperament and QoL in PC survivors. Depressive, cyclothymic, irritable, and anxious temperaments are generally associated with poorer QoL in selected domains, whereas this was not observed for the hyperthymic temperament. The temperament profile is also associated with the mood and anxiety level of patients, which were identified in our study as severe determinants of a poorer QoL/functioning. The relationship between temperament, mental state, and QoL in PC survivors requires better understanding and further research.

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Disclosure

The authors report no conflicts of interest in this work.

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