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Factors influencing post-traumatic growth in patients with urinary incontinence following robot-assisted laparoscopic radical prostatectomy: A positive psychology perspective

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Abstract: Background: Urinary incontinence (UI) after prostate cancer (PCa) surgery not only causes physiological dysfunction but also induces profound psychological distress. However, current research primarily focuses on pathological mechanisms and negative psychological outcomes, neglecting the potential for positive transformation through post-traumatic growth (PTG). **Objective:** This study aimed to identify the factors influencing PTG in patients with UI after robot-assisted laparoscopic radical prostatectomy (RARP) from a positive psychology perspective. **Methods:** We enrolled 215 PCa patients with UI admitted to our hospital between June 2023 and January 2025. At discharge, standardized scales were administered to assess PTG (Post-traumatic Growth Inventory [PTGI]), psychological resilience (Connor-Davidson Resilience Scale [CD-RISC]), gratitude (Gratitude Questionnaire-6 [GQ-6]), and self-disclosure (Distress Disclosure Index [DDI]). Baseline demographic and clinical data, including age, education level, household income, and duration of UI, were collected. Logistic regression analysis was performed to determine the predictors of PTG. **Results:** The total PTGI score exhibited a significant positive correlation with psychological resilience ($p < 0.05$). Multivariate logistic regression analysis identified household income per capita, gratitude, self-compassion, and self-disclosure as independent predictors of PTG ($p < 0.05$). In contrast, the duration of UI, education level, and erectile dysfunction showed no significant association ($p > 0.05$). **Conclusion:** Financial strain, limited health literacy, maladaptive cognitive patterns, and insufficient social support are key barriers to PTG in patients with post-RARP UI. Conversely, gratitude and self-compassion promote PTG by fostering life meaning reconstruction and mitigating psychological distress.

Keywords: post-traumatic growth; prostate cancer; psychology perspective; urinary incontinence

1. Introduction

Post-traumatic growth (PTG) is a positive psychological transformation characterized by enhanced personal strength, renewed life priorities, and improved relationships, occurring after struggles with highly challenging life circumstances [1]. Prostate cancer (PCa), the second most prevalent malignancy among men globally, has seen a marked rise in incidence paralleling the growth of aging populations [2,3]. In China, the incidence of PCa is as high as 17.3/100,000 [4]. Robot-assisted laparoscopic radical prostatectomy (RARP), renowned for its precision and minimally invasive approach, has emerged as the treatment of choice for localized PCa [5].

Despite its advantages, postoperative urinary incontinence (UI) remains a major complication, occurring in 6.8%–30% of cases. This condition not only impairs physiological function but also precipitates profound psychological distress, including self-image disturbances and social withdrawal [6]. UI, the involuntary leakage of urine, classified as stress UI (leakage during physical exertion), urge UI (sudden compelling need to void), or mixed UI. Post-RARP UI primarily manifests as stress UI due to sphincter dysfunction [7]. Men usually play the role of “breadwinner” and “decision maker” in the family. Role disruption caused by UI, such as inability to work and social avoidance, is the core challenge of PTG. Conventional research has predominantly centered on the pathological mechanisms underlying postoperative complications and adverse psychological responses, often neglecting the potential for PTG in patients confronting such challenges [8,9]. We found that current studies of PTG in UI patients after RARP still have the following limitations: first, the field of urology mainly focuses on surgical technology innovation and urination function recovery, and there is no systematic establishment of a postoperative psychological rehabilitation evaluation system (such as the lack of a standardized PTG tracking scheme) [10]. Second, existing empirical studies on PTG mostly focus on tumors with a high incidence in women, such as breast cancer, and there is a significant gender research imbalance in the male-dominated field of PCa [11–13]. Particularly noteworthy is the distinctive physician–patient communication dynamic inherent to robotic surgery—characterized by physical separation between surgeon and patient mediated by mechanical arms—which may fundamentally alter patients’ medical experiences [14].

This study investigates the role of RARP technical characteristics in reshaping patients’ illness perceptions, moving beyond the conventional paradigm that views surgery solely as a medical intervention. Second, by incorporating the theory of psychological resilience, we examine how male patients’ unique psychological coping mechanisms mediate the transformation from UI-related stress to PTG. Based on the social role theory, we proposed the following core hypotheses: (1) household income per capita may have a potential impact on PTG; (2) gratitude moderated the relationship between UI duration and PTG through the meaning reconstruction pathway; (3) the characteristics of doctor–patient communication in robotic surgery negatively regulate the self-disclosure effect. To test our conjecture, we also measured the willingness of patients to actively share traumatic experiences through the 12-item Distress Disclosure Index (DDI). The Gratitude Questionnaire-6 (GQ-6) was used to assess the perception and expression of positive life events. The 10-item Connor-Davidson Resilience Scale (CD-RISC) was used to quantify the resilience to adversity. By elucidating the distinct mechanisms underlying PTG in PCa patients undergoing robotic surgery, this research not only establishes a theoretical foundation for developing targeted psychological interventions but also advances the evolution of surgical medicine from a purely technology-driven approach to an integrated “humanistic-technology” paradigm. These findings hold significant practical implications for enhancing comprehensive cancer care and holistic tumor management.

2. Materials and methods

2.1. Study subjects

This retrospective study included PCa patients admitted to our hospital between June 2023 and January 2025. The required sample size was estimated using G*Power software, with the following parameters: effect size = 0.3, $\alpha = 0.05$, and power = 0.95. The analysis indicated a minimum of 134 participants. Based on the predefined inclusion and exclusion criteria, 215 eligible subjects were enrolled. The study was approved by the Ethics Committee (No. XYFY2025-KL247-01), and all participants provided written informed consent. **Figure 1** illustrates the main process of screening research subjects for this study.

2.2. Inclusion and exclusion criteria

Inclusion criteria: (1) diagnosis of PCa confirmed by histopathological examination [15]; (2) pathological stages were classified according to clinical guidelines

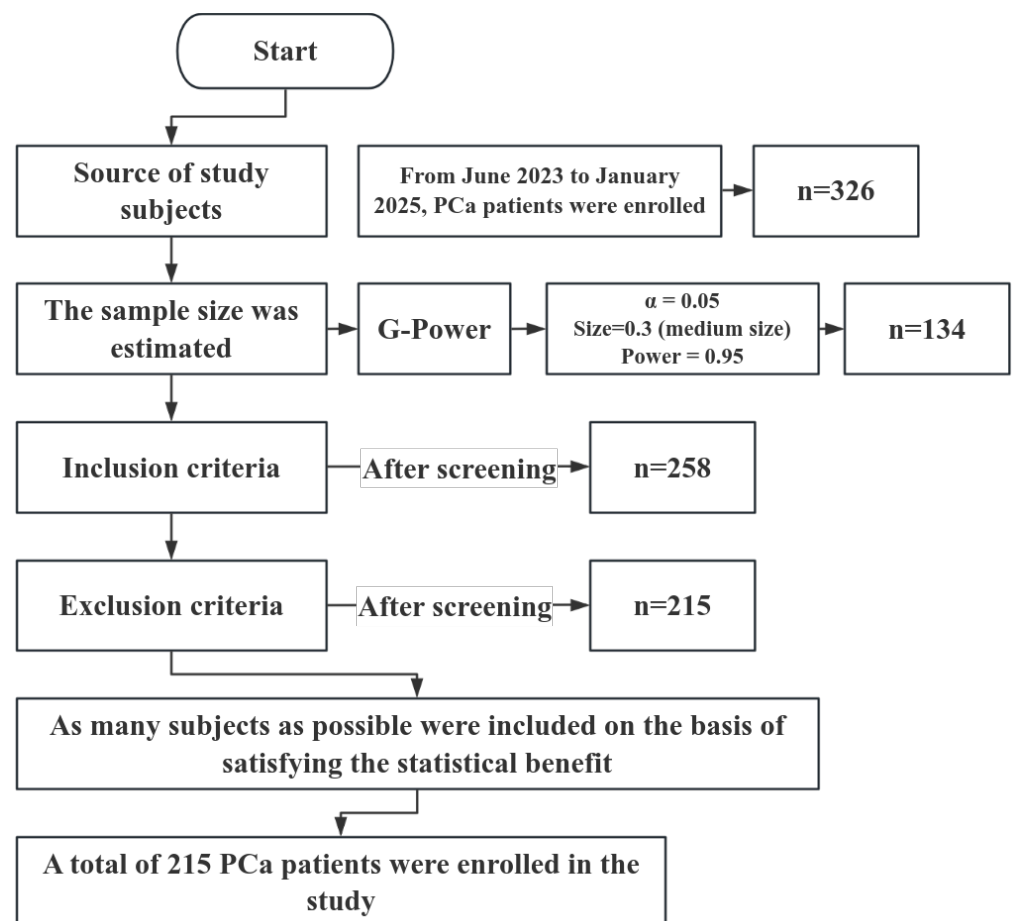


Figure 1. Screening process of study subjects. A total of 326 potential study subjects were included. The sample size was estimated, and the study's minimum value was 134. After inclusion and exclusion criteria screening, 215 patients met the requirements. As many subjects as possible were included on the basis of ensuring statistical benefit. Finally, 215 subjects were identified.

[16]; (3) normal reading comprehension and ability to complete questionnaires independently; (4) adequate limb function and normal mobility; (5) radical prostatectomy in our hospital with postoperative UI (pad test > 2 g 24 h after surgery); (6) availability of complete clinical data.

Exclusion criteria: (1) previous prostate trauma or surgery; (2) coagulation disorders or immune dysfunction; (3) psychiatric disorders (e.g., schizophrenia, depression); (4) severe postoperative complications; (5) exposure to major life stress events during hospitalization; (6) comorbid malignant tumors.

2.3. Baseline data collection

All patients' age, height, weight, ethnicity, fertility status, educational background, family per capita income, religious beliefs, comorbidities (including hypertension, diabetes, and hyperlipidemia), smoking, and drinking habits were collected by the research team at admission. Body mass index = weight/height² was calculated. Subsequently, the patient was admitted for appropriate treatment, and the patient's duration of incontinence, cancer stage, and presence or absence of a pelvic floor muscle training program were recorded by the urological nurse. All the information was recorded by the research team members on the computer for storage. The research team members and nurses who were responsible for the investigation, recording, and statistics were unaware of the grouping of patients.

2.4. Questionnaire survey

Following admission, all patients underwent Robot-Assisted Laparoscopic Radical Prostatectomy (RALP) performed by the same surgical team at our hospital. Postoperative UI was objectively confirmed through standardized pad tests documenting involuntary urine leakage. At discharge, participants were comprehensively evaluated using the following validated scales:

PTG: PTG was measured using the post-traumatic growth inventory (PTGI, $\alpha = 0.89$) [17], which assesses positive psychological adaptation following trauma. This instrument evaluates the following five domains: personal strength, new possibilities, relating to others, spiritual change, and appreciation of life. Responses were scored on a 5-point scale, yielding a maximum total score of 105, with higher scores indicating greater PTG.

Psychological resilience assessment: CD-RISC ($\alpha = 0.91$) [18] was administered to evaluate stress-coping capacity and adaptive psychological functioning. Using a 5-point rating system (total score: 50), this tool measures the ability to thrive in adverse circumstances, with higher scores reflecting greater resilience.

Gratitude assessment: GQ-6 ($\alpha = 0.82$) [19], a 6-item psychometric tool (score range: 6–42), quantified patients' dispositional gratitude across multiple dimensions: emotional expression, and the frequency, depth, breadth, and density of gratitude. Elevated scores correspond to greater gratitude.

Self-disclosure assessment: DDI (total score range: 12–60, $\alpha = 0.79$) [20] measured patients' propensity to communicate distressing experiences with others, with higher scores indicating greater disclosure tendencies.

2.5. Statistical analysis

All statistical analyses were performed using SPSS 24.0 (IBM Corp., Armonk, NY, USA). Categorical variable data were recorded as (*n* [%]) and compared using the chi-square test. All continuous variable data were confirmed to conform to normal distribution by Shapiro-Wilk test ($p > 0.05$) and recorded as $\bar{x} \pm s$. Independent samples *t*-tests were used for group comparisons. Correlation analyses were performed using Pearson's correlation coefficients. The related factors were analyzed by univariate analysis, and the indicators with differences were analyzed by Logistic regression. With grouping as the dependent variable and the difference indicator as the covariate, the mode of analysis was input. Statistical significance was set at $p < 0.05$.

3. Results

3.1. The clinical data of the subjects were collected

Observing the information of the subjects in this study (Table 1), it can be seen that the onset age of PCa is concentrated around 60 years old. At the same time, the

Table 1. Baseline data of study participants included in this study.

Projects		<i>n</i>	Percentage (%)
Age (years)	59.61 ± 5.19	—	—
Body mass index (kg/m ²)	23.15 ± 1.23	—	—
Duration of UI (d)	<3	83	38.60
	≥3	72	61.40
Ethnicity	Han	97	94.42
	Minority	4	5.58
Fertility	Yes	76	76.74
	No	25	23.26
Smoking	Yes	72	68.37
	No	29	31.63
Alcohol consumption	Yes	40	42.79
	No	61	57.21
Education level	<High school	35	41.86
	≥High school	66	58.14
Per capita household income	<5000	24	32.56
	≥5000	77	67.44
Religion	Yes	18	15.81
	No	83	84.19
Tumor stage	I–II	68	68.84
	III–IV	33	31.16
Participation in pelvic floor muscle training	Yes	34	26.98
	No	67	73.02
Erectile dysfunction	Yes	31	38.60
	No	70	61.40
Comorbid chronic diseases	Hypertension	25	27.44
	Hyperlipidemia	37	33.49
	Diabetes mellitus	30	31.63

Table 1. (Continued).

Projects		<i>n</i>	Percentage (%)
GQ-6	30.86 ± 5.56	—	—
DDI	48.01 ± 7.87	—	—
PTGI	77.80 ± 13.28	—	—
CD-RISC	35.69 ± 6.95	—	—

proportion of Han nationality is as high as 94.42%. Secondly, the smoking rate and drinking rate of the study subjects were 68.37% and 42.79%, respectively. 61.40% of the patients had UI lasting for more than 3 days, indicating that most of them were chronic or acute exacerbation cases. Only 38.60% had a course of disease of less than 3 days. It is worth noting that the comorbidity rates of hypertension (27.44%), hyperlipidemia (33.49%), diabetes (31.63%), and other chronic diseases were high. In terms of case stage, the proportion of early and middle stage (I–II) patients was relatively high (68.84%).

3.2. Association between PTG and psychological resilience

Pearson correlation analysis demonstrated a significant positive correlation between PTGI and CD-RISC scores ($r = 0.540$, $p < 0.001$). Similarly, PTGI was positively correlated with GQ-6 and DDI scores ($r = 0.479$, 0.486 , $p < 0.001$). That is, when PTGI is elevated, CD-RISC, GQ-6, and DDI also increase (**Figure 2**).

3.3. Univariate analysis of factors influencing PTG

Based on median split (median PTGI scores ≈ 78), patients were categorized into high PTG (PTGI > 78 , $n = 101$) and low PTG (PTGI ≤ 78 , $n = 114$) groups. Comparative analysis revealed no significant differences in baseline characteristics such as age, ethnicity, fertility status, or education level between the two groups ($p > 0.05$). However, the low PTG group exhibited a higher proportion of individuals with a household income per capita below 5000 yuan, education below high school level, comorbid erectile dysfunction, and a longer duration of UI ($p < 0.05$). Furthermore, participants in the low PTG group were less likely to engage in pelvic floor muscle training programs or receive active empathy and demonstrated significantly lower GQ-6 and DDI scores ($p < 0.05$) (**Table 2**).

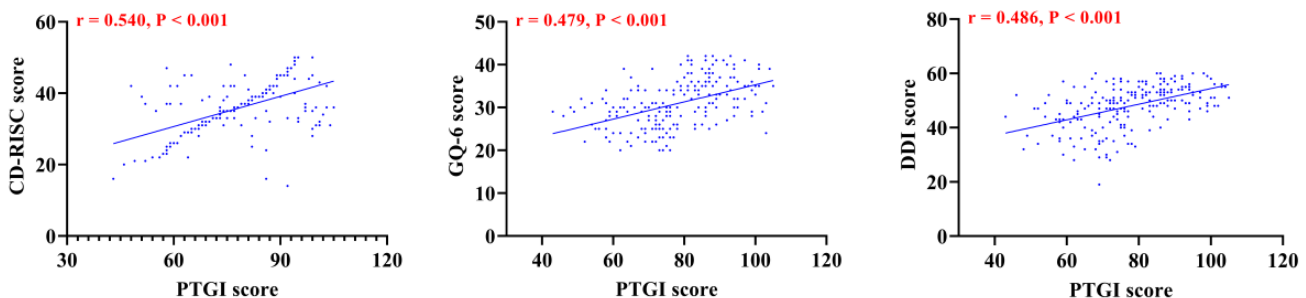


Figure 2. Correlation analysis of PTGI score and CD-RISC, GQ-6, DDI scores.

Note: Post-traumatic growth inventory (PTGI), Connor–Davidson resilience scale (CD-RISC).

Table 2. Univariate analysis affecting PTG.

Factors		Low PTG group	High PTG group	Statistical values (<i>t</i> or χ^2)	<i>p</i>
Age (years)		59.15 ± 4.92	60.14 ± 5.46	1.398	0.164
Duration of UI (d)	<3	54 (47.37)	29 (28.71)	7.864	0.005
	≥3	60 (52.63)	72 (71.29)		
Ethnicity	Han	106 (92.98)	97 (96.04)	0.950	0.330
	Minority	8 (7.02)	4 (3.96)		
Fertility	Yes	89 (78.07)	76 (75.25)	0.239	0.625
	No	25 (21.93)	25 (24.75)		
Smoking	Yes	75 (65.79)	72 (71.29)	0.749	0.387
	No	39 (34.21)	29 (28.71)		
Alcohol consumption	Yes	52 (45.61)	40 (39.60)	0.790	0.374
	No	62 (54.39)	61 (60.40)		
Education level	<High school	55 (48.25)	35 (34.65)	4.065	0.044
	≥High school	59 (51.75)	66 (65.35)		
Per capita household income	<5000	46 (40.35)	24 (23.76)	6.711	0.010
	≥5000	68 (59.65)	77 (76.24)		
Religion	Yes	16 (14.04)	18 (17.82)	0.577	0.448
	No	98 (85.96)	83 (82.18)		
Tumor stage	I–II	80 (70.18)	68 (67.33)	0.203	0.653
	III–IV	34 (29.82)	33 (32.67)		
Participation in pelvic floor muscle training	Yes	24 (21.05)	34 (33.66)	4.323	0.038
	No	90 (79.95)	67 (66.34)		
Erectile dysfunction	Yes	52 (45.61)	31 (30.69)	5.030	0.025
	No	62 (54.39)	70 (69.31)		
Comorbid chronic diseases	Hypertension	34 (29.82)	25 (24.75)	0.692	0.406
	Hyperlipidemia	35 (30.70)	37 (36.63)	0.846	0.358
	Diabetes mellitus	38 (33.33)	30 (29.70)	0.326	0.568
Body mass index (kg/m ²)		23.26 ± 1.11	23.02 ± 1.34	1.431	0.154
GQ-6		27.61 ± 4.20	34.51 ± 4.56	11.563	<0.001
DDI		44.22 ± 8.14	52.29 ± 4.78	8.715	<0.001

Notes: DDI = Distress disclosure index; GQ-6 = Gratitude questionnaire-6; PTGI = Post-traumatic growth inventory; UI = Urinary incontinence.

3.4. Multivariate analysis of factors influencing PTG

Pelvic floor muscle training, comorbid erectile dysfunction, education level, and duration of UI did not emerge as significant independent predictors of PTG ($p > 0.05$). Conversely, several factors were significantly associated with PTG outcomes: household income per capita (OR = 2.663, 95% CI = 1.052–6.742); gratitude (OR = 0.710, 95% CI = 0.638–0.790); and self-disclosure (OR = 0.807, 95% CI = 0.742–0.877) all independently influenced PTG development ($p < 0.05$) (Tables 3 and 4).

4. Discussion

This study examined PTG in 215 patients experiencing UI following RALP for PCa. Our findings identified several independent predictors of PTG, including household income per capita, gratitude, self-disclosure, and the duration of UI. These

Table 3. Assignment of univariate.

Factors	Assignment of value
PTGI	PTGI $\leq$ 78 = 1, PTGI > 78 = 2
Duration of UI (d)	<3 = 1, $\geq$ 3 = 2
Education level	$\geq$ High school = 1, <high school = 2
Per capita household income	$\geq$ 5000 = 1, <5000 = 2
Participation in pelvic floor muscle training	No = 1, yes = 2
Comorbid chronic diseases	No = 1, yes = 2
GQ-6	Analysis was performed using raw data
DDI	Analysis was performed using raw data

Table 4. Multivariate analysis of factors affecting PTG.

Factors	B	S.E.	Wald χ^2	p	OR	95%CI
Duration of UI (d)	−0.605	0.443	1.867	0.172	0.546	0.229–1.300
Education level	−0.786	0.437	3.233	0.072	0.456	0.194–1.073
Per capita household income	0.979	0.474	4.271	0.039	2.663	1.052–6.742
Participation in pelvic floor muscle training	−0.722	0.498	2.104	0.147	0.486	0.183–1.289
Comorbid chronic diseases	0.112	0.449	0.062	0.803	1.118	0.464–2.695
GQ-6	−0.3.43	0.054	39.533	<0.001	0.710	0.638–0.790
DDI	−0.215	0.043	25.118	<0.001	0.807	0.742–0.877

Note: B = Regression coefficient; OR = Odds ratio; S.E. = Standard error; 95%CI = 95% Confidence interval.

insights offer valuable implications for enhancing clinical interventions and improving the quality of care for PCa patients.

First, we found a significant positive correlation between PTG and psychological resilience, as measured by the CD-RISC. This observation aligns with principles from positive psychology, which posits that resilience—a core adaptive capacity in the face of adversity—facilitates PTG through multiple mechanisms [21]. Specifically, highly resilient individuals may be more effective in mobilizing positive emotional resources (e.g., hope and optimism) and employing adaptive coping strategies (e.g., actively seeking rehabilitation guidance) [22]. This ability to harness internal and external resources may help patients reframe the stress of UI into a catalyst for personal growth. Furthermore, greater resilience likely enables patients to derive positive meaning from their illness experience, which aligns closely with the “appreciation of life” dimension of PTG [23]. This mechanism is supported by prior research. For instance, a study by Baseotto et al. demonstrated that resilience enhances PTG by strengthening an individual’s capacity to integrate traumatic experiences into their personal narrative [24].

Further logistic regression analysis identified the following independent risk factors for PTG: (1) lower household income (per capita <5000 yuan) was associated with significantly reduced PTG levels. This may be explained by the dual-pathway inhibitory effect of financial stress on PTG. First, low-income patients face additional expenses related to incontinence care (e.g., urinary pads, rehabilitation aids), and prolonged financial strain exacerbates anxiety, depleting their resource reserves for coping with adversity [25,26]. Second, financial constraints may restrict access to

high-quality social support, such as psychological counseling or advanced rehabilitation equipment. Prior studies suggest that financial stress indirectly impedes PTG by undermining self-efficacy [27]. These results also supported the role of economic role maintenance in reconstructing male identity, suggesting that clinical interventions should be combined with “role reconstruction strategies,” such as bladder function training to restore the role of “autonomous control” or vocational rehabilitation to rebuild the role of “social contributor.” At the same time, integrating financial assistance into comprehensive rehabilitation programs—such as expanding insurance coverage for incontinence supplies or establishing public welfare rehabilitation funds—could help alleviate the negative impact of financial stress on PTG. (2) Gratitude serves as an independent yet complementary facilitator of PTG. The trait of gratitude enables patients to recognize and appreciate positive resources in adversity—such as familial support or advancements in medical technology—thereby fostering a reconstructed sense of meaning in life [28]. In clinical practice, interventions such as gratitude journaling or mindfulness-based self-compassion training can be implemented to help patients identify and cultivate these positive psychological resources. (3) Self-disclosure exhibits a positive correlation with PTG, suggesting that patients who actively share their traumatic experiences are more likely to receive emotional resonance and practical guidance through social support networks. According to Kim et al.’s emotional expression theory, self-disclosure alleviates psychological suppression and enhances cognitive integration of traumatic events [29]. To leverage this mechanism, structured peer support programs should be established, encouraging patients to engage in recovery-focused dialogue via both online and offline platforms. Additionally, healthcare providers should be trained in empathetic communication techniques to guide patients in articulating their distress effectively [30]. In addition, in the study of Peng et al., we found that there is a potential practice between low education level and PTG, which is closely related to differences in health information processing ability and social resource utilization [31]. We believe that less-educated patients often struggle to comprehend medical explanations for incontinence (e.g., “temporary injury”) and may instead attribute it to “surgical failure,” fostering self-blame or mistrust toward healthcare providers [32]. Supporting this, research by Turner et al. found that education level significantly moderates psychological adaptation in chronic disease patients by shaping health-related decision-making [33]. However, the finding of no association between education and PTG in this study does not exclude the possibility that this may be due to chance, due to the small number of cases, or the relatively simple study population. We still recommend targeted low-literacy interventions—such as animated videos, illustrated manuals in local dialects, or training family members as “health information mediators”—could improve health literacy and facilitate PTG in this population.

Based on the results of this study, we suggest that for low-income groups, in addition to basic insurance coverage, public welfare programs, such as incontinence rehabilitation packages (such as smart pads and remote monitoring devices), can be developed to reduce the cost of care through Internet of Things technology. For high-income patients, the focus is on providing personalized psychological services (e.g., mindfulness-based stress reduction programs). Gratitude intervention needs to

be divided into different implementation scenarios: the “three good things” diary method (recording three gratitude events per day) was used during hospitalization, and customized gratitude tips were pushed through mobile terminals after discharge (such as “please thank your spouse for changing your sheets today”). Self-disclosure intervention should break through the traditional psychological counseling model as follows: create an exclusive online community for robotic surgery patients, use VR technology to restore the surgical scene, and help patients safely express the traumatic experience in the virtual environment.

This study has several limitations that warrant consideration. First, all participants were recruited from a single medical institution, resulting in a homogeneous geographical and cultural background that may restrict the generalizability of the findings. Second, postoperative psychological data were collected via cross-sectional surveys, which limits the ability to infer causal relationships between variables. Additionally, potential confounding factors—such as variations in the surgical team’s experience and differences in patients’ preoperative psychological states—may have influenced PTG outcomes. In order to make up for the current limitations, future research should focus on: (1) the intersection field of technical psychology: quantitative analysis of the impact path of interaction design of robotic surgical console interface on patients’ disease cognition. (2) Neural mechanism: fMRI technology was used to detect the functional connectivity changes of default mode network before and after gratitude training, and the neural prediction model of PTG was established. (3) Culturally specific study: the differences in the manifestations of PTG in PCa patients between East Asian and Western cultures were compared. For example, Chinese patients may be more likely to grow through nonverbal means such as calligraphy and gardening, and culturally adapted assessment tools need to be developed. Finally, this study used Harman single factor test to evaluate the bias of the common method, and the first factor interpretation rate (18.7%) was < the critical value of 40%, indicating that the bias of the self-rating scale was controllable. However, it is recommended that future studies include physiological measures (such as cortisol levels) or use diary methods to track dynamic changes.

5. Conclusion

There is a direct relationship between PTG and psychological resilience in patients with UI after PCa, and family income, gratitude, and self-disclosure are independent related factors affecting PTG. In the future, clinical treatment of PCa needs to pay attention to the psychological resilience of patients, and can improve the prognosis of patients’ psychological state through the intervention of patients’ gratitude and self-disclosure, and promote the prognosis of patients’ health.

Author contributions: Conceptualization, QW; methodology, RL; software, RL; validation, QW and RL; formal analysis, YH (Yanan Hu) and YH (Yuqing He); investigation, YH (Yanan Hu) and YH (Yuqing He); resources, YH (Yanan Hu) and YH (Yuqing He); data curation, YH (Yanan Hu) and YH (Yuqing He); writing—original draft preparation, SQ and JC; writing—review and editing, SQ and JC; visualization, QW and JC; supervision, QW and JC; project administration, QW and JC. All authors have read and agreed to the published version of the manuscript.

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Ethical approval: This study was reviewed and approved by Xuzhou Medical University (approval number: XYFY2025-KL247-01).

Informed consent statement: Informed consent was obtained from all subjects and their legal guardians involved in the study.

Conflict of interest: The authors declare no conflict of interest.

References

1. Ning J, Tang X, Shi H, et al. Social support and posttraumatic growth: A meta-analysis. *Journal of Affective Disorders*. 2023; 320: 117–132. doi: 10.1016/j.jad.2022.09.114
2. Carlsson SV, Vickers AJ. Screening for prostate cancer. *Medical Clinics of North America*. 2020; 104(6): 1051–1062. doi: 10.1016/j.mcna.2020.08.007
3. Graham LS, Lin JK, Lage DE, et al. Management of prostate cancer in older adults. *American Society of Clinical Oncology Educational Book*. 2023; 43: e390396. doi: 10.1200/edbk_390396
4. Wang F, Wang C, Xia H, et al. Burden of prostate cancer in China, 1990–2019: Findings from the 2019 global burden of disease study. *Frontiers in Endocrinology*. 2022; 13: 853623. doi: 10.3389/fendo.2022.853623
5. Li JK, Tang T, Zong H, et al. Intelligent medicine in focus: The 5 stages of evolution in robot-assisted surgery for prostate cancer in the past 20 years and future implications. *Military Medical Research*. 2024; 11(1): 58. doi: 10.1186/s40779-024-00566-z
6. Wu X, Wong CH, Gandaglia G, et al. Urinary continence in high-risk prostate cancer after robot-assisted radical prostatectomy. *Current Opinion in Urology*. 2023; 33(6): 482–487. doi: 10.1097/mou.0000000000001127
7. Chen Y, Hao H, Chen S, et al. Insights into urinary incontinence after robot-assisted radical prostatectomy: Urgent urinary incontinence or stress urinary incontinence. *World Journal of Urology*. 2023; 41(12): 3635–3642. doi: 10.1007/s00345-023-04584-9
8. Rosiello G, Gandaglia G, Scuderi S, et al. Reducing the risk of postoperative complications after robot-assisted radical prostatectomy in prostate cancer patients: Results of an audit and feedback intervention following the implementation of prospective data collection. *European Urology Focus*. 2022; 8(2): 431–437. doi: 10.1016/j.euf.2021.03.026
9. Baskin A, Cowan JE, Braun A, et al. Long-term complications and health-related quality of life outcomes after radical prostatectomy with or without subsequent radiation treatment for prostate cancer. *Urologic Oncology*. 2023; 41(10): 429. e9-429.e14. doi: 10.1016/j.urolonc.2023.06.003
10. Chen L, Huang F, Xu W, et al. Effect of individualized peep on perioperative pulmonary complications in elderly patients with prostate cancer undergoing general anesthesia in trendelenburg position: A single-center retrospective study. *Archivos Españoles de Urología*. 2023; 76(5): 319–327. doi: 10.56434/j.arch.esp.urol.20237605.37
11. Franco A, Magno S. The breaking point and post-traumatic growth in breast cancer survivors. *Cancers*. 2023; 15(18): 4441. doi: 10.3390/cancers15184441
12. Karaman IGY, Kacar CY, Dirik G, et al. Posttraumatic stress, posttraumatic growth, and heart rate variability among breast cancer survivors. *Nöro Psikiyatri Arşivi*. 2025; 62(2): 150–155. doi: 10.29399/npa.28713
13. Li RH, Peng HL, Yeh MH, Lou J. Psychological well-being increment as post-traumatic growth in women with breast cancer: A controlled comparison design using propensity score matching. *Healthcare*. 2022; 10(8): 1388. doi: 10.3390/healthcare10081388
14. Demirci A, Hamidi N, Uzel T, et al. The 5-factor modified frailty index is effective in treatment decision and the determination of perioperative complications in patients with localized prostate cancer. *Supportive Care in Cancer*. 2023; 31(10): 603. doi: 10.1007/s00520-023-08078-7
15. Lowrance W, Dreicer R, Jarrard DF, et al. Updates to advanced prostate cancer: AUA/SUO guideline (2023). *Journal of Urology*. 2023; 209(6): 1082–1090. doi: 10.1097/ju.0000000000003452
16. Tilki D, van den Bergh RCN, Briers E, et al. EAU-EANM-ESTRO-ESUR-ISUP-SIOG guidelines on prostate cancer. Part II-2024 update: Treatment of relapsing and metastatic prostate cancer. *European Urology*. 2024; 86(2): 148–163. doi: 10.1016/j.eururo.2024.03.027

17. Ho SMY, Cheng CT, Shih SM, et al. The chinese version of posttraumatic growth and depreciation inventory-expanded version (PTGDI-X) for cancer survivors. *Supportive Care in Cancer*. 2022; 30(1): 237–249. doi: 10.1007/s00520-021-06223-8
18. Wang Y, Xu J, Yang S, et al. Exploratory graph analysis on the connor-davidson resilience scale (cd-risc) among older adults in china. *Scientific Reports*. 2023; 13(1): 19971.
19. Aghababaei N, Akbarilakeh M, Ahmady S, et al. Translation and validation of iranian version of the gratitude at work scale (GAWS). *Journal of Religion and Health*. 2024; 63(5): 3778–3792. doi: 10.1007/s10943-024-02101-9
20. Datta-Barua I, Hauser J. Clinician self-disclosure in palliative care: Describing a taxonomy and proposing a communication tool. *American Journal of Hospice and Palliative Care*. 2023; 40(9): 987–993. doi: 10.1177/10499091231154228
21. Lee SY, Park CL, Laflash S. Perceived posttraumatic growth in cardiac patients: A systematic scoping review. *Journal of Traumatic Stress*. 2022; 35(3): 791–803. doi: 10.1002/jts.22799
22. Yang L, Yang Z, Cheng Y. How fear of COVID-19 promotes posttraumatic growth during COVID-19 epidemic: A moderated mediation model. *Psychological Trauma*. 2024; 16(4): 543–550. doi: 10.1037/tra0001603
23. Tanyi Z, Mirnics Z, Ferenczi A, et al. Cancer as a source of posttraumatic growth: A brief review. *Psychiatria Danubina*. 2020; 32(Suppl 4): 401–411.
24. Baseotto MC, Morris PG, Gillespie DC, et al. Post-traumatic growth and value-directed living after acquired brain injury. *Neuropsychological Rehabilitation*. 2022; 32(1): 84–103. doi: 10.1080/09602011.2020.1798254
25. Manove EE, Poon CYS, Rhodes JE, et al. Changes in psychosocial resources as predictors of posttraumatic growth: A longitudinal study of low-income, female hurricane katrina survivors. *Traumatology*. 2021; 27(4): 346–353. doi: 10.1037/trm0000318.
26. Hong M, Lv S. The current situation and influencing factors of posttraumatic growth in parents of children with autism: A qualitative study. *BMC Psychology*. 2025; 13(1): 646. doi: 10.1186/s40359-025-03059-3
27. Lee Y, You M. Trajectories and influencing factors of post-traumatic stress in disaster-affected people according to their income level: A longitudinal study in South Korea. *Disaster Medicine and Public Health Preparedness*. 2025; 19: e18. doi: 10.1017/dmp.2024.138
28. Confino D, Einav M, Margalit M. Post-traumatic growth: The roles of the sense of entitlement, gratitude and hope. *International Journal of Applied Positive Psychology*. 2023; 27: 1–13. doi: 10.1007/s41042-023-00102-9
29. Kim K, Lee J, Yoon J. Effects of emotional regulation, resilience, and distress disclosure on post-traumatic growth in nursing students. *International Journal of Environmental Research and Public Health*. 2023; 20(4): 2782. doi: 10.3390/ijerph20042782
30. Matsui M, Taku K, Tsutsumi R, et al. Role of peer support in posttraumatic growth among adolescent and young adult cancer patients and survivors. *Journal of Adolescent and Young Adult Oncology*. 2023; 12(4): 503–511.
31. Peng X, Zhao HZ, Yang Y, et al. Post-traumatic growth level and its influencing factors among frontline nurses during the COVID-19 pandemic. *Frontiers in Psychiatry*. 2021; 12: 632360. doi: 10.3389/fpsy.2021.632360
32. Benedetti MG, Tarricone I, Monti M, et al. Psychological well-being, self-esteem, quality of life and gender differences as determinants of post-traumatic growth in long-Term Knee Rotationplasty Survivors: A cohort study. *Children*. 2023; 10(5): 867. doi: 10.3390/children10050867
33. Turner JK, Hutchinson A, Wilson C. Correlates of post-traumatic growth following childhood and adolescent cancer: A systematic review and meta-analysis. *Psychooncology*. 2018; 27(4): 1100–1109. doi: 10.1002/pon.4577