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Fear of Cancer Recurrence as a Mediator Between Illness Perception and Quality of Life Among Prostate Cancer Survivors

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A B S T R A C T

Purpose: This study examined the mediating role of FCR in the association between illness perception and quality of life among prostate cancer survivors attending a selected hospital affiliated with Shahid Beheshti University of Medical Sciences.

Methods and Materials: A cross-sectional analytical study was conducted among 300 prostate cancer survivors. Illness perception was assessed using the Brief Illness Perception Questionnaire, FCR using the Severity subscale of the Fear of Cancer Recurrence Inventory, and quality of life using the EORTC QLQ-C30 Global Health Status/Quality of Life scale. Mediation was tested using PROCESS Model 4 with 10,000 bias-corrected bootstrap resamples while controlling for relevant demographic and clinical variables.

Findings: More threatening illness perceptions significantly predicted greater FCR ($\beta = .51$, $p < .001$) and poorer quality of life ($\beta = -.27$, $p < .001$). Greater FCR was independently associated with poorer quality of life ($\beta = -.43$, $p < .001$). The indirect effect of illness perception on quality of life through FCR was significant ($B = -0.36$, 95% bootstrap CI [−0.49, −0.25]), accounting for approximately 45% of the total association. The adjusted model explained 53% of the variance in quality of life.

Conclusion: FCR partially mediated the relationship between illness perception and quality of life. Assessing and targeting threatening illness representations and recurrence-related fears may improve psychosocial adjustment and quality of life among prostate cancer survivors.

Keywords: *fear of cancer recurrence; illness perception; mediation; prostate cancer; quality of life; survivorship.*

1. Introduction

Cancer remains one of the most consequential global health challenges, imposing substantial burdens on individuals, families, healthcare systems, and societies. Recent international estimates indicate that the global cancer burden continues to increase, with marked variation in incidence and mortality across countries and cancer types. Prostate cancer is among the most frequently diagnosed malignancies in men and constitutes an important component of this growing burden. Advances in early detection, prostate-specific antigen testing, diagnostic imaging, surgery, radiotherapy, hormonal therapy, and other treatment modalities have substantially improved survival for many men with prostate cancer. Consequently, increasing numbers of patients live for years following diagnosis and treatment, shifting attention from mortality and disease control alone toward the long-term physical, psychological, and social consequences of cancer survivorship (Bray et al., 2024). For prostate cancer survivors, successful treatment does not necessarily signify the end of the cancer experience. Persistent treatment-related symptoms, periodic medical surveillance, uncertainty regarding disease progression, changes in sexual and urinary functioning, and concerns about future health may continue to affect everyday life long after primary treatment has been completed.

Within contemporary cancer care, quality of life has therefore become a central indicator of successful survivorship. Quality of life is a multidimensional construct encompassing individuals' perceptions of their physical functioning, emotional well-being, social relationships, role functioning, symptoms, and general health. The European Organisation for Research and Treatment of Cancer developed the EORTC QLQ-C30 to provide a standardized cancer-specific assessment of these dimensions, establishing an internationally influential framework for evaluating functioning, symptoms, and global health status among individuals with cancer (Aaronson et al., 1993). Its Persian-language version has also demonstrated acceptable reliability and validity among Iranian patients with cancer, providing an appropriate foundation for assessing quality of life in Iranian clinical populations (Montazeri et al., 1999). This emphasis on patient-reported quality of life is particularly important in prostate cancer because survivors may experience clinically stable disease while continuing to face psychological distress, concerns regarding recurrence, treatment sequelae, and difficulties resuming valued personal and social roles.

Quality of life among cancer survivors cannot be adequately understood solely through biomedical indicators such as stage, treatment modality, tumor characteristics, or laboratory findings. Psychological interpretations of illness can substantially influence how individuals adapt to chronic and potentially life-threatening health conditions. One of the most important constructs in this regard is illness perception, referring to the cognitive and emotional representations individuals develop regarding their disease. Illness perceptions include beliefs about the consequences and duration of illness, perceived personal and treatment control, symptom identity, understanding or coherence, concern, and emotional responses. The Brief Illness Perception Questionnaire was developed to provide a concise assessment of these major dimensions and has been extensively used in research examining psychological responses to illness (Broadbent et al., 2006). A Persian version has also demonstrated satisfactory psychometric properties, supporting the assessment of illness representations in Iranian populations (Karimi-Ghasemabad et al., 2021).

The relevance of illness perception is grounded in the idea that patients do not respond only to the objective characteristics of disease; they also respond to what the illness means to them. Two individuals with comparable diagnoses and treatment histories may therefore experience substantially different levels of distress and quality of life because they perceive their illnesses differently. A person who understands the condition as controllable, comprehensible, and manageable may respond differently from someone who perceives the same condition as unpredictable, overwhelming, persistent, and highly threatening. Evidence from large cancer-survivor samples indicates that pessimistic and threatening illness perceptions are associated with poorer health-related quality of life, whereas more optimistic and realistic representations are associated with more favorable outcomes (de Rooij et al., 2018). Similarly, research among hematology patients has demonstrated meaningful interrelationships among illness perceptions, health-related quality of life, optimism, and psychosocial experiences, further illustrating the importance of subjective disease representations in adjustment to serious illness (Kiss et al., 2025).

The relationship between illness perception and health outcomes is also evident beyond oncology. Among individuals living with chronic wounds, illness perception

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has been associated with positive psychological well-being and quality of life, emphasizing that the way patients cognitively and emotionally represent persistent health problems can influence adaptation and functioning (Liu et al., 2025). Likewise, research among patients with type 2 diabetes has shown that illness perception is related to self-care and to psychosocial resources including social support, shared decision-making, and self-efficacy (Mohammadi Manesh et al., 2025). These findings suggest that illness perception is embedded within a broader self-regulatory process through which patients interpret threats, evaluate personal resources, make health-related decisions, and engage in coping or self-management behaviors. In cancer survivorship, where uncertainty and future threat may remain salient even when active treatment has ended, these cognitive and emotional representations may be particularly influential.

Prostate cancer research provides further support for this perspective. Illness uncertainty, coping processes, and quality of life have been shown to be interrelated among patients with prostate cancer, indicating that difficulty understanding or predicting illness may compromise psychological adjustment and well-being (Guan et al., 2020). Retrospective and prospective appraisals of prostate cancer have likewise been associated with subsequent quality of life among survivors, suggesting that expectations and interpretations of illness can retain substantial importance years after diagnosis (Maguire et al., 2018). More recently, intervention research has demonstrated that changes in illness perceptions and self-efficacy may contribute to improvements in psychological outcomes among men with localized prostate cancer, supporting the proposition that illness representations are potentially modifiable mechanisms rather than merely static correlates of distress (MacDonald et al., 2024). In the Iranian context specifically, illness perception has been significantly related to quality of life among prostate cancer survivors, with cognitive representations and illness coherence emerging as important components of adjustment (Tajik et al., 2026).

Although illness perception may directly influence quality of life, its effects may also operate through intermediate psychological mechanisms. One particularly important candidate is fear of cancer recurrence (FCR). FCR has been defined as fear, worry, or concern relating to the possibility that cancer may return or progress (Lebel et al., 2016). Some degree of concern about recurrence is understandable following cancer treatment and may encourage adherence to follow-up care. However, when recurrence-related fear becomes persistent, excessive, intrusive, or difficult to regulate, it may involve repetitive worry, heightened monitoring of bodily sensations, reassurance seeking, avoidance, distress around medical examinations, sleep disturbance, difficulty concentrating, and impaired future planning. The Fear of Cancer Recurrence Inventory was developed as a multidimensional instrument to capture the severity, triggers, distress, functional impairment, coping responses, reassurance seeking, and other features of this experience (Simard & Savard, 2009). Its Persian version has also demonstrated satisfactory psychometric characteristics, enabling culturally appropriate assessment of FCR among Iranian cancer populations (Bateni et al., 2019).

FCR has increasingly been recognized as one of the most important psychosocial concerns in cancer survivorship. A meta-analysis of cancer survivors identified numerous correlates of FCR and demonstrated that higher recurrence fear is associated with poorer quality of life and well-being as well as greater anxiety, depression, distress, intrusive thoughts, rumination, avoidance, and fatigue (Zhang et al., 2022). Cognitive formulations propose that FCR develops and persists through interactions among cancer-related cues, threat appraisals, uncertainty, attentional processes, interpretation of bodily sensations, and coping responses (Fardell et al., 2016). Survivors who repeatedly interpret ambiguous symptoms or follow-up procedures as signals of possible recurrence may become increasingly vigilant to cancer-related threats. Such vigilance can strengthen worry and catastrophic anticipation, thereby creating a cycle in which fear is repeatedly reactivated even in the absence of objective evidence of disease progression.

This process may be especially relevant among prostate cancer survivors because post-treatment surveillance itself can repeatedly remind patients of their vulnerability. PSA testing, medical appointments, urinary symptoms, sexual changes, pain, fatigue, and waiting for follow-up results may all acquire recurrence-related meanings. Qualitative evidence from Iranian prostate cancer survivors indicates that uncertainty about complete recovery, concerns regarding PSA results, physical symptoms, and fears that cancer could return or spread are salient features of survivorship. Survivors also employ a range of behavioral, emotional, interpersonal, and spiritual coping strategies to manage these concerns, indicating that FCR is shaped not only by medical circumstances but also by psychological and sociocultural processes (Mardani et al., 2023). These findings underscore the importance of examining FCR

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specifically in Iranian men rather than assuming that recurrence fears identified in other populations operate identically across cultural contexts.

The relationship between FCR and quality of life is particularly important. In prostate cancer survivors, fear of recurrence has emerged as a strong psychological correlate of poorer quality of life even after demographic, treatment-related, physical, and clinical variables are taken into consideration (Maguire et al., 2018). Persistent anticipation of recurrence may compromise quality of life through several pathways. Individuals preoccupied with recurrence may experience increased emotional distress, reduced capacity to enjoy periods of clinical stability, reluctance to establish long-term plans, heightened sensitivity to normal physical sensations, and repeated disruption surrounding follow-up testing. FCR can therefore extend the subjective experience of cancer far beyond active treatment, maintaining a sense of ongoing threat even when objective clinical indicators are reassuring. The growing recognition of its clinical significance is reflected in evidence showing that psychological interventions—including cognitive-behavioral, mindfulness-based, acceptance-oriented, and other approaches—can reduce FCR among cancer patients, although treatment effects vary according to intervention characteristics and patient populations (Wang et al., 2026).

A theoretically plausible pathway therefore exists from illness perception to FCR and subsequently to quality of life. Survivors who perceive cancer as highly consequential, uncontrollable, poorly understood, or emotionally overwhelming may assign greater threat value to the possibility of recurrence. This appraisal can increase monitoring of symptoms and recurrence-related cues and intensify worry about future disease. Greater FCR may then interfere with emotional well-being, social participation, daily functioning, and overall evaluations of health and life. Emerging evidence in other health contexts supports the broader mechanism whereby threatening illness perceptions influence recurrence-related fear through psychological processes. Among myocardial infarction survivors, illness perceptions have been associated with fear of recurrence, with psychological flexibility functioning as an important mediating mechanism (Wang et al., 2025). Such findings indicate that recurrence fear is not exclusive to oncology and may represent a broader response to illnesses perceived as serious, uncertain, and potentially recurring.

More direct evidence is now emerging in cancer populations. Among patients with gastrointestinal cancer, illness perception has been linked to FCR through sequential psychological pathways involving psychological flexibility and maladaptive cognitive emotion regulation (Cai et al., 2026). This finding is particularly important because it illustrates that threatening illness representations may not simply coexist with recurrence fear; rather, they may contribute to psychological processes through which FCR becomes intensified. Together with evidence linking illness perception to quality of life and FCR to poorer survivorship outcomes, these results provide a strong basis for examining whether FCR statistically explains part of the relationship between illness perceptions and quality of life in prostate cancer survivors.

Such a mediation model has both theoretical and clinical relevance. If FCR carries a meaningful proportion of the association between illness perception and quality of life, then threatening illness perceptions may constitute an upstream cognitive-emotional vulnerability, while recurrence fear may represent a more proximal mechanism affecting survivors' day-to-day well-being. This distinction could improve psychosocial assessment and intervention planning. Clinicians could identify survivors who perceive their cancer as especially threatening and subsequently evaluate whether these representations are accompanied by clinically meaningful FCR. Interventions could then combine education aimed at improving illness coherence and realistic perceptions of control with strategies designed to reduce catastrophic interpretations, repetitive worry, maladaptive monitoring, and intolerance of uncertainty. The effectiveness of contemporary psychological interventions for FCR suggests that this mechanism is clinically actionable rather than simply descriptive (Wang et al., 2026).

Despite accumulating evidence concerning these individual relationships, important gaps remain. Previous studies have often examined illness perception and quality of life, or FCR and quality of life, as separate associations. Research among Iranian prostate cancer survivors has demonstrated a relationship between illness perception and quality of life (Tajik et al., 2026), while qualitative evidence has independently documented the salience of recurrence-related fears in this population (Mardani et al., 2023). However, considerably less is known about whether these constructs form an integrated psychological pathway in which threatening illness perceptions are associated with poorer quality of life partly because they are accompanied by stronger FCR. Testing such an indirect pathway requires an explicit mediation framework rather than relying solely on separate correlations or regression coefficients. Methodological research has emphasized that indirect

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effects should be evaluated with adequate statistical power and appropriate methods because the magnitude and sampling distribution of mediated effects differ from those of simple direct associations (Fritz & MacKinnon, 2007; Schoemann et al., 2017).

Clarifying this pathway is particularly important for prostate cancer survivorship because objective clinical stability does not necessarily correspond to psychological recovery. Men with similar stages, treatments, and follow-up findings may differ substantially in quality of life depending on how they interpret their illness and the extent to which those interpretations generate persistent concerns about recurrence. Integrating illness perception, FCR, and quality of life within a single explanatory model may therefore provide a more comprehensive account of survivorship than focusing on clinical variables or isolated psychological symptoms alone. It may also help identify modifiable psychosocial targets that can be incorporated into nursing assessment, psycho-oncology services, patient education, follow-up care, and survivorship interventions.

Accordingly, the present study aimed to examine the mediating role of fear of cancer recurrence in the relationship between illness perception and quality of life among prostate cancer survivors.

2. Methods and Materials

2.1. Study Design and Participants

This study was designed as a cross-sectional analytical study to examine the mediating role of fear of cancer recurrence in the association between illness perception and quality of life among prostate cancer survivors. The study was conducted among patients attending the urology and oncology follow-up clinics of a selected teaching hospital affiliated with Shahid Beheshti University of Medical Sciences, Tehran, Iran, between January 2025 and May 2025.

The target population consisted of adult men with a documented history of prostate cancer who were attending routine post-treatment follow-up appointments. A prostate cancer survivor was operationally defined as an individual with histologically confirmed prostate cancer who had completed primary curative-intent treatment at least six months before enrollment and had no documented evidence of active recurrence or disease progression at the time of assessment.

Participants were eligible if they met the following inclusion criteria: (a) age 18 years or older; (b) histopathologically confirmed prostate cancer; (c) completion of primary treatment, including radical prostatectomy, radiotherapy, or combined treatment, at least six months previously; (d) no documented evidence of local recurrence, biochemical progression requiring a new cancer-directed treatment, or distant metastasis at the time of recruitment; (e) ability to communicate in Persian; (f) sufficient physical and cognitive ability to complete the questionnaires; and (g) provision of written informed consent.

Patients were excluded if they had a current diagnosis of another active malignancy, documented severe cognitive impairment, an acute medical condition requiring immediate hospitalization, a severe psychiatric disorder that substantially interfered with questionnaire completion, or incomplete questionnaires with more than 10% missing data. Patients receiving maintenance androgen-deprivation therapy were not automatically excluded provided that there was no documented evidence of current cancer progression.

The sample size was determined with particular consideration of the primary mediation analysis. Simulation and methodological studies indicate that adequate power for indirect-effect testing depends on the magnitude of both constituent paths and that bootstrap-based mediation testing generally requires larger samples when the expected effects are small to moderate (Fritz & MacKinnon, 2007; Schoemann et al., 2017). A conservative target of 300 analyzable participants was therefore selected to provide sufficient precision for estimation of the direct and indirect effects while allowing adjustment for relevant demographic and clinical covariates. To compensate for incomplete questionnaires and nonparticipation, approximately 330 eligible survivors were planned to be approached.

Participants were recruited using consecutive sampling. During the study period, all potentially eligible prostate cancer survivors attending the selected outpatient clinics were screened according to the inclusion and exclusion criteria. A trained research assistant reviewed clinic lists and, in collaboration with the treating urologist or oncology team, identified potentially eligible participants. Clinical eligibility was verified through medical records before enrollment. Eligible patients were approached consecutively until the required sample size was achieved. The clinical care team was not informed of participants' individual psychological questionnaire scores unless a participant explicitly requested assistance or the assessment revealed an immediate concern requiring referral according to the study safety protocol.

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After ethical and administrative approval had been obtained, potentially eligible patients were identified during scheduled outpatient visits. Following confirmation of clinical eligibility, the researcher explained the purpose and procedures of the study and emphasized that participation was voluntary and unrelated to treatment decisions. Participants who agreed to participate signed a written informed consent form. Questionnaires were completed in a quiet area of the outpatient clinic before or after the clinical appointment. Participants were asked to respond according to their experiences during the relevant period specified by each instrument.

For participants who had difficulty reading because of visual impairment or limited literacy, a trained research assistant administered the questionnaires using a standardized interview format and read each item exactly as written without interpretation or prompting. The mode of administration was recorded and examined in sensitivity analyses if a substantial proportion of questionnaires required interviewer administration. Completion of the questionnaire package was expected to require approximately 20–30 minutes. Medical information, including treatment history, tumor characteristics, and the most recent PSA results, was subsequently extracted from electronic or paper medical records using a standardized clinical data form. Each participant was assigned a unique numerical study code. Psychological questionnaire forms and clinical information were linked only through this code.

Several procedures were implemented to reduce potential measurement and selection bias. Consecutive recruitment was used to reduce discretionary participant selection. Clinical variables were verified from medical records rather than relying exclusively on patient recall. All research assistants received standardized training in recruitment, informed consent, questionnaire administration, and data entry. Treating physicians were not present while participants completed the psychological questionnaires to reduce social desirability and perceived pressure.

Data were entered independently and subjected to range and consistency checks. A random sample of entered records was compared with the original questionnaires to identify possible transcription errors. Because all major study constructs were assessed using self-report questionnaires, procedural strategies were used to limit common-method bias, including assurances of confidentiality, separation of questionnaire sections, neutral instructions, and use of instruments with different response formats.

2.2. Data Collection Tools

A researcher-developed demographic and clinical information form was used to collect potential covariates and describe the sample. Demographic variables included age, marital status, educational level, employment status, place of residence, perceived economic status, and health insurance status. Clinical information was obtained from both participants and medical records and included age at cancer diagnosis, time since diagnosis, time since completion of primary treatment, cancer stage at diagnosis, Gleason score or International Society of Urological Pathology Grade Group when available, treatment modality, history of radical prostatectomy, radiotherapy, androgen-deprivation therapy, current hormonal treatment, most recent prostate-specific antigen level, time since the most recent PSA test, presence of chronic medical comorbidities, and family history of cancer. Treatment modality was categorized as radical prostatectomy, radiotherapy, combined treatment, or other clinically relevant treatment. The Charlson-type comorbidity information or number of physician-diagnosed chronic conditions was also recorded to permit adjustment for general health burden.

Illness perception was assessed using the Brief Illness Perception Questionnaire (B-IPQ), developed by Broadbent et al. (2006). The B-IPQ is a nine-item self-report instrument designed to provide a rapid assessment of cognitive and emotional representations of illness. Eight items are rated on 0–10 numerical scales and assess perceived consequences, timeline, personal control, treatment control, symptom identity, concern, illness coherence, and emotional representation. The ninth item is an open-ended question asking respondents to identify the three factors they believe are the most important causes of their illness (Broadbent et al., 2006). For the quantitative illness-threat score, positively worded control and coherence items were reverse scored so that higher total scores represented a more threatening or negative perception of prostate cancer. The eight quantitative items yielded a possible score range of 0–80. The causal item was analyzed descriptively and was not included in the total score.

The Persian version of the B-IPQ has demonstrated satisfactory psychometric properties, including good internal consistency and test–retest reliability in Iranian populations. Karimi-Ghasemabad et al. (2021) reported Cronbach's alpha and intraclass correlation coefficients of .90 for the Persian version. Because previous Persian psychometric studies were conducted primarily in chronic

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pain populations rather than prostate cancer survivors, reliability was re-estimated in the present sample.

Fear of cancer recurrence was assessed using the Persian version of the Fear of Cancer Recurrence Inventory (FCRI). The original FCRI was developed by Simard and Savard (2009) as a multidimensional instrument specifically designed to assess fear that cancer may return or progress. The complete questionnaire consists of 42 items organized into seven domains: triggers, severity, psychological distress, coping strategies, functional impairment, insight, and reassurance. Items are rated primarily on five-point response scales ranging from 0 to 4 (Simard & Savard, 2009). The nine-item Severity subscale was specified a priori as the primary mediator in the present study. This decision was made because the Severity dimension assesses the core intensity and frequency of recurrence-related fear while avoiding unnecessary conceptual overlap between the FCRI functional-impairment domain and the quality-of-life outcome. Higher Severity scores indicate greater fear of cancer recurrence. The full FCRI was nevertheless administered to preserve the multidimensional clinical information provided by the instrument, and its total and subscale scores were used for descriptive and supplementary analyses. A Persian version of the FCRI was translated and psychometrically evaluated by Bateni et al. (2019). Their validation study supported the factor structure of the Persian instrument and reported good internal consistency and excellent test–retest reliability. In that study, Cronbach's alpha was .86 and the intraclass correlation coefficient was .96. Internal consistency of the Severity subscale and the full scale was recalculated in the present prostate cancer sample.

Health-related quality of life was assessed using the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30). The QLQ-C30 is a 30-item cancer-specific instrument developed to assess multiple aspects of health-related quality of life among individuals with cancer. The instrument includes five functioning scales—physical, role, emotional, cognitive, and social functioning—three multi-item symptom scales assessing fatigue, pain, and nausea/vomiting, several single-item symptom measures, and a two-item Global Health Status/Quality of Life scale. Scores are linearly transformed to a 0–100 scale according to EORTC scoring procedures. Higher functioning and global health status scores represent better functioning or quality of life, whereas higher symptom scores indicate greater symptom burden (Aaronson et al., 1993). The Global Health Status/Quality of Life score was specified as the primary outcome variable in the mediation analysis. Functional and symptom scales were examined as secondary descriptive outcomes. The Persian version of the EORTC QLQ-C30 has been formally translated and validated among Iranian patients with cancer. Montazeri et al. (1999) reported evidence supporting its acceptability, reliability, construct validity, and ability to differentiate patient groups according to clinical status.

2.3. Data Analysis

Data were analyzed using IBM SPSS Statistics version 29.0. Mediation analysis was conducted using the PROCESS macro, Model 4. All statistical tests were two-sided, and the significance level was set at $p < .05$.

Data-entry accuracy, missing values, score distributions, influential observations, and assumptions relevant to regression analysis were examined before hypothesis testing. Questionnaires with more than 10% missing responses were excluded. Scale scores were calculated according to the scoring instructions of the respective instruments. For the EORTC QLQ-C30, missing responses were managed according to EORTC scale-scoring procedures. Cases without sufficient information to calculate the primary predictor, mediator, or outcome were excluded from the corresponding mediation analysis. Continuous variables were examined using means, standard deviations, medians, ranges, skewness, and kurtosis. Categorical variables were summarized using frequencies and percentages. Histograms, Q-Q plots, and standardized residuals were examined to evaluate distributional characteristics.

Potential influential observations were assessed using standardized residuals, leverage values, Cook's distance, and Mahalanobis distance where appropriate. Linearity and homoscedasticity were examined graphically. Multicollinearity was evaluated using tolerance and variance inflation factor values. VIF values below 5 and tolerance values greater than .20 were considered evidence against problematic multicollinearity.

Internal consistency was assessed for the FCRI Severity subscale, the full FCRI, and relevant multi-item EORTC QLQ-C30 scales using Cronbach's alpha. McDonald's omega was additionally calculated where appropriate. Coefficients of .70 or higher were regarded as acceptable for group-level research. The reliability of the B-IPQ composite threat score was also examined, although its coefficient was interpreted cautiously because the instrument intentionally

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samples several distinct dimensions of illness representation rather than redundant indicators of a single narrow construct.

Mean scores and standard deviations were calculated for illness perception, fear of cancer recurrence, and quality of life. Differences in the primary variables across categorical demographic and clinical groups were initially examined using independent-samples t tests or one-way analysis of variance, where appropriate. Pearson correlation coefficients were calculated to examine bivariate relationships among the B-IPQ illness-threat score, FCRI Severity score, and EORTC Global Health Status/Quality of Life score. Spearman correlations were used when assumptions for Pearson correlation were substantially violated. Relationships between the principal study variables and continuous clinical characteristics, including age, time since diagnosis, time since treatment, and PSA-related variables, were also examined.

Covariates were specified primarily on theoretical and clinical grounds rather than being selected exclusively according to univariate p values. The adjusted mediation model included variables that could plausibly influence both psychological adaptation and quality of life. The principal covariates were age, educational level, time since prostate cancer diagnosis, treatment modality, cancer stage at diagnosis, current androgen-deprivation therapy, and comorbidity burden. Treatment modality was entered using dummy variables. Additional sensitivity analyses examined whether adjustment for marital status, employment status, Gleason Grade Group, and the most recent PSA level materially altered the indirect effect. Highly collinear clinical variables were not entered simultaneously.

The hypothesized mediation model examined whether fear of cancer recurrence statistically mediated the association between illness perception and quality of life. Illness perception, represented by the B-IPQ threat score, was entered as the independent variable (X). Fear of cancer recurrence, represented by the FCRI Severity score, was entered as the mediator (M). Global Health Status/Quality of Life from the EORTC QLQ-C30 was entered as the dependent variable (Y).

The following effects were estimated:

- **Path a:** the association between illness perception and fear of cancer recurrence;
- **Path b:** the association between fear of cancer recurrence and quality of life while controlling for illness perception;
- **Total effect (c):** the association between illness perception and quality of life before inclusion of the mediator;
- **Direct effect (c′):** the association between illness perception and quality of life after fear of cancer recurrence was included in the model; and
- **Indirect effect (ab):** the portion of the association between illness perception and quality of life statistically transmitted through fear of cancer recurrence.

The indirect effect was evaluated using bias-corrected bootstrap confidence intervals based on 10,000 resamples. Bootstrapping was selected because the sampling distribution of an indirect effect is commonly non-normal and bootstrap confidence intervals provide a more appropriate basis for inference than reliance on the Sobel test alone (Fritz & MacKinnon, 2007; Schoemann et al., 2017).

The indirect effect was considered statistically significant when its 95% bootstrap confidence interval did not include zero. Unstandardized coefficients, standardized coefficients, standard errors, p values, and 95% confidence intervals were reported. The presence of a significant indirect effect did not require a statistically significant total effect. The direct and indirect effects were interpreted separately rather than relying solely on the traditional distinction between “full” and “partial” mediation.

An unadjusted mediation model was first estimated, followed by the prespecified adjusted model containing demographic and clinical covariates. The proportion mediated was calculated only when the total and indirect effects were in the same direction and when such a ratio produced a meaningful interpretation. Because temporal precedence cannot be demonstrated with cross-sectional data, the mediation findings were described as evidence of an indirect statistical association consistent with the hypothesized model and were not interpreted as proof that illness perceptions causally produce changes in quality of life through fear of recurrence.

Several sensitivity analyses were planned to evaluate the robustness of the primary findings. First, the mediation model was repeated after excluding participants with extreme influential values. Second, models with and without clinical covariate adjustment were compared. Third, the association of individual B-IPQ dimensions with FCR and quality of life was explored to determine whether consequences, personal control, treatment control, concern, illness coherence, or emotional representation showed particularly strong relationships with the mediator or

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outcome. Finally, analyses were repeated after stratification by major treatment category when subgroup sample sizes were sufficient. Because these analyses were secondary and exploratory, their results were interpreted cautiously.

3. Findings and Results

A total of 327 potentially eligible prostate cancer survivors were approached during the recruitment period. Of these, 312 agreed to participate and provided written informed consent, yielding a participation rate of 95.4%. Twelve participants were excluded from the final analyses: seven because more than 10% of questionnaire responses were missing, three because subsequent medical-record review indicated evidence of active disease progression, and two because they discontinued questionnaire completion. The final analytical sample therefore consisted of 300 prostate cancer survivors.

Among retained questionnaires, the overall item-level missingness was 0.9%. Missing responses within individual instruments were handled according to the relevant scoring guidelines. All 300 participants had calculable scores for the primary predictor, mediator, and outcome variables. Preliminary examination indicated no serious violation of regression assumptions. Absolute skewness values ranged from 0.18 to 0.44 and absolute kurtosis values ranged from 0.21 to 0.63 for the three primary study variables. Visual inspection of histograms and Q-Q plots supported approximate normality. Standardized residuals showed no substantial heteroscedasticity, and relationships among continuous predictors were approximately linear. Variance inflation factors ranged from 1.08 to 2.21 and tolerance values ranged from .45 to .93, indicating no problematic multicollinearity. Three potentially influential observations were identified; however, the maximum Cook's distance was .14, and sensitivity analyses excluding these observations produced virtually unchanged estimates. Therefore, all eligible observations were retained.

Participants had a mean age of 67.31 years (SD = 7.42, range = 49–82). The mean time since prostate cancer diagnosis was 3.84 years (SD = 2.36), and the mean time since completion of primary treatment was 3.12 years (SD = 2.07). Most participants were married (86.0%) and had been diagnosed with localized disease (76.3%). Radical prostatectomy was the most frequent primary treatment modality (51.0%), followed by radiotherapy (27.0%) and combined treatment (18.0%). Approximately one quarter of participants (24.0%) were receiving androgen-deprivation therapy at the time of assessment.

Table 1

Demographic and Clinical Characteristics of the Study Sample

Characteristic	Category	*n*	%
Marital status	Married	258	86.0
	Single/widowed/divorced	42	14.0
Educational level	Less than high school diploma	107	35.7
	High school diploma	104	34.7
	University education	89	29.7
Employment status	Employed	82	27.3
	Retired	190	63.3
	Unemployed/other	28	9.3
Disease stage at diagnosis	Localized	229	76.3
	Locally advanced	71	23.7
Primary treatment	Radical prostatectomy	153	51.0
	Radiotherapy	81	27.0
	Combined treatment	54	18.0
	Other	12	4.0
Current androgen-deprivation therapy	Yes	72	24.0
	No	228	76.0
Comorbidity burden	None	84	28.0
	One chronic condition	109	36.3
	Two or more conditions	107	35.7
Family history of cancer	Yes	94	31.3
	No	206	68.7

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The mean B-IPQ illness-threat score was 43.62 (SD = 11.28), indicating considerable variability in participants' cognitive and emotional representations of prostate cancer. The mean FCRI Severity score was 15.84 (SD = 6.91), while the mean total FCRI score was 60.47 (SD = 19.32). The mean EORTC Global Health Status/Quality of Life score was 67.83 (SD = 18.76). Internal consistency was satisfactory for all principal measures. Cronbach's alpha was .81 for the B-IPQ illness-threat composite, .89 for the FCRI Severity subscale, .93 for the full FCRI, and .85 for the EORTC Global Health Status/Quality of Life scale. McDonald's omega coefficients were similar.

Table 2

Descriptive Statistics and Internal Consistency of the Main Study Variables

Measure	*M*	*SD*	α	ω
B-IPQ illness-threat score	43.62	11.28	.81	.82
FCRI Severity	15.84	6.91	.89	.90
FCRI total score	60.47	19.32	.93	.94
EORTC Global QoL	67.83	18.76	.85	.86

Among EORTC QLQ-C30 functioning dimensions, cognitive functioning showed the highest mean score, whereas emotional functioning showed the lowest. Fatigue was the most prominent multi-item symptom.

Table 3

Descriptive Statistics for EORTC QLQ-C30 Functioning and Symptom Scales

EORTC QLQ-C30 Scale	*M*	*SD*
Physical functioning	76.24	18.31
Role functioning	73.86	23.94
Emotional functioning	70.41	20.83
Cognitive functioning	81.07	18.42
Social functioning	78.52	21.46
Fatigue	27.63	20.14
Pain	21.17	23.88
Nausea/vomiting	6.44	12.91

As hypothesized, a more threatening illness perception was strongly associated with greater fear of cancer recurrence, r = .58, p < .001. Illness perception was also negatively associated with global quality of life, r = −.49, p < .001. Fear of cancer recurrence showed the strongest bivariate association with quality of life, r = −.60, p < .001, indicating that survivors reporting greater recurrence-related fear also reported substantially poorer global health and quality of life.

Table 4

Means, Standard Deviations, and Correlations Among the Primary Study Variables

Variable	1	2	3
1. Illness perception	—		
2. Fear of cancer recurrence	.58***	—	
3. Global quality of life	−.49***	−.60***	—
M	43.62	15.84	67.83
SD	11.28	6.91	18.76

Age was weakly and negatively associated with FCR, $r = -.14$, $p = .016$, suggesting somewhat greater recurrence fear among younger survivors. Time since diagnosis was also negatively related to FCR, $r = -.15$, $p = .009$. Neither variable showed a substantial correlation with global quality of life. Greater comorbidity burden was associated with more threatening illness perceptions, $r = .17$, $p = .003$, greater FCR, $r = .19$, $p = .001$, and poorer quality of life, $r =$

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−.29, $p < .001$. Current androgen-deprivation therapy was positively associated with FCR, $r$pb = .18, $p = .002$, and negatively associated with quality of life, $r$pb = −.22, $p < .001$.

Participants currently receiving androgen-deprivation therapy reported significantly higher FCR scores ($M = 17.64$, $SD = 6.87$) than participants not receiving androgen-deprivation therapy ($M = 15.27$, $SD = 6.85$), $t(298) = 2.56$, $p = .011$, Cohen's $d = 0.35$. Quality of life was also significantly poorer among participants receiving androgen-deprivation therapy ($M = 61.94$, $SD = 19.46$) compared with those not currently receiving it ($M = 69.69$, $SD = 18.13$), $t(298) = −3.12$, $p = .002$, $d = 0.42$. Quality of life differed significantly according to comorbidity burden, $F(2, 297) = 14.21$, $p < .001$, $\eta^2 = .087$. Participants without major comorbidities reported the highest quality of life ($M = 74.02$, $SD = 17.12$), followed by those with one comorbid condition ($M = 68.82$, $SD = 17.89$) and those with two or more conditions ($M = 61.94$, $SD = 19.04$). No statistically significant difference in illness perception was observed across primary treatment categories, $F(3, 296) = 1.37$, $p = .252$. Differences in FCR across treatment modalities were also nonsignificant after adjustment for multiple comparisons.

The primary hypothesis proposed that fear of cancer recurrence would mediate the association between illness perception and quality of life. Mediation was tested using PROCESS Model 4 with 10,000 bias-corrected bootstrap resamples. The first regression equation examined the association between illness perception and FCR. After adjustment for age, education, time since diagnosis, primary treatment modality, disease stage, current androgen-deprivation therapy, and comorbidity burden, a more threatening illness perception significantly predicted greater FCR, $B = 0.31$, $SE = 0.03$, $\beta = .51$, $t = 10.33$, $p < .001$, 95% CI [0.25, 0.37]. The mediator model explained 39% of the variance in FCR, $R^2 = .39$, $F(10, 289) = 18.48$, $p < .001$. Current androgen-deprivation therapy and greater comorbidity burden were also independently associated with greater FCR.

In the outcome model, FCR remained a significant negative predictor of global quality of life after illness perception and all covariates were controlled, $B = −1.16$, $SE = 0.15$, $\beta = −.43$, $t = −7.73$, $p < .001$, 95% CI [−1.46, −0.87]. Illness perception also retained a significant direct association with quality of life after FCR was entered into the model, $B = −0.44$, $SE = 0.09$, $\beta = −.27$, $t = −4.89$, $p < .001$, 95% CI [−0.62, −0.26]. Thus, both more threatening illness perceptions and greater FCR were independently associated with poorer quality of life. The complete outcome model explained approximately 53% of the variance in global quality of life, $R^2 = .53$, $F(11, 288) = 29.52$, $p < .001$. Current androgen-deprivation therapy, $B = −4.61$, $SE = 1.92$, $p = .017$, and greater comorbidity burden, $B = −3.58$, $SE = 0.95$, $p < .001$, were additionally associated with poorer quality of life.

Table 5

Adjusted Regression Models for Fear of Cancer Recurrence and Global Quality of Life

Predictor	*B*	*SE*	β	*t*	*p*	95% CI
Outcome: FCRI Severity						
Illness perception	0.31	0.03	.51	10.33	<.001	[0.25, 0.37]
Age	−0.08	0.05	−.08	−1.60	.111	[−0.18, 0.02]
Education	−0.44	0.33	−.07	−1.33	.185	[−1.09, 0.21]
Time since diagnosis	−0.19	0.11	−.07	−1.73	.085	[−0.41, 0.03]
Locally advanced disease	1.43	0.82	.09	1.74	.083	[−0.18, 3.04]
Current ADT	1.92	0.72	.12	2.67	.008	[0.50, 3.34]
Comorbidity burden	0.84	0.35	.11	2.40	.017	[0.15, 1.53]
Outcome: Global quality of life						
Illness perception	−0.44	0.09	−.27	−4.89	<.001	[−0.62, −0.26]
FCRI Severity	−1.16	0.15	−.43	−7.73	<.001	[−1.46, −0.87]
Age	0.11	0.12	.04	0.92	.359	[−0.13, 0.35]
Education	1.08	0.72	.06	1.50	.135	[−0.34, 2.50]
Time since diagnosis	0.28	0.31	.04	0.90	.369	[−0.33, 0.89]
Locally advanced disease	−2.34	2.07	−.05	−1.13	.259	[−6.41, 1.73]
Current ADT	−4.61	1.92	−.10	−2.40	.017	[−8.39, −0.83]
Comorbidity burden	−3.58	0.95	−.16	−3.77	<.001	[−5.45, −1.71]

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Before FCR was entered into the model, illness perception had a significant total effect on quality of life, $B = -0.80$, $SE = 0.09$, $\beta = -.48$, $t = -8.89$, $p < .001$, 95% CI [−0.98, −0.62]. Thus, each one-point increase in the B-IPQ illness-threat score was associated with an estimated 0.80-point reduction in global quality-of-life score after adjustment for the prespecified covariates. After FCR was included, the direct effect decreased to $B = -0.44$, indicating attenuation of the illness perception–quality of life association. The estimated indirect effect through FCR was −0.36, bootstrapped $SE = 0.06$, 95% bootstrap CI [−0.49, −0.25]. Because the confidence interval did not include zero, the indirect effect was statistically significant. Approximately 45% of the total statistical association between illness perception and quality of life was accounted for by the indirect pathway through FCR.

Table 6

Total, Direct, and Indirect Effects of Illness Perception on Quality of Life Through Fear of Cancer Recurrence

Effect	*B*	Bootstrapped *SE*	95% CI	*p*
Total effect (*c*)	−0.80	0.09	[−0.98, −0.62]	<.001
Direct effect (*c′*)	−0.44	0.09	[−0.62, −0.26]	<.001
Indirect effect (*ab*)	−0.36	0.06	[−0.49, −0.25]	—

A statistically significant indirect effect is indicated when the bootstrap confidence interval does not include zero. The standardized mediation pathways were: Illness perception → FCR: $\beta = .51$, $p < .001$; FCR → quality of life: $\beta = -.43$, $p < .001$; Illness perception → quality of life, controlling for FCR: $\beta = -.27$, $p < .001$; Total standardized association between illness perception and quality of life: $\beta = -.48$, $p < .001$. These findings were consistent with a partial statistical mediation model, in which more threatening illness perceptions were associated with poorer quality of life both directly and indirectly through greater fear of cancer recurrence.

The indirect effect was also statistically significant in the unadjusted model, $B = -0.43$, bootstrap $SE = 0.06$, 95% CI [−0.55, −0.32]. After adjustment for demographic and clinical variables, the indirect effect decreased modestly to −0.36 but remained statistically significant, indicating that the mediating association could not be explained solely by age, disease characteristics, treatment modality, androgen-deprivation therapy, or comorbidity burden.

Table 7

Comparison of Unadjusted and Adjusted Mediation Models

Model	Path *a*	Path *b*	Direct Effect *c′*	Indirect Effect *ab*	95% Bootstrap CI
Unadjusted	0.35***	−1.23***	−0.37***	−0.43	[−0.55, −0.32]
Adjusted	0.31***	−1.16***	−0.44***	−0.36	[−0.49, −0.25]

Exploratory analyses were conducted to determine which dimensions of illness perception showed the strongest relationships with FCR and quality of life. The emotional representation and concern dimensions demonstrated the strongest positive correlations with FCR, $r = .64$ and $r = .61$, respectively, both $ps < .001$. Perceived consequences also showed a moderate association with FCR, $r = .46$, $p < .001$. Poorer global quality of life was most strongly associated with greater emotional representation, perceived consequences, symptom identity, and illness-related concern.

Table 8

Correlations of B-IPQ Dimensions With Fear of Cancer Recurrence and Global Quality of Life

B-IPQ Dimension	FCRI Severity	Global QoL
Consequences	.46***	−.49***
Timeline	.31***	−.25***
Personal control†	.38***	−.35***
Treatment control†	.27***	−.30***
Identity	.39***	−.41***

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Concern	.61***	−.42***
Illness coherence†	.29***	−.33***
Emotional representation	.64***	−.50***

The pattern suggested that emotional and threat-related representations of prostate cancer were particularly important in recurrence-related fear, whereas perceived consequences and emotional responses were most closely related to global quality of life.

The robustness of the mediation effect was examined in several sensitivity analyses. First, exclusion of the three observations identified as potentially influential produced an indirect effect of $B = -0.35$, 95% bootstrap CI [−0.48, −0.24], which was nearly identical to the primary estimate. Second, additional adjustment for marital status, employment status, Gleason Grade Group, and the most recent PSA level did not materially alter the indirect effect, $B = -0.34$, 95% bootstrap CI [−0.47, −0.23].

Third, when the full FCRI total score rather than the Severity subscale was entered as the mediator, the indirect effect remained statistically significant. However, this analysis was considered supplementary because the full FCRI includes a functional-impairment domain that conceptually overlaps with quality of life. Finally, exploratory analyses conducted separately among participants treated primarily with radical prostatectomy and radiotherapy showed indirect effects in the same direction as the full-sample model. No evidence suggested that the main mediation finding was dependent on a single treatment subgroup.

4. Discussion and Conclusion

The present study examined the mediating role of fear of cancer recurrence (FCR) in the relationship between illness perception and quality of life among prostate cancer survivors. The findings supported the proposed model. More threatening illness perceptions were significantly associated with greater FCR ($\beta = .51$, $p < .001$) and poorer global quality of life, while greater FCR independently predicted poorer quality of life ($\beta = -.43$, $p < .001$). Illness perception also retained a significant direct association with quality of life after FCR was introduced into the model ($\beta = -.27$, $p < .001$). Most importantly, the indirect effect of illness perception on quality of life through FCR was statistically significant (B = −0.36, 95% bootstrap CI [−0.49, −0.25]), accounting for approximately 45% of the total association. The adjusted model explained 53% of the variance in global quality of life. Collectively, these findings indicate that prostate cancer survivors' quality of life is related not only to how threatening they perceive their illness to be but also to the extent to which these perceptions are accompanied by persistent fear that cancer may return.

The first major finding was that a more threatening perception of prostate cancer was associated with poorer quality of life. Survivors who viewed their illness as more consequential, emotionally distressing, persistent, symptomatic, or difficult to control tended to report poorer global health and quality of life. This finding is consistent with previous evidence suggesting that patients' subjective representations of illness can influence their adaptation independently of the objective medical characteristics of the disease. In a large population-based sample of cancer survivors, pessimistic illness perceptions were associated with poorer quality of life, whereas more optimistic and realistic representations corresponded with more favorable outcomes (de Rooij et al., 2018). Similarly, research among hematology patients has demonstrated meaningful relationships between illness perception and health-related quality of life, suggesting that perceptions of disease severity, manageability, and personal consequences are important components of adjustment to serious illness (Kiss et al., 2025). Evidence from other chronic conditions has likewise shown that illness perception is linked to psychological well-being and quality of life (Liu et al., 2025). Thus, the present results reinforce the broader proposition that patients respond not simply to disease itself, but also to the meanings and expectations they attach to it.

The finding is particularly consistent with prostate cancer-specific evidence. Tajik et al. demonstrated a significant relationship between illness perception and quality of life among prostate cancer survivors, emphasizing the importance of cognitive illness representations and illness coherence in survivors' adjustment (Tajik et al., 2026). Maguire et al. similarly showed that survivors' appraisals of prostate cancer were associated with quality-of-life outcomes, indicating that expectations and interpretations concerning illness may continue to influence well-being well beyond the acute treatment period (Maguire et al., 2018). Moreover, illness uncertainty has been associated with poorer physical and mental quality of life among patients with prostate cancer, with coping processes helping to account for this relationship (Guan et al., 2020).

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The current findings extend this literature by demonstrating that the association between illness perception and quality of life persists even after accounting for FCR and relevant clinical and demographic factors. One possible explanation is that threatening illness representations can influence multiple aspects of survivorship, including emotional reactions, interpretation of bodily symptoms, confidence in disease management, coping behaviors, and expectations regarding future health.

The second major finding was that threatening illness perceptions were strongly associated with greater FCR. The standardized coefficient of .51 indicated a substantial relationship even after adjustment for age, education, time since diagnosis, cancer stage, treatment modality, current androgen-deprivation therapy, and comorbidity burden. This finding can be understood in terms of the way illness representations shape threat appraisal. When survivors understand prostate cancer as severe, unpredictable, poorly controllable, or emotionally overwhelming, ordinary bodily changes, follow-up examinations, and PSA monitoring may acquire greater threat significance. Fardell et al. proposed that FCR can be maintained through cognitive processes involving threatening interpretations of cancer-related cues, heightened attention to bodily sensations, repetitive worry, and maladaptive efforts to obtain certainty (Fardell et al., 2016). Therefore, negative illness representations may provide a cognitive context in which ambiguous health-related information is more readily interpreted as evidence of possible recurrence.

Recent evidence provides additional support for this interpretation. Cai et al. found that illness perception was related to FCR among patients with gastrointestinal cancer and identified psychological flexibility and maladaptive cognitive emotion regulation as sequential mechanisms within this relationship (Cai et al., 2026). Although the clinical population differed from that of the present study, the findings support the broader idea that perceptions of illness can initiate psychological processes that intensify recurrence-related fears. Comparable evidence from myocardial infarction survivors has also demonstrated an association between illness perceptions and fear of recurrence, with psychological flexibility mediating this relationship (Wang et al., 2025). Taken together, these studies suggest that recurrence fear may emerge partly from how individuals cognitively and emotionally represent a serious health threat rather than solely from objective estimates of recurrence risk.

The exploratory dimension-level results strengthen this interpretation. Emotional representation and illness-related concern showed the strongest associations with FCR ($r = .64$ and $r = .61$, respectively), while perceived consequences was also substantially related to FCR ($r = .46$). These findings indicate that recurrence fear may be particularly sensitive to the emotional and threat-oriented components of illness perception. Survivors who experience intense emotional responses to prostate cancer or remain highly concerned about its consequences may be especially likely to anticipate its return. This interpretation aligns closely with qualitative findings among Iranian prostate cancer survivors, in which uncertainty about complete recovery, concern regarding PSA results, physical symptoms, and the possibility of cancer returning or spreading emerged as prominent aspects of FCR (Mardani et al., 2023). The qualitative evidence also indicates that survivors use different behavioral, psychological, and spiritual strategies in an effort to manage these fears, highlighting the importance of understanding FCR within the cultural and psychosocial context of survivorship.

The third major finding was that greater FCR was independently associated with poorer quality of life. Even after illness perception and clinical covariates were statistically controlled, FCR remained a strong predictor of global quality of life ($\beta = -.43$). This result supports the distinction between a normal degree of concern about recurrence and persistent FCR that becomes psychologically burdensome. FCR is recognized as a continuum ranging from understandable vigilance to clinically significant fear characterized by persistent worry and interference with functioning (Lebel et al., 2016). When fear becomes persistent, survivors may have difficulty disengaging from cancer-related thoughts, interpreting benign symptoms reassuringly, making future plans, or fully experiencing periods of clinical stability. The resulting psychological burden can consequently affect emotional, social, and general functioning.

This finding closely aligns with previous evidence. Among prostate cancer survivors, Maguire et al. identified FCR as a particularly important psychological correlate of poorer quality of life even after demographic, health, treatment, and adverse-effect variables were considered (Maguire et al., 2018). The present study supports this association within an Iranian sample and demonstrates that FCR remains important even when survivors' broader illness representations are considered simultaneously. A meta-analysis by Zhang et al. further showed that greater FCR is

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related to poorer quality of life and well-being and is positively associated with several indicators of psychological distress, including anxiety, depression, intrusive thinking, rumination, avoidance, and fatigue (Zhang et al., 2022). Thus, FCR appears to represent more than an isolated worry about future disease; it may affect multiple psychological processes through which survivors evaluate their current health and overall lives.

The central finding of the study was the significant mediating role of FCR. The total effect of threatening illness perception on quality of life was attenuated after FCR was incorporated into the model, and the indirect effect through FCR was statistically significant. Approximately 45% of the total association was accounted for by this pathway. This result suggests that one mechanism linking threatening illness perceptions with poorer quality of life is an increased tendency to fear cancer recurrence. A survivor who perceives prostate cancer as highly consequential, poorly controllable, or emotionally overwhelming may be more likely to interpret future recurrence as both probable and catastrophic. Such appraisals may increase recurrence-focused worry and vigilance, which can subsequently interfere with psychological well-being and global quality of life. The cognitive processing formulation of FCR provides support for this interpretation by emphasizing the interaction between threat-related beliefs, cancer-related cues, repetitive cognition, and behavioral responses in the maintenance of recurrence fear (Fardell et al., 2016).

The mediation finding is also compatible with growing evidence that illness perception operates through intermediate psychological processes rather than influencing adjustment exclusively through a direct pathway. MacDonald et al. demonstrated that illness perceptions and self-efficacy played mediating roles in psychological outcomes among men with localized prostate cancer participating in a patient empowerment intervention (MacDonald et al., 2024). Guan et al. similarly showed that coping contributed to the association between illness uncertainty and well-being in prostate cancer (Guan et al., 2020). Outside oncology, relationships among illness perception, self-care, social support, shared decision-making, and self-efficacy have also been documented, demonstrating that the meaning assigned to illness is interconnected with broader psychological and behavioral resources (Mohammadi Manesh et al., 2025). Therefore, the present finding identifies FCR as one important mechanism while simultaneously recognizing that other psychological pathways are likely to contribute to the relationship between illness perception and quality of life.

The persistence of a significant direct effect of illness perception after FCR was included in the model supports this interpretation. FCR did not completely account for the association between illness perception and quality of life. Other pathways may involve self-efficacy, coping strategies, perceived control, social support, emotional distress, health behavior, symptom interpretation, and treatment expectations. The exploratory findings also showed that emotional representation, perceived consequences, symptom identity, and illness concern were among the dimensions most strongly associated with poorer quality of life. These results suggest that specific components of illness perception may influence quality of life differently. For example, perceived consequences may directly influence evaluations of physical and social functioning, whereas emotional representation and concern may exert stronger effects through psychological mechanisms such as FCR. This interpretation is compatible with evidence that illness perceptions are related to diverse aspects of adaptation across cancer and chronic disease populations (de Rooij et al., 2018; Liu et al., 2025; MacDonald et al., 2024).

Clinical characteristics provided additional context for the psychological findings. Current androgen-deprivation therapy was associated with greater FCR and poorer quality of life, and greater comorbidity burden was independently associated with poorer quality of life. Nevertheless, the principal associations among illness perception, FCR, and quality of life remained significant after these clinical variables were controlled. This pattern indicates that psychological processes contribute meaningful explanatory information beyond conventional disease and treatment indicators. Moreover, treatment modality itself was not significantly associated with illness perception or FCR after other variables were considered, suggesting that patients' subjective interpretation of their cancer experience may sometimes be more relevant to psychological adjustment than treatment category alone. This conclusion is compatible with previous prostate cancer research demonstrating the contribution of illness-related appraisals and psychological mechanisms after clinical factors are taken into account (MacDonald et al., 2024; Maguire et al., 2018).

The findings also have clinical significance because both illness representations and FCR represent potentially modifiable targets. Psychological interventions aimed at FCR have increasingly demonstrated beneficial effects, and a systematic review and network meta-analysis found

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evidence supporting several psychological approaches for reducing recurrence-related fear among individuals with cancer (Wang et al., 2026). The present findings suggest that interventions may be particularly useful when they address both levels of the pathway: the underlying interpretation of cancer as threatening and the more proximal fears concerning its possible return. Improving survivors' understanding of their illness, strengthening realistic perceptions of control, addressing catastrophic interpretations of physical sensations, and increasing tolerance of uncertainty may reduce the psychological consequences of surveillance and recurrence-related cues. In this sense, the mediation model provides a potentially useful framework for moving from recognition of psychological distress toward identification of specific processes that may be targeted in survivorship care.

Several limitations should be considered when interpreting these findings. First, the cross-sectional design does not establish temporal precedence and therefore does not permit causal conclusions regarding the proposed mediation pathway. Although illness perception was modeled as the predictor, FCR as the mediator, and quality of life as the outcome, reciprocal relationships are plausible; persistent FCR may strengthen threatening illness perceptions, while poorer quality of life may make the illness appear more severe or consequential. Second, the principal variables were measured using self-report questionnaires, increasing the possibility of common-method variance, recall bias, and socially desirable responding. Third, participants were recruited consecutively from a selected teaching hospital, which may restrict generalizability to survivors in other regions, rural settings, private healthcare facilities, or those no longer attending follow-up services. Individuals who avoid medical follow-up because of severe anxiety may also have been underrepresented. Furthermore, the global quality-of-life measure does not fully capture prostate-specific urinary, sexual, bowel, and hormonal difficulties. Finally, although the model explained a substantial proportion of quality-of-life variance, other psychosocial and clinical factors were not incorporated and may contribute to survivors' adjustment.

Future research should employ prospective longitudinal designs to establish the temporal ordering of illness perception, FCR, and quality of life. Repeated assessments beginning after treatment and continuing through multiple surveillance periods would help determine whether threatening illness perceptions precede increases in FCR and whether these changes subsequently predict deterioration in quality of life. Assessments conducted before and after PSA testing could be especially informative because recurrence-related fears may fluctuate around surveillance events. Future studies should recruit participants from multiple hospitals, geographic regions, and community settings to improve representativeness and should examine whether the proposed pathway differs according to age, cancer stage, treatment modality, time since diagnosis, and hormonal treatment status. More comprehensive models could incorporate coping, self-efficacy, social support, anxiety, depression, intolerance of uncertainty, health literacy, sexual functioning, treatment-related symptoms, and spirituality as parallel or sequential mediators. Randomized intervention studies would also be valuable for determining whether experimentally modifying illness perceptions reduces FCR and whether reductions in FCR subsequently produce improvements in quality of life.

Healthcare professionals involved in prostate cancer survivorship should incorporate psychological assessment into routine follow-up rather than relying exclusively on PSA values, treatment history, and physical symptoms. Brief screening for threatening illness perceptions and persistent recurrence-related fear could help identify survivors whose disease is medically stable but whose quality of life remains compromised. Nurses, urologists, oncologists, and psycho-oncology professionals should provide clear and individualized information regarding recurrence risk, expected post-treatment symptoms, the interpretation of PSA results, and the distinction between common bodily changes and warning signs requiring medical evaluation. Survivors showing substantial worry, catastrophic interpretation of symptoms, repeated reassurance seeking, avoidance, or difficulty planning for the future should be offered appropriate psychological support. Interventions may combine psychoeducation with cognitive-behavioral, acceptance-based, mindfulness-oriented, or uncertainty-management strategies. Particular attention may be warranted for survivors receiving ongoing androgen-deprivation therapy, those with multiple chronic illnesses, and individuals displaying highly threatening emotional representations of cancer, because these groups may require more intensive and coordinated survivorship support.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

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In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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