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Illness uncertainty, coping, and quality of life among patients with prostate cancer

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Abstract

Objective: Illness uncertainty is a significant source of psychological distress that affects cancer patients' quality of life (QOL). Mishel's uncertainty in illness theory (UIT) proposes that illness uncertainty influences an individual's use of coping strategies, and directly and indirectly influences their QOL. This study tested the relationships depicted in the adapted UIT in cancer patients.

Methods: This cross-sectional study is a secondary analysis of the baseline data from a randomized clinical trial ($N = 263$ prostate cancer patients). Patients were diagnosed with localized (64.6%), biochemical recurrent (12.6%), or advanced (22.8%) prostate cancer. Uncertainty, coping (avoidant and active coping strategies), and QOL (physical and mental well-being) were measured using the Mishel's uncertainty of illness scale, Brief COPE, and the Medical Outcomes Study 12-item short form (SF-12), respectively. We used path analysis to achieve the research aim.

Results: Patients' illness uncertainty directly, negatively influenced their physical well-being ($P < .001$) and mental well-being ($P < .05$). Patients' illness uncertainty was positively related to their avoidant coping strategies ($P < .001$). Patients' active and avoidant coping strategies influenced their mental well-being ($P < .001$). Uncertainty also negatively influenced mental well-being through avoidant coping strategies. The model had excellent fit to the data.

Conclusions: Our findings have indicated the potential of improving QOL by decreasing illness uncertainty and reducing avoidant coping strategies. Future research is needed to better understand the complex relationships between illness uncertainty, coping strategies, and domains of QOL among patients with different types of cancer using longitudinal research.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

DATA AVAILABILITY STATEMENT

The data are currently used for other studies and manuscript development. The data that support the study may be available upon request with permission from the researchers who collected the data.

Keywords

coping; oncology; path analysis; prostate cancer; quality of life; uncertainty

1 | BACKGROUND

Illness uncertainty, or difficulty determining the meaning of illness-related cues or events, has long been recognized as a common and significant source of psychosocial stress across the illness trajectory among people diagnosed with cancer.¹ The cognitive state of illness uncertainty is characterized by an individual's acute perception of the ambiguous significance of his or her symptoms and other illness-related experiences (ambiguity), the complexity of the underlying illness and the terms used to explain it (complexity), and the unpredictability of what his or her future will hold in terms of function, recurrence, and ultimately survival (unpredictability).² Mishel's uncertainty in illness theory (UIT) has provided a model of how an individual's appraisals of illness uncertainty as dangerous or beneficial influences his or her ways of coping, which can in turn influence health outcomes such as quality of life (QOL).²

Coping refers to the cognitive and behavioral strategies that individuals use to manage stress.³ If the coping strategies are effective in relieving illness uncertainty following an individual's positive self-appraisal, stress will decrease and QOL will improve; if coping strategies help sustain illness uncertainty following an individual's negative self-appraisal, stress will increase, and QOL will deteriorate.² Cognitive and behavioral coping strategies can be categorized as a) active (also referred to as problem-focused), the goal of which is to resolve illness uncertainty, or b) avoidant (also referred to as emotion-focused), the goal of which is to control intense emotions that occur in response to an illness-related cue or event perceived as dangerous.⁴ Previous studies have found that cancer survivors with higher levels of illness uncertainty tended to use more avoidant coping strategies than active coping strategies, perhaps because they lacked the requisite psychological, social, or environmental resources for active coping.^{5,6} Studies have also shown that higher levels of illness uncertainty adversely impacted patients' overall QOL,^{7,8} as well as its subdomains including physical, mental, functional, and spiritual well-being.^{6,9,10} As illness uncertainty increased, a patient's appraisal of his illness as dangerous also increased and adversely influenced his QOL.¹¹ Illness uncertainty and its influence on QOL even persisted beyond the completion of active cancer treatment into long-term survivorship.^{12,13}

Although extensive research has examined the relationships between illness uncertainty and coping strategies as well as between illness uncertainty and QOL (including its subdomains), there have been limited research testing the UIT. In addition, the evidence has been inconsistent about how coping strategies influence the relationships between illness uncertainty and QOL. Kurita and colleagues found that avoidant coping strategies fully accounted for the effects of illness uncertainty on the nonsomatic depressive symptoms and emotional well-being of patients with lung cancer; illness uncertainty was positively related to avoidant coping strategies; avoidant coping strategies were positively related to depressive symptoms and negatively related to emotional well-being.¹⁴ Ahadzadeh and Sharif, on the

other hand, found that illness uncertainty was positively related to avoidant coping and negatively related to active coping among women with breast cancer, whereas active coping strategies were the only strategies that positively correlated with overall QOL.¹⁵ Research is needed to strengthen the evidence about the relationships between illness uncertainty, coping strategies, and QOL, as depicted in UIT, in particular the pathways through which illness uncertainty and coping strategies influence QOL for patients with cancer.

This study tested the fit of a model adapted from Mishel's UIT (Figure 1) using data collected from a sample of patients with prostate cancer. Men with prostate cancer report high levels of distress such as uncertainty both at diagnosis and over time because there are a large number of treatment options but each treatment has the risk of substantial physical impairments.¹⁶ The adapted UIT model depicts three key constructs (illness uncertainty, coping strategies, and QOL) and the relationships among the variables that are used to operationalize the constructs. We hypothesized that: a) patients' illness uncertainty negatively affects their physical and mental well-being domains of QOL (direct effect of uncertainty); b) their illness uncertainty is related to coping strategies; c) their coping strategies are related to their physical and mental well-being domains of QOL; and d) the relationships between illness uncertainty and the physical and mental well-being domains of QOL are mediated by coping strategies (ie, indirect effects of uncertainty on QOL through coping).

2 | METHODS

2.1 | Study design and sample

This cross-sectional study is a secondary analysis of the baseline data from a randomized clinical trial (RCT) that examined the effects of a dyadic-based psychoeducational intervention on QOL for patients with prostate cancer and their partners ([Clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT00708968) registration number: [NCT00708968](https://clinicaltrials.gov/ct2/show/study/NCT00708968)).¹⁷ Patients were eligible for the RCT if they were (a) recently diagnosed with localized disease and completing primary treatment, or (b) diagnosed with recurrent disease based on two consecutive rises in prostate-specific antigen following completion of primary treatment, or (c) diagnosed with advanced cancer based on metastasis or progression. Prostate cancer patients were eligible if they were treated with a prostatectomy or external beam radiation with or without hormonal treatments and/or chemotherapy. Other criteria for patient inclusion were as follows: (a) being 30 years of age or older; (b) having a life expectancy of at least 12 months; and (c) having a spouse or cohabitating partner. Patients were excluded if they had a second primary cancer. The study was approved by the Institutional Review Boards at the study sites (IRBMED 2001-009). The sampling and data collection procedures for the RCT have been published previously.¹⁷ Briefly, after providing written informed consent, patients and their partners completed baseline questionnaires in their homes prior to the intervention. The RCT baseline data from the patients was used to achieve the research aims.

2.2 | Measurement

The study variables were measured using a set of well-established instruments. Uncertainty was measured using the Mishel Uncertainty in Illness Scale (MUIS).¹⁸ MUIS is 28-item

scale with a 5-item Likert-type response that ranges from 1 (*strongly disagree*) to 5 (*strongly agree*). All 28 items are summed to calculate a total score that ranges from 28 to 140, with higher scores indicating higher levels of illness uncertainty.¹⁹ The internal consistency Cronbach α for MUIS was 0.91 in the study sample.

Coping strategies were assessed using the 28-item version of the Brief COPE which measured 14 coping strategies (eg, self-distraction, active coping, denial, alcohol/drug use, positive reframing).²⁰ The scale employed a four-item Likert-type response ranging from 1 (*I usually do not do this at all*) to 4 (*I usually do this a lot*). The internal consistency Cronbach alpha for Brief COPE was .84 in the study sample. Higher-order exploratory factor analyses of the RCT data were conducted to create two summary scores: active coping strategies and avoidant coping strategies.¹⁷ Higher scores indicate greater use of either active or avoidant coping strategies.

We measured QOL using the Medical Outcomes Study 12-item short form (SF-12).²¹ SF-12 has two summary scores: the physical component summary and the mental component summary, each scored on a scale from 0 to 100. Higher scores represent better physical and mental well-being. Norm-based scoring is used for the SF-12, with a mean of 50 and a SD of 10 in the general US population.²¹ The internal consistency Cronbach alpha for the physical well-being and mental well-being were .86 and .87, respectively, in this study.

Covariates included patient characteristics (age, race, education, household income, prostate cancer situation, and months since diagnosis), which have been shown to be related to uncertainty, coping, or QOL.^{22–24} General symptoms and prostate cancer-specific symptoms also influence QOL^{23,24} and thus were statistically controlled for in the model fitting process. General symptoms were measured using the 16-item Symptom Scale (including general symptoms such as fatigue, pain, urinary incontinence, and sexual difficulties), a subscale of the Risk of Distress Scale with a three-item Likert-type response that ranges from 0 (*no trouble*) to 2 (*a lot of trouble*).²⁵ Higher scores indicate more general symptoms. In this study, internal consistency reliability was $\alpha = .80$. Prostate cancer-specific symptoms were assessed using the 50-item expanded prostate cancer index composite (EPIC), with a five-item Likert-type response. EPIC measures patients' urinary, bowel, sexual, and hormonal symptoms.²⁶ Higher scores (range from 0 to 100) indicate fewer symptoms. Each of the four symptom domains demonstrated good internal consistency ($\alpha = .77$ for each).

2.3 | Data analysis

We used Stata version 15 to calculate statistics to describe the study sample characteristics and the study measures. We used MPlus version 7 to conduct a path analysis to test the hypothesized relationships among the study variables measured.²⁷ Path analysis is a type of structural equation modeling for testing a theoretical construct path model as depicted in Figure 1 where the construct paths are composed of summary scores from the relevant measurement items.²⁸ To prepare for path analysis, we first conducted diagnostic checks for normality and missingness on the variables used in the analysis. The data were normally distributed as evidenced by the absolute values of the skewness index of the data (ie, less than three) and the absolute values of the kurtosis index (ie, less than 10).²⁹ All measurement data were complete except 0.6% of the income data, 0.8% of months since

diagnosis data, 0.4% of QOL data were missing. The Little's Test showed that the data were "missing completely at random" ($P > .05$).³⁰ Because the amount of missing data was so small as to be trivial, we conducted path analysis using a maximum likelihood estimator. We also included covariates in the path analysis. To evaluate the hypothesized mediation effect of coping strategies on the relationships between uncertainty and physical and mental well-being, indirect effects was examined in the path from uncertainty to physical well-being and mental well-being. We specified the indirect effect of uncertainty on physical well-being and mental well-being via the mediator active coping strategies and avoidant coping strategies and estimated the total, direct, and indirect effects. We have used the following goodness-of-fit indices to examine the model fit: the comparative fit index (CFI) and the Tucker-Lewis index (TLI) (>0.95 indicating an excellent fit); standardized root mean square residual (SRMR) (<0.08 indicating a good fit); and root mean square error of approximation (RMSEA) (<0.06 indicating a good fit).

3 | RESULTS

3.1 | Demographics and clinical characteristics

A total of 263 prostate cancer patients were enrolled in the RCT (Table 1). The patients' mean age was 63.1 (SD = 9.1). Most of the men were white (83.3%). The majority had localized prostate cancer (64.6%), while biochemical recurrent (12.6%) and advanced (22.8%) prostate cancers were less prevalent. Upon entering the study, the mean time since diagnosis of the patients was 29.0 months. The mean score of patients' illness uncertainty was 60.6 (SD = 15.7), with approximately 50.6% of the patients scored higher than the mean score. For QOL, approximately 48.7% of the patients scored lower than the US norm on the physical well-being whereas 35.4% of the patients scored lower than the US norm on the mental well-being.

3.2 | Path analysis results: Relationship among uncertainty, coping strategies and QOL

The model had excellent fit to the data: $\chi^2 (11, N = 263) = 16.300, P = .1303$; CFI = 0.990; TLI = 0.969; RMSEA = 0.043 (90% CI [0.000, 0.084]); SRMR = 0.035.

As displayed in Figure 2, illness uncertainty was directly, negatively associated with physical well-being ($\beta = -.263, P < .001$) and mental well-being ($\beta = -.136, P < .05$). Illness uncertainty was positively associated with avoidant coping strategies ($\beta = .297, P < .001$). Active coping strategies were positively associated with mental well-being ($\beta = .225, P < .001$) while avoidance coping strategies were negatively associated with mental well-being ($\beta = -.319, P < .001$).

Regarding the indirect effects of uncertainty on QOL through coping, the total standardized effect of uncertainty on mental well-being (ie, the sum of the direct and indirect effects) was $-0.244 (P < .001)$; the standardized direct effect of uncertainty on mental well-being was $-0.136 (P < .05)$; and the standardized indirect effect of uncertainty on mental well-being via avoidance coping strategies was $-0.095 (P < .001)$. These results indicated suppression effect,³¹ that is, avoidant coping enhanced the negative effects of uncertainty on mental well-being.

In addition, covariates such as patient characteristics and symptoms were related to their coping strategies and QOL. Specifically, active coping strategies were associated with age ($\beta = -.200, P < .001$), education ($\beta = .145, P < .05$), and the severity of general symptoms ($\beta = .251, P < .001$). Compared to patients with localized prostate cancer, patients with advanced cancer were more likely to use active coping strategies ($\beta = .170, P < .01$). Avoidant coping strategies were associated with both specific hormonal symptoms ($\beta = -.243, P < .001$) and general symptoms ($\beta = .182, P < .01$) of prostate cancer. Physical well-being was associated with both age ($\beta = -.179, P < .001$) and general symptoms ($\beta = -.488, P < .001$). Compared to patients with localized prostate cancer, patients with biochemical recurrent prostate cancer had better physical well-being ($\beta = .145, P < .01$). Mental well-being was associated with age ($\beta = .152, P < .05$), education ($\beta = -.106, P < .05$), and both specific hormonal symptoms ($\beta = .298, P < .001$) and general symptoms ($\beta = -.232, P < .001$).

4 DISCUSSION

This study examined the relationships among uncertainty, coping, and QOL as proposed in the adapted UIT in patients with prostate cancer. Our results have validated the findings of prior studies that showed the negative influences of illness uncertainty on patient physical and mental well-being, and illness uncertainty was positively associated with avoidant coping strategies. We also found that the direct influences of patients' active and avoidant coping strategies on their mental well-being. Most importantly, we found uncertainty negatively influenced mental well-being through avoidant coping strategies, that is, avoidant coping enhanced the negative effects of uncertainty on mental well-being.

The diagnosis and treatment of cancer is a stressful experience and illness uncertainty is a source of that stress. As predicted, we found that illness uncertainty was negatively related with patients' physical and mental well-being, after controlling for patient characteristics and symptoms. These findings lend further support for the relationship between uncertainty and adjustment outcomes as proposed in Mishel's UIT. Consistent with the results from previous studies,^{6,8} our findings provide evidence to support the use of uncertainty management interventions to improve QOL among patients with cancer.³²

Our findings also highlight the importance of assessing coping strategies because of their significant impact on QOL. After controlling for patient characteristics and symptoms as well as the level of illness uncertainty, active coping strategies were positively related to mental QOL while avoidant coping strategies were negatively related to mental QOL, with avoidant coping strategies exhibiting a stronger association with QOL than that of active coping strategies with QOL. Avoidant coping strategies such as denial and alcohol/drug use may create additional stress and further exacerbate mental QOL while patients manage cancer-related stress.³³ Our work has added new evidence to a recent systematic review examining the relationship between coping strategies and mental QOL that yielded inconsistent results.³⁴ Our findings also provide supporting evidence for the need for interventions that help broaden patients' coping repertoire to include active coping and reduce their use of avoidant coping strategies.

Finally, our results highlighted the importance of mitigating the effects of avoidant coping strategies because avoidant coping enhanced the negative effects of uncertainty on mental well-being. These results are consistent with Kurita's study of patients with lung cancer.¹⁴ When a situation is or appears to be highly uncertain, patients' coping strategies are very limited because there is no clear goal for their active coping strategies.⁵ In this situation, patients may choose avoidant coping strategies including denial and disengagement to help them ignore the fact, distract from the stressor, and/or its related emotions. Although using avoidant coping strategies might temporarily make an individual feel less stressed, over the long term, these strategies are ineffective to manage the uncertainty because they do not provide an individual with the techniques to solve the problem.³⁵ Use of avoidance coping strategies may also cause new problems, accumulate more stress or intensify stress, and ultimately exacerbate the individual's mental well-being.³ On the other hand, our results did not support the hypothesized effect of active coping strategies on the relationship between illness uncertainty and QOL. This finding could be attributable to the fact that the study participants were men with prostate cancer who often used avoidant coping strategies that reflected their own understandings of masculine characteristics, such as "self-reliance" and "emotional control."³⁶

4.1 | Clinical implications

Our findings have added useful evidence for developing interventions for patients with prostate cancer to improve these patients' QOL by decreasing their illness uncertainty. A number of studies have shown that uncertainty management interventions can improve QOL among prostate cancer patients.^{17,32} For example, an intervention has shown to be effective in uncertainty management when it is designed to help patients to identify their specific concerns, reframe cognitive perception of the cancer situation, and provide relevant cancer information.¹⁷ Care providers can help patients reduce their use of avoidant coping strategies in order to improve patients' QOL. Although previous studies have suggested that interventions focused on active coping might improve QOL, our findings suggest that interventions targeted at reducing avoidant coping strategies may particularly benefit the mental QOL of patients with prostate cancer.^{37,38}

4.2 | Limitations and future direction

This study has the following limitations. This cross-sectional study used the baseline data from an RCT, and thus causality cannot be determined from our analyses. Longitudinal research is needed to test the model and examine the relationships among the variables of interest. Next, the study has focused on male patients with prostate cancer, which has limited the generalizability of our findings. Future research is needed to validate our results in patients of different gender and with different types of cancer. Furthermore, the majority of the patients were well-educated, middle-class Caucasian Americans. There is a need for testing the model in a population of diverse sociodemographic and cultural backgrounds. Finally, the model tested did not include a variable for patients' appraisal of their own illness and/or condition, as proposed by Mishel's UIT. Future model testing should include patients' appraisal to explain how the relationships between uncertainty, coping strategies, and QOL are influenced by appraisal of illness for patients.

5 | CONCLUSIONS

Our study results lend support to selected linkages put forth by Mishel's UIT. We found that illness uncertainty negatively influenced the patient's physical and mental well-being; that illness uncertainty was positively related to a patient's avoidant coping strategies; that patients' active and avoidant coping strategies influenced their mental well-being; and that avoidant coping strategies enhanced the negative effect of uncertainty on mental well-being. Further research using longitudinal data is needed to better understand the complex relationships among illness uncertainty, coping strategies, and domains of QOL in both male and female patients with different types of cancer. Identifying patients who use avoidant coping and lack the necessary resources for managing illness uncertainty may guide the provision of psychosocial interventions to improve QOL.

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REFERENCES

1. Jabloo VG, Alibhai SMH, Fitch M, et al. Antecedents and outcomes of uncertainty in older adults with cancer: a scoping review of the literature. *Oncol Nurs Forum*. 2017;44(4):E152–E167. [PubMed: 28632247]
2. Mishel MH. Uncertainty in illness. *J Nurs Scholarsh*. 1988;20(4): 225–232.
3. Folkman S, Moskowitz JT. Coping: pitfalls and promise. *Annu Rev Psychol*. 2004;55:745–774. [PubMed: 14744233]
4. Roth S, Cohen U. Approach, avoidance, and coping with stress. *Am Psychol*. 1986;41(7):813–819. [PubMed: 3740641]
5. Hilton BA. The relationship of uncertainty, control, commitment, and threat of recurrence to coping strategies used by women diagnosed with breast cancer. *J Behav Med*. 1989;12(1):39–54. [PubMed: 2746642]
6. Parker PA, Alba F, Fellman B, et al. Illness uncertainty and quality of life of patients with small renal tumors undergoing watchful waiting: a 2-year prospective study. *Eur Urol*. 2013;63(6):1122–1127. [PubMed: 23419322]
7. Wonghongkul T, Dechaprom N, Phumivichuvate L, Losawatkul S. Uncertainty appraisal coping and quality of life in breast cancer survivors. *Cancer Nurs*. 2006;29(3):250–257. [PubMed: 16783127]
8. Sammarco A Perceived social support, uncertainty, and quality of life of younger breast cancer survivors. *Cancer Nurs*. 2001;24(3):212–219. [PubMed: 11409065]
9. Sammarco A, Konecny LM. Quality of life, social support, and uncertainty among Latina breast cancer survivors. *Oncol Nurs Forum*. 2008; 35(5):844–849. [PubMed: 18765332]
10. Parker PA, Davis JW, Latini DM, et al. Relationship between illness uncertainty, anxiety, fear of progression and quality of life in men with favourable-risk prostate cancer undergoing active surveillance. *BJU Int*. 2016;117(3):469–477. [PubMed: 25714186]

11. Uncertainty Wallace M. and quality of life of older men who undergo watchful waiting for prostate cancer. *Oncol Nurs Forum*. 2003;30(2): 303–309. [PubMed: 12692664]
12. Eisenberg SA, Kurita K, Taylor-Ford M, Agus DB, Gross ME, Meyerowitz BE. Intolerance of uncertainty, cognitive complaints, and cancer-related distress in prostate cancer survivors. *Psychooncology*. 2015;24(2):228–235. [PubMed: 24891013]
13. Hall DL, Mishel MH, Germino BB. Living with cancer-related uncertainty: associations with fatigue, insomnia, and affect in younger breast cancer survivors. *Support Care Cancer*. 2014;22(9):2489–2495. [PubMed: 24728586]
14. Kurita K, Garon EB, Stanton AL, Meyerowitz BE. Uncertainty and psychological adjustment in patients with lung cancer. *Psychooncology*. 2013;22(6):1396–1401. [PubMed: 22887017]
15. Ahadzadeh AS, Sharif SP. Uncertainty and quality of life in women with breast cancer: moderating role of coping styles. *Cancer Nurs*. 2018;41(6):484–490. [PubMed: 29489477]
16. Miller KD, Nogueira L, Mariotto AB, et al. Cancer treatment and survivorship statistics, 2019. *CA Cancer J Clin*. 2019;1–23.
17. Northouse LL, Mood DW, Schafenacker A, et al. Randomized clinical trial of a family intervention for prostate cancer patients and their spouses. *Cancer*. 2007;110(12):2809–2818. [PubMed: 17999405]
18. Mishel MH. The measurement of uncertainty in illness. *Nurs Res*. 1981;30(5):258–283. [PubMed: 6912987]
19. Mishel M, Epstein D. *Uncertainty in Illness Scales: Manual*. Tucson, AZ: University of Arizona; 1990.
20. Carver CS. You want to measure coping but your protocol' too long: consider the brief cope. *Int J Behav Med*. 1997;4(1):92–100. [PubMed: 16250744]
21. Ware JE Jr, Kosinski M, Keller SD. A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care*. 1996;34(3):220–233. [PubMed: 8628042]
22. Kazer MW, Bailey DE Jr, Chipman J, et al. Uncertainty and perception of danger among patients undergoing treatment for prostate cancer. *BJU Int*. 2013;111(3 Part B):E84–E91. [PubMed: 22985348]
23. Kershaw TS, Mood DW, Newth G, et al. Longitudinal analysis of a model to predict quality of life in prostate cancer patients and their spouses. *Ann Behav Med*. 2008;36(2):117–128. [PubMed: 18830672]
24. Song L, Northouse LL, Braun TM, et al. Assessing longitudinal quality of life in prostate cancer patients and their spouses: a multilevel modeling approach. *Qual Life Res*. 2011;20(3):371–381. [PubMed: 20927648]
25. Mood D, Song L, Kershaw T, Northouse L. Assessing risk for distress in cancer patients and family caregivers. *Oncol Nurs Forum*. 2007;34(1):233.
26. Wei JT, Dunn RL, Litwin MS, Sandler HM, Sanda MG. Development and validation of the expanded prostate cancer index composite (EPIC) for comprehensive assessment of health-related quality of life in men with prostate cancer. *Urology*. 2000;56(6):899–905. [PubMed: 11113727]
27. Muthén LK, Muthén B. *Mplus user's guide*. 8th 1998–2017 https://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf. Accessed July 1, 2019.
28. Kelloway EK. *Using Mplus for Structural Equation Modeling: A Researcher's Guide*. New York, NY: Sage Publications; 2014.
29. Kline RB. *Principles and Practice of Structural Equation Modeling*. New York, NY: The Guilford Press; 2011.
30. Little RJ. A test of missing completely at random for multivariate data with missing values. *J Am Stat Assoc*. 1988;83(404):1198–1202.
31. MacKinnon DP, Krull JL, Lockwood CM. Equivalence of the mediation, confounding and suppression effect. *Prev Sci*. 2000;1(4):173–181. [PubMed: 11523746]
32. Bailey DE Jr, Mishel MH, Belyea M, Stewart JL, Mohler J. Uncertainty intervention for watchful waiting in prostate cancer. *Cancer Nurs*. 2004;27(5):339–346. [PubMed: 15525860]

33. Stanton AL, Danoff-Burg S, Cameron CL, et al. Emotionally expressive coping predicts psychological and physical adjustment to breast cancer. *J Consult Clin Psychol*. 2000;68(5):875–882. [PubMed: 11068973]
34. Morris N, Moghaddam N, Tickle A, Biswas S. The relationship between coping style and psychological distress in people with head and neck cancer: a systematic review. *Psychooncology*. 2018;27(3): 734–747. [PubMed: 28748624]
35. Mishel MH, Belyea M, Germino BB, et al. Helping patients with localized prostate carcinoma manage uncertainty and treatment side effects: nurse-delivered psychoeducational intervention over the telephone. *Cancer*. 2002;94(6):1854–1866. [PubMed: 11920549]
36. Spindel JS, Eli Joubert H, Lee H, Fairhurst BR. Coping and adjustment in men with prostate cancer: a systematic review of qualitative studies. *J Cancer Surviv*. 2018;12(2):155–168. [PubMed: 29063497]
37. Penedo FJ, Dahn JR, Molton I, et al. Cognitive-behavioral stress management improves stress-management skills and quality of life in men recovering from treatment of prostate carcinoma. *Cancer*. 2004;100 (1):192–200. [PubMed: 14692040]
38. Lambert SD, McElduff P, Girgis A, et al. A pilot, multisite, randomized controlled trial of a self-directed coping skills training intervention for couples facing prostate cancer: accrual, retention, and data collection issues. *Support Care Cancer*. 2016;24(2):711–722. [PubMed: 26184499]

FIGURE 2.

Tested study model: the relationships between illness uncertainty, coping strategies, and QOL domains. *Notes:* The solid lines represent statistically significant paths ($P < .05$) after controlling for the effects of covariates, including patient characteristics (eg, age, race, education, household income, months since diagnosis, and prostate cancer situation) and symptoms (eg, general symptoms, and prostate cancer-specific symptoms). The dashed lines indicate statistically nonsignificant paths. QOL, quality of life. * $P < .05$; ** $P < .01$; *** $P < .001$

TABLE 1

Descriptive results(N = 263)

Study population characteristics (covariates)	N	%
Race		
White	219	83.3
Nonwhite	44	16.7
Household income		
<\$30 000	22	8.4
\$30 000-\$50 000	43	16.4
\$50 000-\$75 000	50	19.0
>75 001	131	49.8
Prostate cancer situation		
Localized	170	64.6
Biochemical recurrent	33	12.6
Advanced	60	22.8
	Mean	SD
Age	63.1	9.1
Education	15.7	3.5
Months since diagnosis	29.0	42.2
Patient symptoms (covariates)		
Prostate cancer-specific symptoms_urine	78.3	16.6
Prostate cancer-specific symptoms_bowel	89.0	11.1
Prostate cancer-specific symptoms_sexual	27.3	22.4
Prostate cancer-specific symptoms_hormonal	82.5	15.4
General symptoms	6.8	4.3
Model constructs		
Illness uncertainty	60.6	15.7
Coping: Active strategies	32.2	7.4
Coping: Avoidant strategies	14.6	3.9
QOL: Physical well-being	47.7	10.0
QOL: Mental well-being	51.8	8.7

Abbreviation: QOL, Quality of life.