Effects of physical and mental health on relationship satisfaction: a dyadic, longitudinal examination of couples facing prostate cancer

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Abstract

Objectives: Prostate cancer may affect quality of life in men diagnosed as well as their spouses. Changes in health may disrupt the couple's relationship functioning which disrupts recovery. This study examined how mental and physical health relates to relationship satisfaction for couples at diagnosis through the year following treatment.

Methods: Patients with stage I–II prostate cancer and their spouses ($N = 159$ couples) were recruited from a urology clinic and completed questionnaires at diagnosis, 1 month, 6 months, and 12 months post prostatectomy on demographics, mental and physical health quality of life, and relationship satisfaction. The Actor–Partner Interdependence Model was employed to examine effects of each partners' mental and physical health on their own and their partner's relationship satisfaction.

Results: Patients and spouses had declined mental and physical health at 1 month post-surgery. Health improved at 6 and 12 months but did not fully return to pre-surgery levels. Actor effects showed that patient's physical health consistently predicted own relationship satisfaction. Both patient's and spouse's mental health consistently related to their own relationship satisfaction. Partner effects showed that patient's and spouse's physical health had an effect on each other's relationship satisfaction at 1 month. Spouse's mental health predicted patient's relationship satisfaction throughout the year following treatment.

Conclusion: The effects of patient and spouse mental and physical health quality of life on their own as well as their partner's relationship satisfaction differed across time which will inform psychosocial interventions for couples with prostate cancer.
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Prostate cancer is the most common cancer in American men, with about 233, 000 new cases in 2014 [1]. Although prostate cancer treatment is often successful and survival rates are high [2], many patients experience long-term physical and psychological side effects, such as impaired urinary functioning, impaired sexual functioning, and reduced quality of life [3–6]. Prostate cancer also affects the patient's loved ones, particularly the spouse or partner, and because of this, has been described as a 'couple's disease' [7]. In general, couples' relationship satisfaction suffers following prostate cancer treatment [8,9]; although some couples report that the experience brought them closer together [10]. Understanding relationship functioning in this population is important because being in a satisfying marital relationship is related to less distress following cancer treatment [11]. Among prostate cancer survivors, evidence exists that higher marital satisfaction relates to patient health several years after treatment [6] as well as longer median survival time [12].

Research on psychosocial issues related to prostate cancer has historically focused on either the patient or the caregiver. Patient-centered research, for example, has shown that a patient's perception of social support is a strong correlate of their health-related quality of life [13]. Further, cancer patients often identify their partners as their most important sources of practical and emotional support and the first person from whom support is sought after diagnosis [14]. Literature focused on the experiences of the patient's partner has identified a number of challenges associated with caregiving and shown that caregivers of prostate cancer patients report even more distress than patients [7,15–17]. Further, partners' appraisals of their own caregiving experiences negatively relate to their own marital satisfaction and to cancer-specific and mental health quality of life two years after prostate cancer treatment [18].

Dyadic research has found that coping with cancer treatment can challenge a couple's established communication patterns, roles, and responsibilities [19], leading to significant adjustment issues, communication difficulties, decreased intimacy and greater interpersonal conflict over time [20,21]. In a study of 189 patients with localized

prostate cancer and their female partners, partner's mental health was most affected by the mental health and by the physical complaint of sexual bother [22]. Data collected within 10 years of prostate cancer treatment from 77 couples found that partner's depressive symptoms predicted patient relationship satisfaction [23]. Zhou and colleagues (2011) examined advanced prostate cancer survivor dyads ($N = 29$ couples) after treatment ($M = 11.8$ months since treatment, $SD = 9.6$) and found that one's own mental and physical health had strong associations with marital satisfaction for both the survivor and partner, and that the partners' mental and physical health predicted the survivors' marital satisfaction. This study provides evidence of an association between physical health and mental health with partner's relationship satisfaction in couples who have experienced prostate cancer treatment; however, the study was limited by non-standard assessment times and large variability in the time since treatment among participants [24].

Given that patients and partners experience different stressors during diagnosis and through the various stages of the treatment process, it is important to consider the research question of how relationship satisfaction of both partners is impacted *at specific points in time*. As early as diagnosis, partners of prostate cancer patients play important support roles. Couples work together to understand the diagnosis, make treatment decisions, and plan for the future [25,26]. At diagnosis, Fang and colleagues (2000) found a strong relationship between spouse distress and marital quality [27]. The physical and psychological effects of prostate cancer on both the patient and partner change during the course of treatment. A longitudinal study of 81 prostate cancer dyads found that patients were less socially active than their wives following diagnosis, but then became more similar to their wives at later time points, indicating that men may experience a period of isolation and adjustment to illness which initially disrupts the couple's life together [28]. Additionally, patients experienced more emotional distress than their wives in the year after treatment suggesting that the treatment period may result in a loss of control and self-esteem for men. Another dyadic study of couples facing prostate cancer showed that couples' communication declined over the year following treatment [29]. These studies suggest that relationship functioning may be affected in different ways during prostate cancer diagnosis, treatment, and recovery depending on the changing physical health and mental health of both partners throughout this period.

The current study aims to address some of the limitations in the literature by employing a relatively large sample size of couples followed longitudinally at diagnosis of prostate cancer, and 1 month, 6 months, and 12 months following treatment. The current study is similar to Zhou *et al.* (2011) [24], in that it examined the effects of both partners' physical and mental health on relationship satisfaction; however, it expands upon the previous work, by exploring differential effects at four distinct time points in relation to treatment from a much larger sample of couples. In this way, we are able to examine what is most predictive of relationship satisfaction at specific times which is crucial for providing appropriate resources to couples during their journey from diagnosis of prostate cancer through survivorship.

Methods

Participants and procedures

Newly diagnosed early stage (I and II) patients with prostate cancer and their spouses (partners of patients included both married and unmarried, male and female significant others; the term spouse is used to refer to romantic partners) were recruited from the Duke University Medical Center's Department of Urology. Men were considered eligible for study participation if they (a) understood and read English, (b) had a Stage I or II prostate cancer diagnosis and had not yet undergone a prostatectomy, and (c) had a romantic partner who was willing to participate in the study. A questionnaire packet was mailed to the patient's home and contained separate written consent documents for both partners. Patients and their spouses completed the initial questionnaire within approximately a week of diagnosis and then completed additional mailed assessments approximately 1 month, 6 months, and 12 months after the patient underwent a prostatectomy. Participants were instructed to complete assessments independently and not discuss them with each other. Participants received $10.00 for each returned questionnaire. All procedures were approved by the Duke University Medical Center's Institutional Review Board.

Data were collected from at least one partner within 188 unique couples. Sixteen of these were patients who did not have partners. In some couples, only one partner gave consent for participation. Both partners from 165 couples participated in the study. Across the four time points, 104 patients and 99 spouses completed all assessments. At diagnosis, 159 couples had data from at least one partner (154 couples had data from both partners). Participants lost at any follow-up did not significantly differ from those retained at all time points on demographic characteristics (age, income, ethnicity, education, and length of marriage), physical health, mental health, or relationship satisfaction at diagnosis. Retention analyses were conducted on patients and spouses separately. Main analyses employed all available data at each time point. On average patients and spouses were in their sixties ($M = 63$ and 60 years, respectively) and represented a range of education and income levels (see Table 1). The majority (87%) were white; 9% were black. The average length of time couples had been together was over 30 years ($M = 33$ years).

Table 1. Patient and spouse demographics at diagnosis

	Patients (N = 158)	Spouses (N = 155)
Age (years)	M = 63.05 (SD = 7.79)	M = 60.14 (SD = 8.67)
Race/ethnicity		
White	86.7%	87.9%
Black	9.6%	8.4%
Hispanic	.6%	1.2%
Native American	1.8%	2.4%
Other	.6%	0%
Education		
Grade school	12%	8.4%
High school	17.5%	19.9%
Some college	18.1%	35.5%
College graduate	23.5%	21.7%
Graduate degree	27.7%	13.9%
Number of medical illnesses	M = 6.78 (SD = 6.45)	M = 3.99 (SD = 5.10)
Income		
≤$18 000	7.5%	
$18 000-$30 000	11.3%	
$30 001-$40 000	13.2%	
$40 001-$50 000	10.1%	
$50 001-$60 000	13.2%	
>$60 000	44.7%	
Relationship length (years)	M = 33.26 (SD = 13.76)	

Measures

Demographic and medical questions

Self-reported demographics (e.g. age, sex, education, household income, and racial/ethnic background) and health information were collected during the initial assessment at diagnosis from the patient and spouse. A checklist of 26 illnesses and conditions was presented to participants. The number of these comorbidities that people indicated currently experiencing was summed to create a measure of co-morbidities. Stage of illness and treatment information was obtained from medical records for each patient.

Physical health

Physical health was measured using the Physical Component Summary score from the Medical Outcomes Study (MOS) 36-item short form health survey (SF-36) [30]. Subscales included role limitations because of physical health problems, bodily pain, physical functioning, and general health. Across the four time points, this composite scale exhibited high reliability for spouses and patients ($\alpha = .88–.94$).

Mental health

Mental health was measured using the Mental Component Summary score from the Medical Outcomes Study (MOS) 36-item short form health survey (SF-36) [30]. Subscales included role limitations because of emotional problems, energy/fatigue, emotional well-being, and social functioning. Across the four time points, this composite scale exhibited high reliability for spouses and patients ($\alpha = .88–.93$).

Relationship satisfaction

Relationship satisfaction was measured using the Marital Quality Index (MQI). The MQI [31] contains six items with responses on a seven-point Likert-type scale and ranges from 'strongly agree' to 'strongly disagree' (e.g. 'During the past month, our marriage/relationship has been strong'). Items were modified slightly depending on the couple's relationship status (marriage/spouse vs. relationship/partner). This scale demonstrated excellent reliability across all four time points for spouses and patients ($\alpha = .93–.97$).

Statistical analyses

Descriptive statistics were computed and mean differences between mental health, physical health, and relationship satisfaction for patients and spouses at each time point were examined using paired-samples *t*-tests. To control for inflated Type 1 error of running these 12 tests, an alpha of .01 was used as criteria for determining statistical significance. Changes over time for physical health, mental health, and relationship satisfaction were examined within person across the four time points using repeated-measures ANOVA. When these tests were significant, simple comparisons of each time point with diagnosis were computed. The primary research questions were evaluated in Mplus 6 [32] using an Actor Partner Interdependence Model (APIM) [33] approach. This type of analysis allows for examination of effects between predictors and outcomes assessed from a single person (actor effects) and between predictors measured from one person with outcomes measured from another person (partner effects). Actor and partner effects are estimated simultaneously to allow for tests of predictors while controlling for other predictors. Further, these models appropriately handle the non-independence associated with dyadic data. Using this framework, relationship satisfaction of each partner was predicted by their own and their partner's health with separate models estimated for physical health and mental health at each of the four time points. Because models were estimated separately at each time point for only couples in which at least one partner completed measures, there was little missing data. Within the eight APIM models estimated, missing data on individual variables did not exceed 4%. Missing data within these models were handled using full information maximum likelihood estimation within Mplus 6 in order to utilize all available data.

Results

The means and standard deviations for physical health, mental health, and relationship satisfaction at each time point for patients and spouses separately are reported in Table 2. Patients showed a drop in physical health after diagnosis that persisted through 6 months and recovered to

Table 2. Descriptive statistics of patients and spouses over time

	Diagnosis M (SD)	1 month M (SD)	6 months M (SD)	12 months M (SD)
Physical health				
Patient	79.84 (20.11)***	48.86 (15.51)***c	75.33 (20.54)***c	78.32 (21.16)***
Spouse	72.68 (20.98)	68.42 (23.22)a	66.24 (24.08)c	67.78 (24.71)a
Mental health				
Patient	75.85 (19.76)***	52.84 (15.94)**c	77.54 (18.81)**	79.18 (18.72)***a
Spouse	71.07 (18.61)	67.50 (19.46)	71.60 (20.66)	71.92 (20.65)
Relationship satisfaction				
Patient	40.18 (6.53)	38.77 (7.68)	36.64 (8.61)+	36.73 (9.40)
Spouse	39.73 (6.59)	37.34 (8.53)	35.06 (9.99)	35.85 (9.18)

Note. Comparisons between partners:
+$p < .06$,
*$p < .05$,
**$p < .01$,
***$p < .001$.
Comparisons to diagnosis:
a$p < .05$,
b$p < .01$,
c$p < .001$.

diagnosis levels by 12 months. Spouses also experienced a small decline in physical health after diagnosis that was still present 12 months after treatment. Further, at each time point, spouses reported significantly lower physical health than patients. Patients exhibited a decline in mental health at 1 month that returned to diagnosis levels by 6 months and was actually significantly better than diagnosis by 12 months. The average mental health scores of spouses did not exhibit significant change over this time period but at each of the four time points spouses' scores were significantly lower than patients. Relationship satisfaction remained fairly stable over time with non-significant trends downward for both patients and spouses. The associations of relationship satisfaction with demographic variables were tested. No significant relationships were found for age, education level, income, or length of relationship. Ethnicity was the only demographic variable significantly associated with relationship satisfaction such that being non-Hispanic white was related to higher satisfaction for spouses ($p < .05$). Correlations between number of diagnosed illnesses (comorbidities) of both partners at diagnosis with relationship satisfaction of both partners at all four time points were examined. Consistently, comorbidities of the spouse were negatively associated with relationship satisfaction of the patient and spouse across time (r ranged from −.23 to −.42, all $p < .02$). Comorbidities of the patient were not related to relationship satisfaction of either the patient or spouse.

Effects of physical health on relationship satisfaction

At each time point, the APIM models in which patient and spouse physical health predicted patient and spouse relationship satisfaction fit the data well (CFI = 1.00, RMSEA = .00, and SRMR = .00 at each time point; see Figure 1). Interestingly, patient and spouse physical health ratings are moderately positively correlated at all four time points, including shortly after patients' surgery which is consistent with the fact that both spouses and patients experienced a drop in physical health at this time.

Actor effects

At every time point except 1 month, the patient's own physical health predicted his own relationship satisfaction. Spouse's relationship satisfaction was only predicted by the spouse's own physical health at 6 months post-surgery.

Partner effects

Patient's physical health had the strongest effect on spouse's relationship satisfaction at 1 month; at diagnosis and 6 months post-surgery, this effect approached significance ($p < .10$). Spouse's physical health only predicted patient relationship satisfaction at 1 month.

Effects of mental health on relationship satisfaction

At each time point, the APIM models in which patient and spouse mental health predicted patient and spouse relationship satisfaction fit the data well (CFI = 1.00, RMSEA = .00, and SRMR = .00 at each time point; see Figure 2). Taken together, the models suggest a changing relationship between mental health and relationship satisfaction over time. As with physical health, mental health of the patient and spouse were highly correlated with one another ($p < .001$) at all four measurement times.

Actor effects

Patient's mental health strongly predicted his own relationship satisfaction at all time points except for 1 month post-surgery. Spouse's mental health was a strong
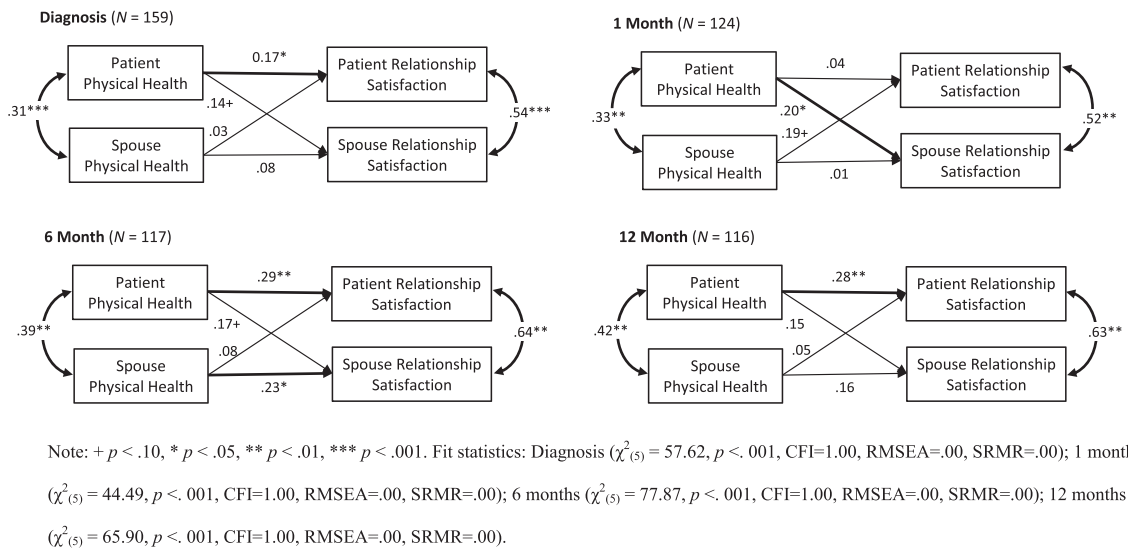
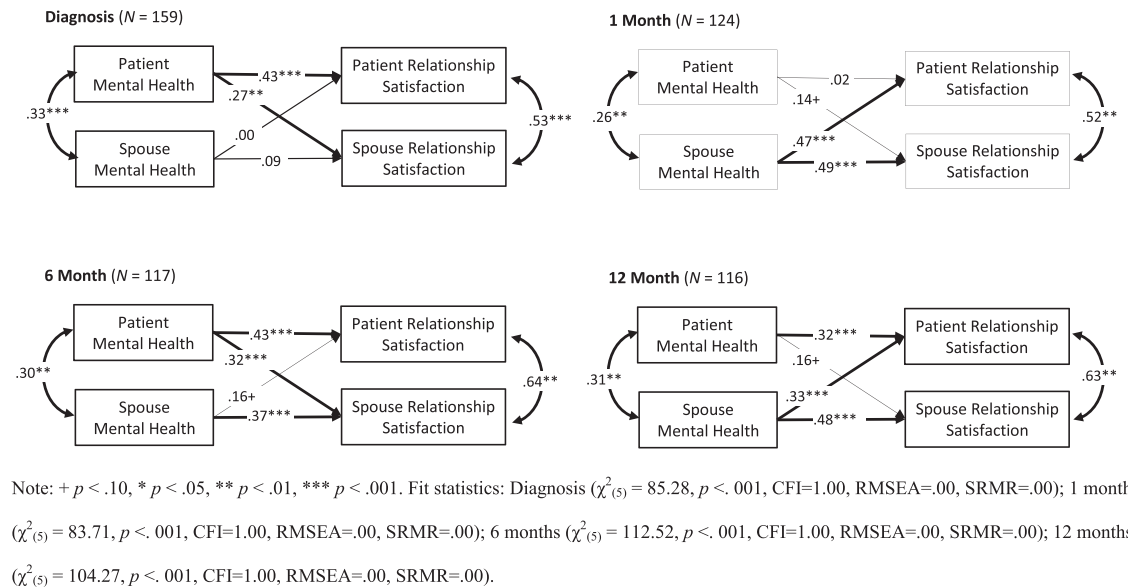**Figure 1.** APIM of physical health on relationship satisfaction

Note: + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Fit statistics: Diagnosis ($\chi^2_{(5)} = 57.62$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00); 1 month ($\chi^2_{(5)} = 44.49$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00); 6 months ($\chi^2_{(5)} = 77.87$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00); 12 months ($\chi^2_{(5)} = 65.90$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00).

Figure 2. APIM of mental health on relationship satisfaction

Note: + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Fit statistics: Diagnosis ($\chi^2_{(5)} = 85.28$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00); 1 month ($\chi^2_{(5)} = 83.71$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00); 6 months ($\chi^2_{(5)} = 112.52$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00); 12 months ($\chi^2_{(5)} = 104.27$, $p < .001$, CFI=1.00, RMSEA=.00, SRMR=.00).

predictor of the spouse's own relationship satisfaction at each time points after surgery but not at diagnosis.

Partner effects

Patient's mental health had the strongest effects on spouse's relationship satisfaction at diagnosis and 6 months post-surgery. Also, following surgery, spouse's mental health was a strong predictor of patient's relationship satisfaction, although less so at 6 months.

Discussion

The current study adds to the ongoing effort to facilitate a shift in both research and clinical work toward treating the

patient dyad rather than solely the patient [34]. Our results showed that not only patients, but spouses as well, experience a significant decrease in mental and physical health 1 month post-surgery. In fact, the spouses indicated worse mental and physical health than the patients at all time points other than 1 month post-surgery. While our study indicates that health gradually recovers at 6 and 12 months post-surgery, neither patients nor spouses return to their pre-surgery levels of health.

Previous work examining prostate cancer patients and spouses has indicated that for both members of the couple, one's own physical and mental health was predictive of their own marital satisfaction [17]; however, patients' marital satisfaction was also predicted by their partner's

physical and mental health [24]. The results of our study add to the dyadic prostate cancer literature by expanding the work by Zhou and colleagues (2011) in examining the influence of physical health and mental health on relationship satisfaction among a larger sample size of couples at four distinct time points, beginning at diagnosis and extending to 12 months after treatment. This longitudinal approach is advantageous to cross-sectional studies because it allows for an examination of change in health and relationship satisfaction from before surgery to long-term recovery. Further, the specific assessment periods allow for examining differences in associations of physical and mental health with relationship satisfaction over the course of a year to better tailor support for couples based on their time since treatment.

Similar to Zhou and colleagues (2011), both actor and partner effects of physical and mental health on relationship satisfaction were present in couples facing prostate cancer. What is unique to the current study is that results illustrate that the relationships between health and relationship satisfaction change throughout the year following diagnosis and treatment. In terms of actor effects, patient's own mental health and physical health were positively related to their own relationship satisfaction at all time points except for 1 month. This may indicate that at 1 month post-surgery, patients accept that they may not feel well while recovering but feel as though they will be back to 'normal' soon. Additionally, patients may be receiving extra care and attention from their spouse and loved ones because of the recent surgery. Patient's relationship satisfaction at 1 month was related to their spouse's health and suggests that how well a spouse is coping with caregiving duties is particularly important to the relationship at this point in time. One month after treatment for prostate cancer is a time when patients experience the most extensive physical limitations such as reliance on the use of a catheter and poor bladder control; thus spouses may have the greatest caregiving responsibilities at this time. Furthermore, if spouses are in poor health themselves, the patient's relationship satisfaction may decline at this time because the spouse is limited in the amount of caregiving they can provide. The correlation between number of spouse illnesses and relationship satisfaction of both partners also suggests the ability (or lack thereof) of spouses to support the patient may be impacting the relationship. Our findings also showed that patient's mental health had the strongest effect on spouse's relationship satisfaction at diagnosis and 6 months post-surgery; perhaps indicating that spouses are affected by the partner's mental adjustment to the diagnosis and adjustment to the longer-term recovery process.

Spouse's mental health predicted their own relationship satisfaction at all time points except diagnosis, possibly because the spouse is attending more to the patient's well-being rather than their own during that time. Conversely, spouse's own physical health was only related to their own relationship satisfaction at 6 months after surgery, suggesting that spouses are experiencing caregiving fatigue by 6 months that is leaving them physically depleted and emotionally less connected with their spouse. In terms of how each person's health impacted the other person's satisfaction, results showed that patient's relationship satisfaction was predicted by spouse mental health at all time points following surgery, but spouse physical health only predicted patient relationship satisfaction at 1 month after treatment. Patient's physical health had the strongest effect on the spouse's marital satisfaction at 1 month after surgery. This effect may be caused by the patient's sharp decrease in physical health resulting in a change in relationship dynamics as the spouse adapts to the caregiver role.

Several study limitations should be noted. First, because participants reported health related quality of life at the same time as relationship satisfaction we cannot draw strong causal conclusions; however, based on theory of the process, we have chosen to present associations as effects of health on relationship satisfaction. It is possible that patient's level of relationship satisfaction influenced their mental and physical health related quality of life. Second, it is unclear from the data whether some of the differences between patients and caregivers can be attributed to gender differences. The majority of spouses were women, and the number of male partners in the dataset was too small to allow tests of gender effects. Third, our sample was predominantly White and well-educated. It is possible that in other populations, the pattern of quality of life levels following treatment would be different. It is also possible that if other sources of support in one's network were stronger than the spousal relationship, partner effects observed would be of lesser magnitude. Finally, we did not distinguish between patients diagnosed with either stage I or II disease. To the extent that these experiences differ, an examination of these groups separately might lead to more specific, targeted recommendations.

Despite these limitations, the results of our study provide novel information about the experiences of both partners in a couple over the year following prostate cancer treatment and contributes to the growing understanding of how prostate cancer impacts both the men diagnosed and their spouses. Additionally, demonstrating different predictors of relationship satisfaction at different time points may have important clinical implications. While couples-based interventions have shown promise [34] they may be improved by considering where the couple is within the time course of diagnosis, treatment, and recovery. Our results indicate that 1 month post-treatment would be a particularly important time to intervene. Additionally, it may be important to consider how the stress both partners are experiencing could impact the relationship as a whole. Couples may be more likely to participate

in stress management classes or support groups when they understand how their mental and physical health impacts not only themselves, but their spouse as well.

References

1. American Cancer Society. *Facts and Figures 2014*, American Cancer Society: Atlanta, 2014.

2. Baade PD, Youlden DR, Krnjacki LJ. International epidemiology of prostate cancer: geographical distribution and secular trends. *Mol Nutr Food Res* 2009;**53**(2):171–184. DOI:10.1002/mnfr.200700511.

3. Litwin MS, Melmed GY, Nakazon T. Life after radical prostatectomy: a longitudinal study. *J Urol* 2001;**166**(2):587–592.

4. Lubeck DP, Litwin MS, Henning JM, Stoddard ML, Flanders SC, Carroll PR. Changes in health-related quality of life in the first year after treatment for prostate cancer: results from CaPSURE. *J Urol* 1999;**53**(1):180–186.

5. Nguyen LN, Pollack A, Zagars GK. Late effects after radiotherapy for prostate cancer in a randomized dose–response study: results of a self-assessment questionnaire. *J Urol* 1998;**51**:991–997.

6. Galbraith ME, Arechiga A, Ramirez J, Pedro LW. Prostate cancer survivors' and partners' self-reports of health-related quality of life, treatment symptoms, and marital satisfaction 2.5–5.5 years after treatment. *Oncol Nurs Forum* 2005;**32**(2):E30–E41. DOI:10.1188/05.ONF.E30-E41.

7. Soloway CT, Soloway MS, Kim SS, Kava BR. Sexual, psychological and dyadic qualities of the prostate cancer "couple.". *BJU Int* 2005;**95**:780–785. DOI:10.1111/j.1464-410X.2005.05400.

8. Couper J, Bloch S, Love A, Macvean M, Duchesne GM, Kissane D. Psychosocial adjustment of female partners of men with prostate cancer: a review of the literature. *Psycho-Oncology* 2006;**15**(11):937–953. DOI:10.1002/pon.1031.

9. Langer S, Abrams J, Syrjala K. Caregiver and patient marital satisfaction and affect following hematopoietic stem cell transplantation: a prospective, longitudinal investigation. *Psycho-Oncology* 2003;**12**(3):239–253. DOI:10.1002/pon.633.

10. Baider L, Kaufman B, Peretz T, Manor O, Ever-Hadani P. Mutuality of fate adaptation and psychological distress in cancer patients and their partners. *In Cancer in the Family*, Baider L, Cooper C, Kaplan De-Nour A (eds). Wiley: Chichester, 1996; 173–186.

11. Weihs K, Enright T, Howe G, Simmens SJ. Marital satisfaction and emotional adjustment after breast cancer. *J Psychosoc Oncol* 1999;**17**(1):33–49.

12. Krongrad A, Lai H, Burke MA, Goodkin K, Lai S. Marriage and mortality in prostate cancer. *J Urol* 1996;**156**(5):1696–1700. DOI:10.1016/S0022-5347(01)65485-5.

13. Queenan JA, Feldman-Stewart D, Brundage M, Groome PA. Social support and quality of life of prostate cancer patients after radiotherapy treatment. *Eur J Cancer Care (Engl)* 2010;**19**(2):251–259.

14. Pistrang N, Barker C. The partner relationship in psychological response to breast cancer. *Soc Sci Med* 1995;**40**(6):789–797. DOI:10.1016/0277-9536(94)00136-H.

15. Ko CM, Malcarne VL, Varni JW, et al. Problem-solving and distress in prostate cancer patients and their spousal caregivers. *Support Care Cancer* 2005;**13**(6):367–374. DOI:10.1007/s00520-004-0748-5.

16. Eton DT, Lepore SJ, Helgeson VS. Psychological distress in spouses of men treated for early-stage prostate carcinoma. *Cancer* 2005;**103**(11):2412–2418. DOI:10.1002/cncr.21092.

17. Kornblith AB, Herr HW, Ofman US, Scher HI, Holland JC. Quality of life of patients with prostate cancer and their spouses: the value of a data base in clinical care. *Cancer* 1994;**73**(11):2791–2802.

18. Harden JK, Sanda MG, Wei JT, et al. Partners' long-term appraisal of their caregiving experience, marital satisfaction, sexual satisfaction, and quality of life 2 years after prostate cancer treatment. *Cancer Nurs* 2013;**36**(2):104–113. DOI:10.1097/NCC.0b013e3182567c03.

19. Carlson LE, Bultz BD, Speca M, St-Pierre M. Partners of cancer patients. *J Psychosoc Oncol* 2000;**18**(3):33–43. DOI:10.1300/J077v18n03_03.

20. Badr H, Taylor CL. Sexual dysfunction and spousal communication in couples coping with prostate cancer. *Psycho-Oncology* 2009;**18**(7):735–746. DOI:10.1002/pon.1449.

21. Wittmann D, Carolan M, Given B, et al. Exploring the role of the partner in couples' sexual recovery after surgery for prostate cancer. *Support Care Cancer* 2014;**22**:2509–2515. DOI:10.1007/s00520-014-2244-x.

22. Chambers SK, Schover L, Nielsen L, et al. Couple distress after localised prostate cancer. *Support Care Cancer* 2013;**21**(11):2967–2976. DOI:10.1007/s00520-013-1868-6.

23. Garos S, Kluck A, Aronoff D. Prostate cancer patients and their partners: differences in satisfaction indices and psychological variables. *J Sex Med* 2007;**4**(5):1394–1403. DOI:10.1111/j.1743-6109.2007.00545.

24. Zhou ES, Kim Y, Rasheed M, et al. Marital satisfaction of advanced prostate cancer survivors and their spousal caregivers: the dyadic effects of physical and mental health. *Psycho-Oncology* 2011;**20**(12):1353–1357. DOI:10.1002/pon.1855.

25. Bailey DE, Wallace M, Mishel MH. Watching, waiting and uncertainty in prostate cancer. *J Clin Nurs* 2007;**16**(4):734–741. DOI:10.1111/j.1365-2702.2005.01545.x.

26. Germino BB, Mishel MH, Belyea M, Harris L, Ware A, Mohler J. Uncertainty in prostate cancer: ethnic and family patterns. *Cancer Pract* 1998;**6**(2):107–113. DOI:10.1046/j.1523-5394.1998.1998006107.x.

27. Fang CY, Manne SL, Pape SJ. Functional impairment, marital quality, and patient psychological distress as predictors of psychological distress among cancer patients' spouses. *Health Psychol* 2001;**20**(6):452–457.

28. Ezer H, Chachamovich JLR, Chachamovich E. Do men and their wives see it the same way? Congruence within couples during the first year of prostate cancer. *Psycho-Oncology* 2011;**20**(2):155–164. DOI:10.1002/pon.1724.

29. Song L, Northouse LL, Zhang L, et al. Study of dyadic communication in couples managing prostate cancer: a longitudinal perspective. *Psycho-Oncology* 2012;**21**(1):72–81. DOI:10.1002/pon.1861.

30. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992;**30**(6):473–483.

31. Norton R. Measuring marital quality: a critical look at the dependent variable. *J Marriage Fam* 1983;**45**(1):141–151.

32. Muthén L, Muthén B. *Mplus 6 User's Guide*, Muthén & Muthén: Los Angeles, 2012.

33. Kenny DA, Kashy DA, Cook WL. *Dyadic Data Analysis*, The Guilford Press: New York, 2006.

34. Badr H, Carmack CL, Milbury K, Temech M. Psychosocial interventions for couples coping with cancer: a systematic review. *In Psychological Aspects of Cancer*, Carr BI, Steel J (eds). Springer: US, 2013; 177–198. DOI: 10.1007/978-1-4614-4866-2_11