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CLINICAL CORRESPONDENCE

WILEY

Ten-year quality of life outcomes in men with prostate cancer

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mental health, prostatic neoplasms, psychological symptoms, prostate cancer, quality of life, survivors, survivorship, supportive care

1 | BACKGROUND

Although men with prostate cancer are living longer, they are not necessarily living well, with symptom burden increasing and HRQoL declining over time.[1] For many men, the first five years after diagnosis is marked by unmet needs, debilitating disease and treatment-related bowel, urinary and sexual symptoms.[2] To date, few studies have examined the trajectories of men over the 10 years after diagnosis.[3] To advance survivorship care, it is crucial to understand what factors drive long-term (10 year) health outcomes after a prostate cancer diagnosis. Accordingly, this study extends our previous research[4] to report physical and mental HRQoL, life satisfaction and symptom burden of men over the 10 years after prostate cancer diagnosis.

2 | METHOD

2.1 | Study setting and participants

This study of newly diagnosed adult men with prostate cancer was conducted in Queensland, Australia. Sampling strategy and methods are previously described.[4] Ethical approval was obtained from the Queensland University of Technology Human Research Ethics Committee (Approval No.3629H). In total, 1291 men were approached, 1064 consented, and 598 (56%) completed the final 10-year questionnaire. Self-administered questionnaires and computer-assisted telephone interviews were completed at baseline, and 2,6,12,24,36,48,60,72,84,96,108 and 120 months after the commencement of treatment.

2.2 | Measures and statistical analyses

Participants' demographics and clinical characteristics have been previously described.[4] Outcome measures included Disease-specific (Expanded Prostate Cancer Index Composite; EPIC) and HRQoL (Short Form 36; SF-36); Satisfaction with Life (Satisfaction with Life Scale; SWLS) (see Figures 1a-1c).[5-7] Growth mixture models (GMMs) in Mplus (Muthen and Muthen, 2015, Mplus User's Guide http://www.statmodel.com/usersguide/chapter8.shtml) were adopted to identify trajectory classes and predictors using 10-year follow-up data, with EPIC longitudinal subscales as time-varying covariates.[4] Missing EPIC

were computed using multiple-imputation (10 repetitions), but participants with >9 missing values in EPIC or with missing data in other predictors were excluded (sample size reduced to *n*=928). The number of trajectory classes was determined using the Lo-Mendell-Rubin likelihood ratio test.

3 | RESULTS

3.1 | Quality of life – Physical health

T1 F2 Three trajectory classes were identified (Table 1a and Supplementary File 1: Figures 1a and 2a). 35.0% of men experienced poor physical HRQOL (Class 1; standardized effect sizes relative to Classes 2 or 3 greater than 0.6 at 5-10 years after diagnosis). Compared with the group of participants (38.9%) with constantly high QoL physical health over 10 years (Class 3), Class 2 (lower physical HRQoL) was characterized by participants with ≥3 comorbid conditions (adjusted OR=3.29, 95% CI=1.33-8.18) and participants who received external beam

Key points

- Many prostate cancer survivors face ongoing decrements in health-related quality of life (HRQoL)
- The long-term trajectories of men with prostate cancer are not well described
- To our knowledge, this is the first substantive prospective study to track men's HRQoL, life satisfaction and symptom burden ten years from diagnosis
- Androgen deprivation therapy (ADT), multiple comorbidities, younger age and socioeconomic disadvantage are risk indicators for poorer long-term HRQoL after prostate cancer.
- Risk indicators need to be incorporated into survivorship care planning to facilitate personalised care for men most at risk of poorer physical and mental health.

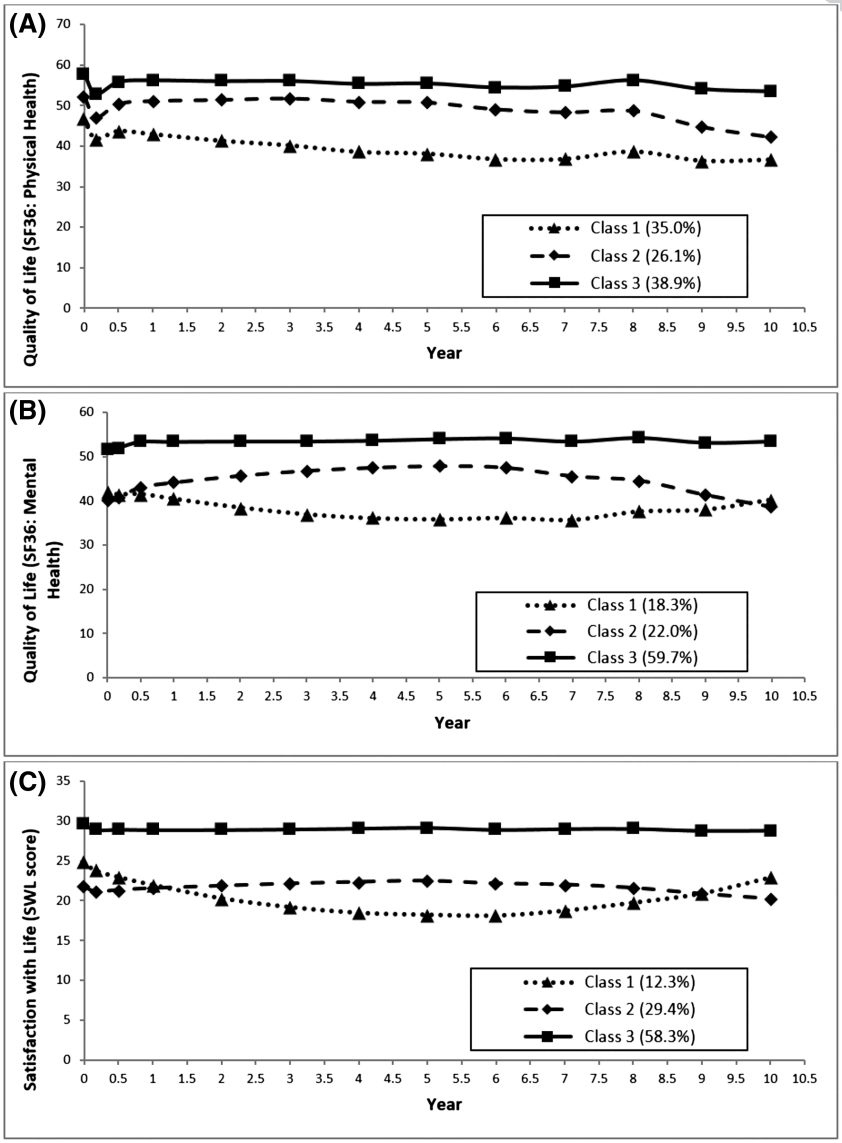

FIGURE 1 Trajectory patterns identified using growth mixture models: A, quality of life SF36, physical health domain (*N*=928); B, quality of life SF36, mental health domain (*N*=928); C, satisfaction with life (SWL) score (*N*=928)

TABLE 1 Predictors of trajectory class membership for various outcome measures

Table 1(a): Quality of Life SF36 (Physical Health Domain, *N*=928)			
	Adjusted OR (95% CI) relative to Constant High class (Class 3)		
Predictor	**Class 2**	**Class 1**	***P* value[a]**
Household income			<.001
<$40,000	1.82 (0.81, 4.06)	4.20* (2.01, 8.77)	
$40,000 - $80,000	2.13 (0.84, 5.40)	2.72* (1.25, 5.94)	
>$80,000	Reference	Reference	
Not answer/don't know	1.50 (0.47, 4.81)	1.94 (0.72, 5.24)	
Comorbidity			<.001
0 condition	Reference	Reference	
1-2 conditions	1.13 (0.54, 2.36)	2.63* (1.32, 5.22)	
≥3 conditions	3.29* (1.33, 8.18)	12.4* (5.27, 29.2)	
Therapy performed vs nil			<.001
Radical prostatectomy	0.66 (0.19, 2.25)	0.19* (0.08, 0.45)	
External beam radiation	2.71* (1.36, 5.41)	0.76 (0.36, 1.61)	
Brachytherapy	0.92 (0.30, 2.79)	0.27* (0.12, 0.64)	
Hormone therapy	1.74 (0.64, 4.77)	2.96* (1.21, 7.23)	
Watchful waiting	0.88 (0.20, 3.78)	0.63 (0.24, 1.66)	
Table 1(b): Quality of Life SF36 (Mental Health Domain, *N*=928)			
	Adjusted OR (95% CI) relative to Constant High class (Class 3)		
Predictor	**Class 2**	**Class 1**	***P* value[a]**
Household income			<.001
<$40,000	1.94* (1.03, 3.66)	2.62* (1.41, 4.89)	
$40,000 - $80,000	1.53 (0.80, 2.92)	1.18 (0.57, 2.42)	
>$80,000	Reference	Reference	
Not answer/don't know	1.10 (0.43, 2.82)	0.98 (0.34, 2.86)	
Comorbidity			<.001
0 condition	Reference	Reference	
1-2 conditions	1.50 (0.80, 2.80)	3.41* (1.24, 9.44)	
≥3 conditions	2.34* (1.14, 4.80)	6.25* (2.16, 18.09)	
Table 1(c): Satisfaction with Life (SWLSM, *N*=928)			
	Adjusted OR (95% CI) relative to Constant High (Class 3)		
Predictor	**Class 2**	**Class 1**	***P* value[a]**
Age (Younger)	1.09* (1.04, 1.14)	1.01 (0.92, 1.11)	<.001
Marital status			
Married/defacto	Reference	Reference	.004
Never married/widowed/ divorced/separated	2.55* (1.40, 4.65)	1.57 (0.72, 3.43)	
Household income			<.001
<$40,000	2.86* (1.20, 6.79)	1.14 (0.33, 4.02)	
$40,000 - $80,000	1.99 (0.96, 4.09)	0.67 (0.22, 1.98)	
>$80,000	Reference	Reference	
Not answer/don't know	0.86 (0.30, 2.49)	0.71 (0.24, 2.16)	

(Continues)

TABLE 1 (Continued)

Table 1(c): Satisfaction with Life (SWLSM, *N*=928)			
	Adjusted OR (95% CI) relative to Constant High (Class 3)		
Predictor	**Class 2**	**Class 1**	***P* value[a]**
Comorbidity			<.001
0 condition	Reference	Reference	
1-2 conditions	1.63 (0.81, 3.27)	1.28 (0.48, 3.46)	
≥3 conditions	3.39* (1.65, 6.95)	0.90 (0.23, 3.49)	

*significant at 0.05 level on the adjusted log odds of being in the class versus Class 3

[a]likelihood ratio test (full model versus model without the predictor under consideration)

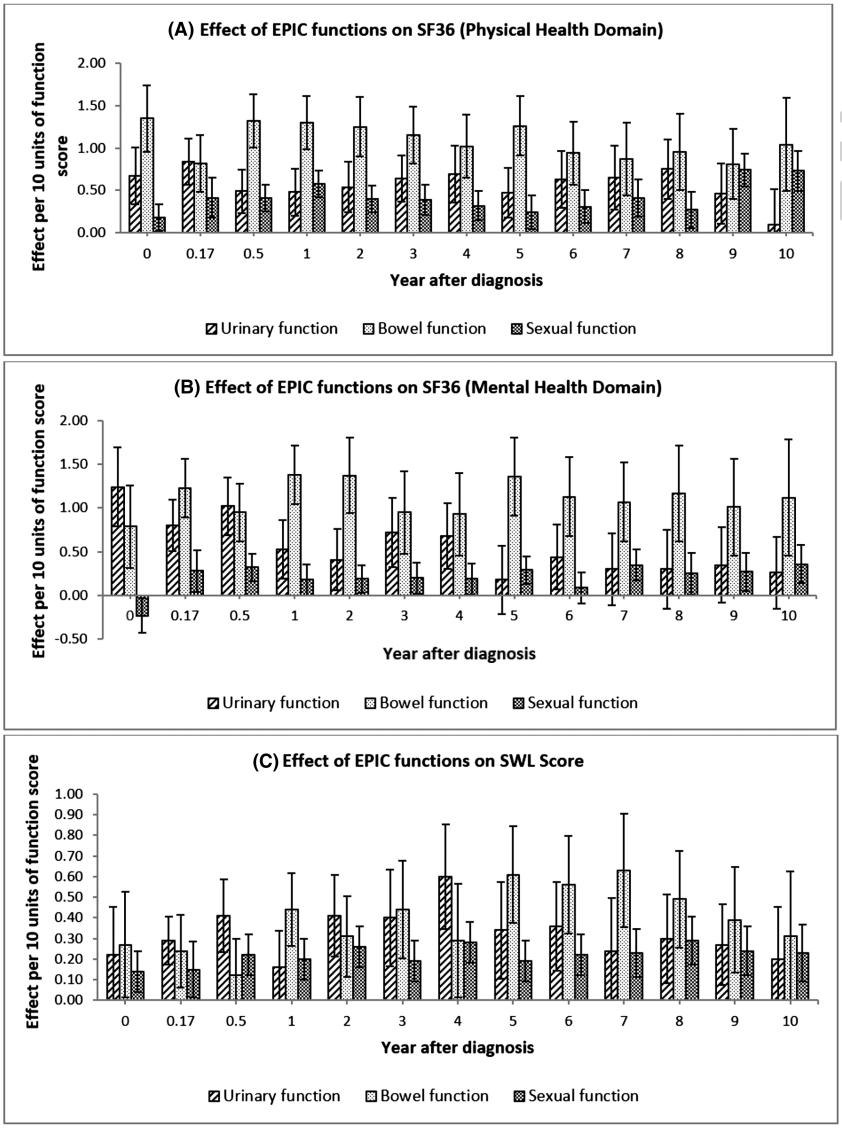

FIGURE 2 Effects from the expanded prostate cancer index composite (EPIC) urinary, bowel, and sexual functions on: A, quality of life SF36, physical health domain (*N* = 928); B, quality of life SF36, mental health domain (*N*=928); C, satisfaction with life (SWL) score (*N*=928)

radiation therapy (EBRT) (adjusted OR=2.71, 95% CI=1.36-5.41). Alternatively, Class 1 (lowest QoL) was differentiated by participants with lower household income (e.g., adjusted OR=4.20, 95% CI=2.01-8.77 for income <$40,000), participants with high levels of comorbidity (e.g., adjusted OR=12.4, 95% CI=5.27-29.2 for ≥3 comorbid conditions), participants who did not receive RP (adjusted OR=0.19, 95% CI=0.08-0.45) or BT (adjusted OR=0.27, 95% CI=0.12-0.64), and participants who received ADT (adjusted OR=2.96, 95% CI=1.21-7.23).

3.2 | Quality of life – Mental health

Three trajectory classes were identified (Table 1b and Supplementary File 1: Figures 1b and 2b). 40.3% of men reported adverse mental HRQOL (Classes 1 or 2; standardized effect sizes relative to Class 3 greater than 0.9 at 5-10 years). Compared with the group of participants (59.7%) with constantly high QoL mental health over 10 years (Class 3), Class 2 (lower mental-health QoL) was characterized by participants with lower household income (adjusted OR=1.94, 95% CI=1.03-3.66 for income <$40,000) and participants with ≥3 comorbid conditions (adjusted OR=2.34, 95% CI=1.14-4.80**).** Alternatively, Class 1 (lowest QoL) was differentiated by participants with lower household income (adjusted OR=2.62, 95% CI=1.41-4.89 for income <$40,000) and participants with high levels of comorbidity (e.g., adjusted OR=6.25, 95% CI=2.16-18.1 for ≥3 comorbid conditions).

3.3 | Satisfaction with life

Three trajectory classes were identified (Table 1c and Supplementary File 1: Figures 1c and 2c). 41.7% of men reported low life satisfaction (Classes 1 or 2; standardized effect sizes relative to Class 3 greater than 1.3 at 5-10 years). Compared with the group of participants (58.3%) who had constantly high SWL score throughout the 10-year follow-up period (Class 3), Class 2 (low constant) was characterized by participants who were younger age (adjusted OR=1.09 per 1-year decrease in age, 95% CI=1.04-1.14), never married/widowed/divorced/separated (adjusted OR=2.55, 95% CI = 1.40-4.65), and participants with household income <$40,000 (adjusted OR=2.86, 95% CI=1.20-6.79), ≥3 comorbid conditions (adjusted OR=3.39, 95% CI=1.65-6.95).

3.4 | Time-varying effects of EPIC subscales

Generally, higher EPIC function significantly increased QoL and SWL scores at each time point. The effects of EPIC bowel function on the SF36 QoL physical and mental health were generally larger compared to urinary and sexual functions; see[4] for comparative results of the 6-year follow-up data. For the SF36 QoL physical domain, the effect of the EPIC urinary function started to decrease whereas that of the EPIC sexual function started to increase after 8-year post diagnosis. For the SF36 QoL mental domain, the effects of all the EPIC functions remained similar after 6-year post diagnosis. For SWL, the effects of all EPIC functions started to reduce after 8 years post-diagnosis.

4 | DISCUSSION

Our findings indicate that 35 to 40% of men experience long term decrements (ten years) in physical and mental quality of life outcomes and life satisfaction after the diagnosis and treatment of prostate cancer. With gaps in prostate cancer survivorship interventions reported in a recent review,[3] urgent action is needed to improve ongoing care for men with the disease.[8]

In particular, steps to ameliorate the side-effects of ADT are needed given the lasting effects of this treatment on men contributing to poorer long-term physical HRQoL. These steps may include interventions such as tailored exercise to reduce symptoms like fatigue, sexual dysfunction, sarcopenia, and weight gain.[9]

Further support for socioeconomically disadvantaged and **younger** men is needed with poorer ten-year HRQoL most pronounced in men who were younger, single, of lower income status, and living with multiple comorbidities. Accordingly, these findings may reflect the burden of disrupted life goals related to career development, impaired relationship intimacy and greater financial responsibilities which may fall more heavily upon younger or single men.[10]

4.1 | Clinical implications

These results provide a compelling case for routine, life-long survivorship care including physical and psychological symptom management for men after a prostate cancer diagnosis. In our study, treatment with ADT, the presence of multiple comorbidities, and socioeconomic disadvantage are risk indicators for poorer long-term HRQoL and life satisfaction after a prostate cancer diagnosis. Given a substantive group with these factors reported constant comparatively poorer long-term outcomes over ten years, men should be assessed for these factors and provided with suitable supportive care. Accordingly, we propose men are comprehensively assessed soon after diagnosis, fully informed of the short and long-term implications of treatment choices for their disease; supported in developing their own comprehensive survivorship care plan; and referred to services for regular care and support across the course of their disease.

4.2 | Limitations

Study limitations include using non-probability sampling and not having matched controls as a comparison group. Strengths of the study include a large sample, application of well validated and reliable measures, high response, an attrition rate comparable to similar studies a follow-up of 10 years.

5 | CONCLUSIONS

Over ten years, poorer long-term HRQoL and life satisfaction were associated with the use of ADT, multiple comorbidities, and low socioeconomic status. Since these factors predict poorer health outcomes, men should be assessed for them and provided with life-long prostate cancer survivorship care.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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CONFLICT OF INTEREST

The authors declare they have no conflict of interest.

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