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## ONCOLOGY

## Sexual Activity, Function and Dysfunction After a Diagnosis of Bladder Cancer

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### ABSTRACT

**Background:** Sexual dysfunction is common in those affected by cancer and local and radical treatments for Bladder Cancer (BC) can affect sexual function directly.

**Aim:** To evaluate sexual function following a bladder cancer (BC) diagnosis.

**Methods:** Self-reported sexual function was collected 10 years after a diagnosis of BC as part of a cross-sectional patient reported outcome measure (PROM) survey exploring life after BC diagnosis and treatment.

**Outcomes:** Participants completed a combined EORTC QLQ-BLM30 and QLQ-NMIBC24 questionnaire, including questions on sexual activity, intimacy, erectile/ejaculatory function and vaginal dryness.

**Results:** A total of 1796 participants returned a completed survey out of 3279 eligible participants (55%). Of the participants who returned a completed survey, a total of 1530 (85%) participants answered sexual function questions. The median (IQR) age was 75 (70–81). Participants were predominantly men (78%) and married/in civil partnerships (66%). In total, 31% were sexually active. Vaginal dryness was common (66%) in women. Erectile and ejaculatory dysfunction (80% and 58% respectively) were common in men. Compared to TURBT +/- intravesical treatments, those who had radical treatment were less likely to be sexually active (adjusted OR 0.56, 95% CI: 0.44–0.72,  $P<0.001$ ) and had worse mean scores for intimacy problems (29.1 [radical treatment] vs 12.1,  $P<0.001$ ), male sexual problems (72.2 [radical treatment] vs 45.7,  $P<0.001$ ) and overall sexual function (17.1 [radical treatment] vs 20.3,  $P=0.01$ ).

**Clinical Implications:** These findings highlight the magnitude of sexual dysfunction in the BC patient cohort and can help inform patients during the pre-op counselling process and shared decision making prior to BC treatments.

**Strengths and Limitations:** This study provides the largest in-depth analysis of sexual activity and function after BC diagnosis and treatment, to date. Limitations include the lack of data on participants' sexual function prior to BC treatment and the heterogeneity with respect to time passed since last BC treatment.

**Conclusion:** Sexual dysfunction in BC patients is common and rates appear higher following radical treatments compared to endoscopic. It is important to elicit these problems in clinics to enable counselling and treatment.

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**Key Words:** Bladder Cancer; Quality of Life; HRQOL; Patient Reported Outcomes; EQ5D, Sexual Function; Erectile Dysfunction

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## INTRODUCTION

Sexual dysfunction in those affected by cancer is common and may arise from anatomical disruption, side-effects from medication, emotional consequences of the diagnosis and treatment, or a combination of these.<sup>1,2</sup> Bladder cancer (BC) is the ninth most commonest and one of the most prevalent cancers worldwide.<sup>3</sup> Treatments vary between local bladder-sparing approaches and radical cystectomy (RC) or radiotherapy (RT). Local and radical treatments may affect sexual function directly. Endoscopic resection uses electrocautery that may temporarily disrupt erectile function and libido.<sup>4</sup> Intravesical treatments (such as Bacillus Calmette-Guerin [BCG] and chemotherapy) may cause infections or local inflammation leading to painful ejaculation, erectile difficulties and concern about contamination.<sup>5,6</sup> Both RC and RT lead to erectile and ejaculation dysfunction in men, and vaginal dryness, vaginal shortening and dyspareunia in women.<sup>7</sup> Cystectomy often requires an ileal conduit diversion and this may impact upon body image.<sup>8</sup> These predictable changes may be discussed too briefly at the time of consent, leading to distress.<sup>9</sup>

We recently published a large cross-sectional survey of health-related quality of life (HRQOL) in participants 1–10 years after a diagnosis of BC.<sup>10</sup> HRQOL was found to be significantly worse than for colorectal or prostate cancer patients. With regards to sexual problems, we found these were more commonly reported by younger men and those who received radical treatment. To date, most reports of sexual function in BC have been modest in size, focussed on either NMI or invasive disease, or have compared surgical approaches (e.g. ileal conduit vs neobladder).<sup>11</sup> Whilst small reports have identified areas of potential concern, there is an urgent need to comprehensively understand the sexual consequences of BC diagnosis and treatment, thereby helping in the counselling of individuals and development of therapeutic strategies.<sup>12</sup> Here we evaluate and explore in detail, the sexual function components from our previously published survey.<sup>10</sup>

## METHODS

### Study Design and Setting

Sexual function information was collected as part of a cross-sectional patient reported outcome measure (PROM) survey exploring life after BC diagnosis and treatment. The full methods and wider results are published elsewhere.<sup>10,13</sup> In brief, eligible participants aged  $\geq 18$  years, between 1–10 years after a diagnosis of BC (NMI or invasive) between January 2007 and December 2016 and diagnosed in the National Health Service (NHS) hospitals in Yorkshire and Humber, North Derbyshire or South Tees regions were invited to participate. Participants could either complete a paper questionnaire that was mailed to their home address, complete an online questionnaire, or complete the questionnaire over the telephone.

## Questionnaire Content

With the appropriate permissions from the EORTC, components of the EORTC QLQ-BLM30 and QLQ-NMIBC24 questionnaires were combined to assess treatment and cancer-specific HRQOL.

The combined EORTC QLQ-BLM30 and QLQ-NMIBC24 questionnaires included the following sexual function scales/items answered on a 4-point scale ('not at all' to 'very much') with reference to the last 4 weeks:

- Sexual function (2 items, covering sexual activity ["To what extent were you sexually active?"] and interest ["To what extent were you interested in sex?"])
- Male sexual problems (2 items, covering erectile ["Did you have difficulty in gaining or maintaining an erection?"] and ejaculation issues ["Did you have ejaculation problems?"])
- If sexually active in the last 4 weeks:
- Female sexual problems (1 item, on vaginal dryness ["Did you have a dry vagina or other problems during intercourse?"])
- Sexual intimacy (1 item, about comfort with sexual intimacy ["Have you felt uncomfortable about being sexually intimate?"])
- Risk of contaminating partner (1 item, worry about treatment contamination ["Have you worried that you may contaminate your partner during sexual contact with the bladder treatment you have been receiving?"])
- Sexual enjoyment (1 item ["To what extent was sex enjoyable for you?"]).

Higher scores reflect better function for the sexual function and sexual enjoyment domains. In contrast, higher scores for the following domains: male sexual problems, female sexual problems, sexual intimacy and risk of contaminating partner, reflect worsening function. The survey captured self-reported information on participant socio-demographics, level of physical activity (GODIN scale),<sup>14</sup> treatment received for BC (TURBT +/- intravesical treatments, RC or RT) and the presence of long term conditions (LTCs). The LTCs captured were heart conditions, angina, stroke, hypertension, diabetes, arthritis, asthma/chronic chest problems, gastrointestinal problems (stomach, bowel or gall bladder problems), kidney diseases, Alzheimer's/Dementia, Epilepsy, Neurological problems and liver or pancreas problems. The income domain of the Index of Multiple Deprivation (IMD) was used to measure socioeconomic deprivation. The IMD was allocated using postcode of residence at diagnosis and grouped into quintiles, with IMD category 1 being the most socially deprived.<sup>15</sup>

## Statistical Analysis

Age was grouped into <65, 65–74, 75–84, and  $\geq 85$  years. The number of LTCs were grouped into none, one, two, three or  $\geq 4$ . In addition, we looked at sexual activity in patients with specific LTCs.

EORTC Questionnaire responses were linearly transformed to a 0–100 scale as previously described.<sup>16</sup> Mean (and standard

deviation [SD]) scores were calculated for: sexual function, male sexual problems, sexual intimacy problems, risk of contaminating partner worry, sexual enjoyment and female sexual problems. For the purposes of analysis, treatment group was separated into two groups. TURBT was grouped together with adjuvant intravesical treatments and RC and radical RT were grouped together as radical treatment due to the small number of patients undergoing RT. Categorical outcomes were analysed using a chi-square test and continuous variables were analysed using a T test for parametric data and a Mann-Whitney U test for non-parametric data. Logistic regression was used to assess the relationship between sexual activity and treatment group controlling for confounding variables. With regards to missing data and individual questions in the survey that weren't answered, data was analysed if there were still questions answered that were stand-alone and not dependent on others. However, we did not include answers to sexual questions where there was a dependency on being sexually active in the last 4 weeks. For these questions participants were instructed to answer only if sexually active in the last 4 weeks. Where participants had not followed the instructions and reported not being sexually active in the last 4 weeks, and still answered the questions that depended on being sexually active, their answers were excluded from the analysis. Statistical Analysis was performed using STATA (Version 16.1 for Windows).

## RESULTS

### Participants

As previously reported,<sup>10</sup> 1,796 of 3,279 eligible participants returned a completed survey (55%). Of these, 1,530 (85% of those who returned a completed survey) answered questions on sexual activity and were used as the denominator in this sub-study. In total, 1492 participants completed paper questionnaires, 29 participants completed online questionnaires and 9 participants completed telephone questionnaires.

Most participants were men (78%), married or in a civil partnership (66%), insufficiently active using the GODIN exercise scale (53%) and were current (9%) or ex-smokers (60%) (Table 1). A further breakdown of demographics stratified by sex and individual treatments are in [supplementary tables 1 and 2](#) respectively.

### Response Rates

The highest response rate was for the question on sexual interest (100%). The lowest response rates were for questions on sexual enjoyment (78% of those who reported being sexually active), risk of contaminating partner worry (78% of the sexually active), and female sexual problems (78% of the sexually active) ([Supplementary Table 3](#)).

Sexual item response rates varied most by relationship status ([Supplementary Table 3](#)). Participants who were not in a relationship (but reported being sexually active) had lower response

rates for questions on sexual intimacy (69% [no relationship] vs 83% [in a relationship]), risk of contaminating partner (65% vs 82%), sexual enjoyment (66% vs 82%) and female sexual problems (64% vs 81%) compared to those in a relationship.

### Sexual Activity by Participant Demographics

In total, 31% of participants reported being sexually active in the last 4 weeks (Table 2). Rates of sexual activity varied with sex, age and LTCs. In particular, fewer women were sexually active compared to men ('A little', 'Quite a bit' or 'Very much': 19% [females] vs 34% [males],  $P<0.001$ ), and the proportion of participants <65 years who were sexually active was double that of the 75–84 age group (50% vs 25% respectively,  $P<0.001$ , Table 2). Participants with 4+ LTCs were much less likely to belong to the sexually active group than participants with no LTCs (17% vs 38%,  $P<0.001$ ). There were no significant differences in sexual activity with respect to carer roles or smoking status (Table 2). Participants with cardiovascular conditions or diabetes were less likely to be sexually active than participants without LTCs (% Sexually active: 23% for heart conditions, 17% for angina, 26% for strokes, 27% for hypertension only, 27% for diabetes vs 38% for no LTCs (Table 3).

### Sexual Function by Sex

The EORTC sexual questionnaire used in this study only included one female-specific sexual function item about vaginal dryness/problems with intercourse. Over a third (36%) of sexually active women reported problems with vaginal dryness/problems with intercourse (answering 'quite a bit or 'very much' (Figure 1). Over two thirds (67%) of men reported erectile difficulty (answering 'quite a bit or 'very much') and half of men (50%) reported ejaculation problems (answering 'quite a bit or 'very much') (Figure 1).

Rates of sexual interest were higher in men than women (23% vs 6% respectively reporting 'Quite a bit' or 'Very much',  $P<0.001$ , Figure 1). Similarly, more males were sexually active compared to females (answering 'A little', 'Quite a bit' or 'Very much': 34% [males] vs 19% [females],  $P<0.001$ , Figure 1).

Mean sexual function scores were higher in men compared to women (21.2 [males] vs 8.9 [females],  $P<0.001$ , Figure 2a and [Supplementary Table 4](#)). No statistically significant differences were seen for intimacy problems, fear of contaminating partner or sexual enjoyment.

### Sexual Activity and Function by Treatment Received

Participants who received radical treatment (RC or RT+/- systemic treatments) were less likely to be sexually active compared to those who underwent local treatment (TURBT+/- intravesical agents) (26% vs 36% respectively, Unadjusted OR 0.65 [95% CI 0.52–0.81], [ $<0.001$ ] (Table 2). This difference persisted after adjustment for age, sex, LTCs, relationship status and IMD

**Table 1.** Demographic Characteristics of Participants and Treatment

Characteristic	All treatments (N=1,530)		TURBT+/- MMC/BCG (N=731) <sup>a</sup>		Radical Cystectomy or Radical RT +/- other (N=737) <sup>a</sup>		P value
	No. or Median	% or IQR	No. or Median	% or IQR	No. or Median	% or IQR	
Sex							
Male	1,199	78	597	52	558	48	0.005
Female	331	22	134	43	179	57	
Age at diagnosis, years	69	63–75	69.0	63–76	69	63–75	0.19
Age at survey, years	75	70–81	76.0	70–82	75	70–80	0.003
No. of other LTCs							
None	364	24	163	47	187	53	0.15
1	466	30	222	50	226	50	
2	320	21	145	48	159	52	
3	205	13	106	53	95	47	
≥4	175	11	95	58	70	42	
IMD							
1 (least deprived)	345	23	169	52	157	48	0.70
2	388	25	174	47	196	53	
3	323	21	155	49	162	51	
4	240	16	117	52	109	48	
5 (most deprived)	234	15	116	51	113	49	
Employment status							
Employed	176	12	76	44	97	56	0.19
Unemployed	28	2	11	41	16	59	
Retired	1,277	83	615	50	605	50	
Other	13	1	7	54	6	46	
Not known	36	2	22	63	13	37	
Relationship status							
Married/Civil partnership	1,012	66	477	49	503	51	0.03
Separated/Divorced	135	9	56	43	75	57	
Widowed/Surviving Partner	255	17	136	57	101	43	
Single	51	3	25	53	22	47	
Other	21	1	12	60	8	40	
Not known	56	4	25	47	28	53	
Smoking							
Never smoker	405	26	194	50	194	50	0.88
Ex-smoker	914	60	438	50	441	50	
Current smoker	143	9	72	52	66	48	
Not known	68	4	27	43	36	57	
GODIN Exercise							
Insufficiently active	809	53	380	49	401	51	0.20
Moderately active	109	7	50	48	55	52	
Active	242	16	129	55	105	45	
Not known	370	24	172	49	176	51	
Carer							
No	1,132	74	538	50	547	50	0.48
Yes	297	19	149	52	138	48	
Not known	101	7	44	46	52	54	
Ethnicity							
White	1,455	95	696	50	700	50	0.45
Non white	16	1	10	63	6	38	
Not known	59	4	25	45	31	55	

BCG = Bacillus Calmette-Guerin; GODIN = Godin Leisure-Time Exercise Questionnaire; IMD=Index of Multiple Deprivation; LTCs= Long Term Conditions; MMC = Intravesical Mitomycin C; TURBT = Transurethral Resection of a Bladder Tumour

<sup>a</sup>N=62 out of N=1530 with Treatment Other/Not known excluded from analysis

**Table 2.** Demographic Characteristics of Participants and Sexual Activity

Characteristic	Total (N=1,530)		Sexually Active (N=471)		Not Sexually Active (N=1,059)		Unadjusted ORs	95 % CI	p value
	No.	%	No.	% <sup>a</sup>	No.	% <sup>a</sup>			
<b>Sex</b>									
Male	1199	78	407	34	792	66	1.00		
Female	331	22	64	19	267	81	0.47	0.35	0.63 <0.001
<b>Age, years</b>									
<65	179	12	90	50	89	50	3.06	2.17	4.32 <0.001
65-74	522	34	198	38	324	62	1.85	1.43	2.38 <0.001
75-84	616	40	153	25	463	75	1.00		
≥85	213	14	30	14	183	86	0.50	0.32	0.76 0.001
<b>No. long-term conditions</b>									
None	364	24	137	38	227	62	1.00		
1	466	30	168	36	298	64	0.93	0.70	1.24 0.64
2	320	21	96	30	224	70	0.71	0.52	0.98 0.04
3	205	13	40	20	165	80	0.40	0.27	0.60 <0.001
4+	175	11	30	17	145	83	0.34	0.22	0.54 <0.001
<b>Relationship status</b>									
Married/Civil partnership	1012	66	350	35	662	65	1.00		
Separated/Divorced	135	9	40	30	95	70	0.80	0.54	1.18 0.25
Widowed/Surviving Partner	255	17	44	17	211	83	0.39	0.28	0.56 <0.001
Single	51	3	14	27	37	73	0.72	0.38	1.34 0.30
Other / Not known	77	5	23	30	54	70	n/a	n/a	n/a
<b>Index of Multiple Deprivation</b>									
1, 2 or 3 (least deprived)	1056	69	339	32	717	68	1.00		
4 or 5 (most deprived)	474	31	132	28	342	72	0.82	0.64	1.04 0.10
<b>Ethnicity</b>									
White	1455	95	446	31	1009	69	1.00		
Non-white	16	1	10	63	6	38	3.77	1.36	10.44 0.01
Not known	59	4	15	25	44	75	n/a	n/a	n/a
<b>Carer</b>									
No	1132	74	353	31	779	69	1.00		
Yes	297	19	94	32	203	68	1.02	0.78	1.35 0.88
Not known	101	7	24	24	77	76	n/a	n/a	n/a
<b>Smoking</b>									
Never smoker	405	27	118	29	287	71	0.93	0.72	1.20 0.56
Ex-smoker	914	60	281	31	633	69	1.00		
Current smoker	143	9	49	34	94	66	1.17	0.81	1.70 0.40
Not known	68	5	23	34	45	66	n/a	n/a	n/a
<b>Treatment</b>									
TURBT ± BCG/MMC	731	48	260	36	471	64	1.00		
RC or Radical RT ± other	737	48	194	26	543	74	0.65	0.52	0.81 <0.001
Other / Not known	62	4	17	27	45	73	n/a	n/a	n/a

BCG = Bacillus Calmette-Guerin; MMC = Intravesical Mitomycin C; RC = Radical Cystectomy; RT = Radiotherapy; TURBT = Transurethral Resection of a Bladder Tumour

<sup>a</sup>Row percentages used to show distribution of sexual activity by patient characteristic, rather than by outcome

(adjusted OR 0.56, 95% CI: 0.44 -0.72,  $P<0.001$ ) and might reflect lack of interest and/or poorer sexual function.

However, there was no significant difference in sexual interest between those receiving radical treatment compared to TURBT ('Quite a bit' or 'Very much': 19% [radical treatment] vs 21% [TURBT],  $P=0.35$ ) (Figure 3). A larger

proportion of men who had received radical treatment reported more severe erectile dysfunction ('Quite a bit' or 'Very much': 81% [radical] vs 54% [TURBT],  $P>0.001$ ), ejaculatory problems ('Quite a bit' or 'Very much': 65% [radical] vs 36% [TURBT],  $P<0.001$ ) and intimacy problems ('Quite a bit' or 'Very much': 26% [radical] vs 10%

**Table 3.** Long Term Conditions and Sexual Activity

Long Term Condition	Sexually Active		Not sexually Active	
	%	95% CI	%	95% CI
Heart condition	23	19–28	77	72–81
Angina	17	11–24	83	76–89
Stroke	26	17–36	74	64–83
Hypertension	27	23–30	73	70–77
Diabetes	27	22–33	73	67–78
Arthritis	22	18–26	78	74–82
Asthma/chronic chest problem	26	21–33	74	67–79
Stomach, bowel, or gallbladder problem	25	20–31	75	69–80
Kidney disease	20	14–28	80	72–86
Alzheimer's/dementia	13	4–31	88	69–96
Epilepsy	16	6–38	84	62–94
Neurological problem	27	17–40	73	60–83
Liver or Pancreas problem	13	5–28	88	72–95
None	38	33–43	62	57–67

\*Frequencies not shown due to potential for identification.

[TURBT],  $P<0.001$ ) compared to TURBT+/- adjuvant treatments (Figure 3).

There was no significant difference between the treatments in females who reported vaginal dryness/problems with intercourse ('Quite a bit' or 'Very much': 40% [radical treatment] vs 32% [TURBT],  $p=0.76$ ), though limited by few participants (Figure 3). Participants who had received radical treatment had worse mean scores for sexual function (17.1 [radical treatment] vs 20.3,  $P=0.01$ ), male sexual problems (72.2 [radical treatment] vs 45.7,  $P<0.001$ ) and intimacy problems (29.1 [radical treatment] vs 12.1,  $P<0.001$ ) than those who had received TURBT +/- adjuvant treatments (Figure 2b and Supplementary Table 5). There were no statistically significant differences in concerns over contaminating partner and sexual enjoyment scores.

### Sexual Function by Sexual Activity

There were marked differences in the rate of sexual interest between sexually active and inactive participants (Supplementary Figure 1). For example, 48% of sexually active participants were 'Quite a bit' or 'Very much' interested in sex, compared to 7% of inactive participants ( $P<0.001$ ). Males who were not sexually active were more likely to report erectile dysfunction ('Quite a bit' or 'very much': 76% [not active] vs 52% [active]) and ejaculatory problems ('Quite a bit' or 'very much': 56% [not active] vs 40% [active]) (both  $P<0.001$ ). Males who were sexually active had lower scores for male sexual problems compared to inactive respondents (48.6 [active] vs 64.7 [not active],  $P<0.001$ , Figure 2c and Supplementary Table 6).

## DISCUSSION

This study provides the largest in-depth analysis of sexual activity and function after BC diagnosis and treatment, to date. We

present a large multi-centre study showing data from a population that has traditionally been difficult to reach. Additionally, it is one of very few studies evaluating sexual function in patients with NMIBC. There are several key findings: Firstly, a significant proportion of sexually active men and female participants reported sexual problems. Secondly, we found that compared to men, women reported less sexual interest, were less sexually active and had overall worse sexual function. Finally, individuals who have undergone radical treatments for BC were less likely to be sexually active and this was independent of age, sex, LTCs, relationship status and IMD, and reported worse sexual intimacy problems and (male) sexual problems compared to those undergoing TURBT.

High rates of male and female sexual problems were reported in both TURBT and radical treatment groups. Erectile and ejaculatory dysfunction were even higher in the radical group. These findings are supported by studies demonstrating the impact of radical treatment on specific male and female sexual function parameters.<sup>7,17</sup> In addition, our finding of worse overall sexual function with radical treatment compared to non-radical treatments in BC confirm a previous smaller series.<sup>18</sup> The impact of cystoscopic treatment on sexual function outcomes has been reported to a lesser degree. A study of 117 NMIBC patients demonstrated vaginal dryness in 63% of sexually active females, as well as erectile dysfunction and ejaculation problems in 60% and 43% of sexually active males respectively.<sup>6</sup> This data provides a useful insight for the clinician into the magnitude of sexual dysfunction in the BC patient cohort.

We found that compared to men, women were less sexually active, had less sexual interest and had overall worse sexual function. This finding supports previous work in 117 NMIBC patients that found fewer women were sexually active compared to men (percentage sexually active: 44% vs 69% [men]) and fewer women had interest in sex compared to men (per-

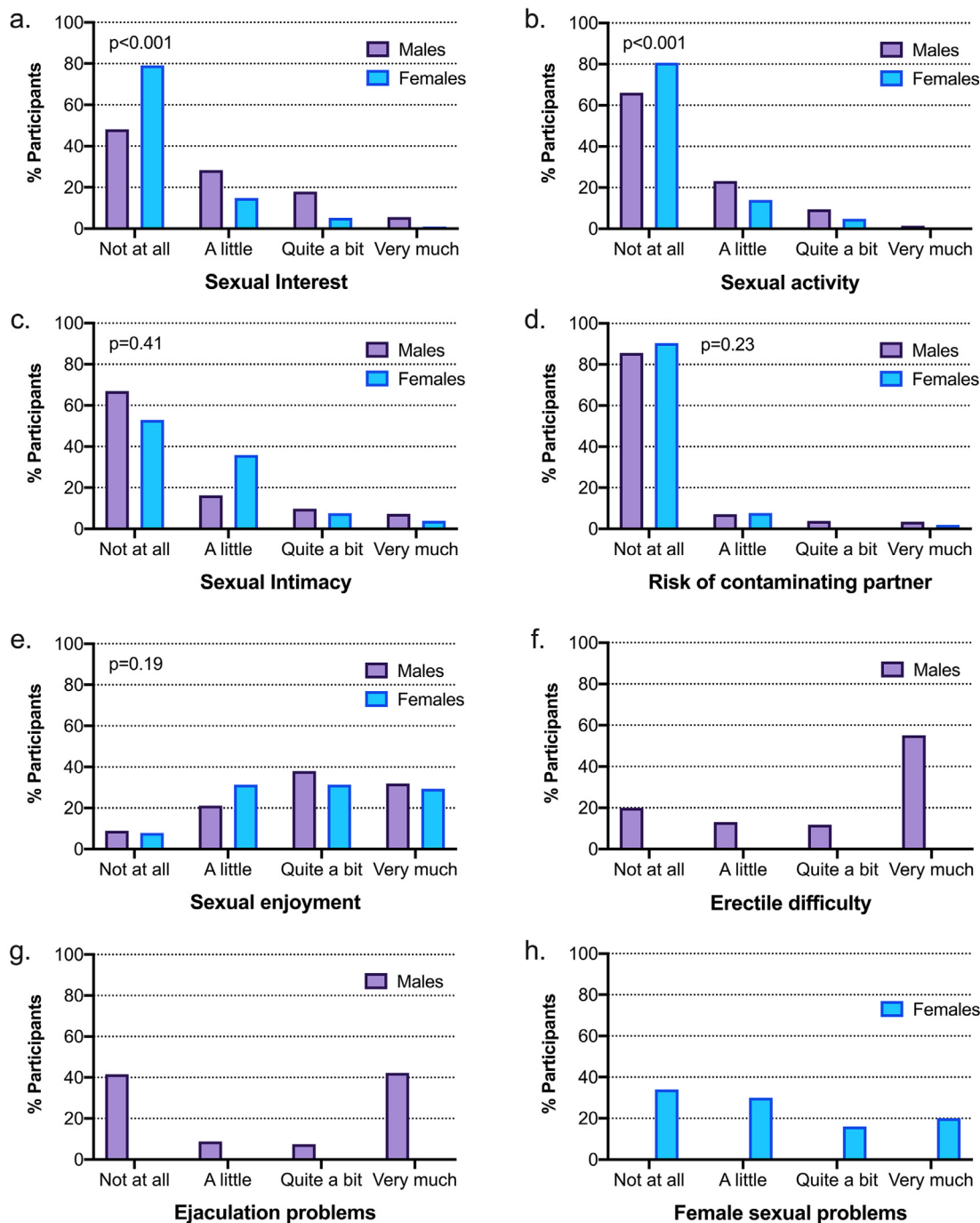


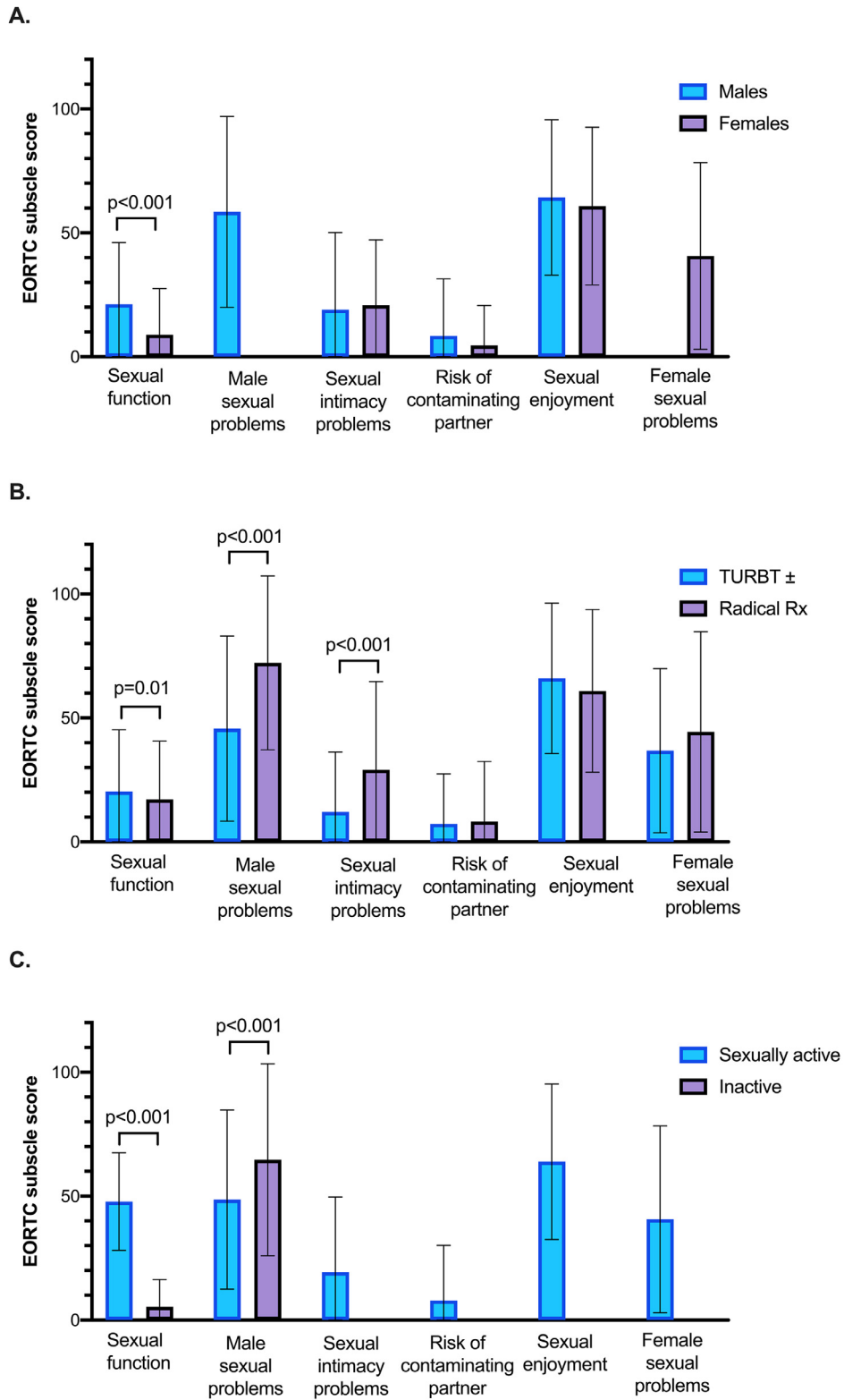
Figure 1. Responses to Each Individual Question Stratified by Sex.

centage with interest in sex: 68% vs 87% [men]).<sup>6</sup> It is imperative that clinicians are aware of the prevalence of male and female sexual dysfunction, effectively counsel patients pre-treatment, and proactively ask about their symptoms post treatment.

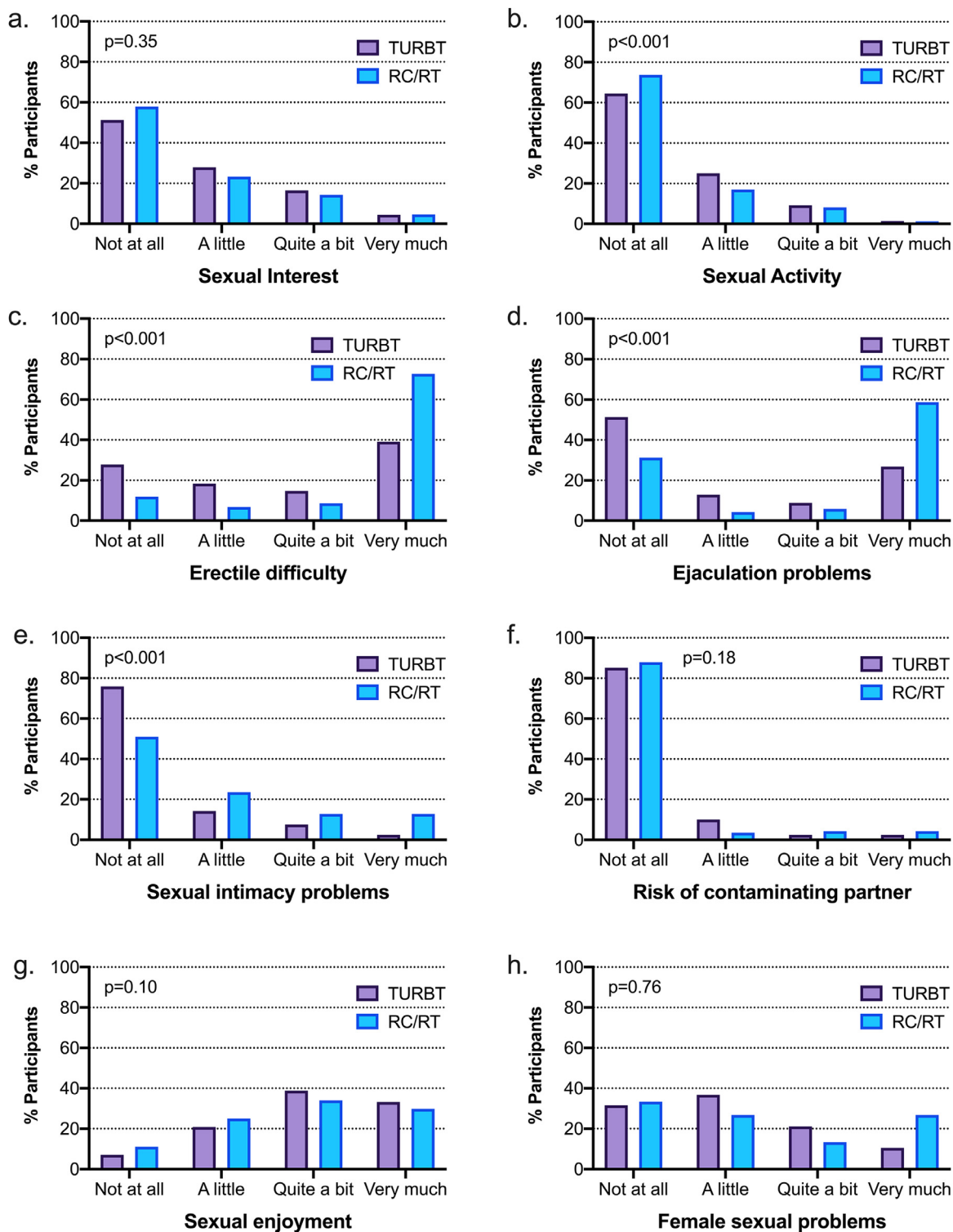
The likelihood of participants being sexually active, reduced with increasing age and a greater number of self-reported LTCs.

With regards to LTCs, participants with cardiovascular conditions or diabetes were less likely to be sexually active than participants without LTCs. This is supported by studies demonstrating a link between age, co-morbidities such as hypertension and diabetes and erectile dysfunction<sup>19,20</sup> as well as female sexual dysfunction.<sup>21</sup> Furthermore, younger age (less than 65 years) has been shown to be associated with better erectile function





**Figure 2.** Sexual Scores (Mean and Standard Deviation) For Each Subscale Stratified by (A) Sex, (B) Treatment Received and (C) Sexual Activity. For each, a higher score either represents better function, more enjoyment or more problems.



**Figure 3.** Responses to Each Individual Question Stratified by Treatment Received.

following RC.<sup>22</sup> These findings are exploratory but highlight the potential effects of specific conditions on sexual activity in BC patients. The findings have direct clinical relevance to the pre-op counselling process and shared decision making prior to BC treatments.

### Limitations

Firstly, the sexual activity and sexual function questions were included as part of a wider set of quality of life measures. Therefore, the breadth and content of the sexual items in the questionnaires were not as comprehensive as other available measures and

limits some of the conclusions that can be drawn. Secondly, there were slightly lower response rates for some of the questions on sexual function compared to other measures which can represent a bias. However, out of the participants who answered questions on sexual activity, all the sexual function questions had at least a 78% response rate. The overall response rate to the sexual activity question, out of the participants who returned a completed survey, was 85% which is higher than has been reported in another recent quality of life questionnaire based study.<sup>1</sup>

Thirdly, as we did not have data on participants' sexual activity or sexual function prior to BC treatment, it is not possible to ascertain whether differences in sexual function and sexual activity between treatment groups are due to the treatment itself or pre-morbid states. In addition, participants were between 1–10 years beyond their BC diagnosis and therefore non-treatment related factors may play a confounding role with respect to sexual dysfunction. There is also heterogeneity with respect to time passed since last treatment for BC and this may have influenced the results. Finally, due to the small numbers of patients who underwent RT in our cohort, we merged RC and RT into one category representing radical treatments. However, we did note that there were no differences in sexual activity rates between the two groups.

## CONCLUSIONS

Sexual dysfunction is very common in patients with a diagnosis of BC and not confined to those with MIBC. However, compared to endoscopic treatments, radical treatments for BC are associated with worse sexual function. Both men and women report significant problems with sexual function. It is essential that clinical teams recognise the potential for sexual dysfunction at all stages of the BC care pathway. The results from this study should be used to support evidence-based counselling prior to BC treatments and pro-active enquiry and support following treatments.

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## STATEMENT OF AUTHORSHIP

Conceptualization, JC and AG; Methodology, JC, AG, AD and KA; Investigation, JC, AG, AD, ZR and KA; Writing – Original Draft, IJ, JC, AG, AD, ZR and KA; Writing – Review & Editing, IJ, JC, AG, AD, ZR and KA; Funding Acquisition, JC and AG; Resources, SB, ZR.; Supervision, JC, AG, KA and AD.

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## SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jsxm.2022.06.016.