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Higher prevalence of sexual dysfunction in colon and rectal cancer survivors compared with the normative population: A population-based study

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Abstract ***Background:*** To compare colorectal cancer survivors with a normative population regarding erectile dysfunction, ejaculation problems, dyspareunia, dry vagina, sexual functioning (SF) and enjoyment (SE). In addition, the sociodemographic, clinical and psychological correlates of (dys)function in survivors are examined.

Patients and methods: The European Organisation for Research and Treatment of Cancer (EORTC) QLQ-CR38 sexuality subscales were completed by survivors ($n = 1371$; response rate 82%), of which 1359 received surgical treatment and were included in the analysis. The normative population consisted of 400 participants (response rate 78%).

Results: Erectile problems were more often present in rectal cancer (54%) than colon cancer survivors (25%) and the normative population (27%; $p < .0001$). They also had more ejaculation problems (68%) than colon cancer survivors (47%; $p < .001$). Dry vagina was common in colon (28%) and rectal cancer survivors (35%), while the normative population scored lower (5%; $p = .003$). In addition, colon (9%) and rectal cancer survivors (30%) experienced more pain during intercourse than the normative population (0%; $p = .001$). SE for men was similar

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across groups, while women with colorectal cancer reported lower scores than the normative population. Higher age, being a woman, not having a partner, a low educational level, rectal cancer, depressive symptoms and fatigue were associated with lower SF. Lower SE was associated with higher age and being a woman, depressive symptoms and cardiovascular disease. ***Conclusion:*** SF was deteriorated in both sexes after cancer, which affected women's SE negatively. Attention towards sexual (dys)function in colorectal cancer survivors is needed.

1. Introduction

Colorectal cancer is the third most common cancer in men (10%), and the second most common cancer in women.[1] Due to medical advances about 62% of the patients will become long-term survivors,[2,3] especially in younger cohorts.[4]

Conventionally, outcomes assessment in colorectal cancer included mortality, morbidity, disease recurrence and long-term survival. However, patient-reported outcomes (e.g. quality of life) are now also regarded as key measurements in assessing outcomes of interventions.[5] Sexuality and intimacy are considered to be important aspects of quality of life.[6] The majority of colorectal cancer survivors often remain sexually active.[7] However, survivors do experience sexual dysfunction, which may be caused by surgical treatment, radiochemotherapy,[7–9] or the presence of a stoma.[7] In addition, sexual functioning and sexual satisfaction are influenced by the presence of depressive symptoms, anxiety and fatigue.[10–12]

In a recent literature review ($n = 82$), about half of the studies had small samples sizes ($n < 75$) and presented data for both men and women.[7] In addition, only four studies have used a healthy population as a control group.[13–16] Since, the majority of studies did not include an age- and sex-matched normative population, it is often unclear whether sexual dysfunction is purely related to age or comorbidities. Therefore, the aim of this large population-based study was to examine (i) the prevalence of erectile dysfunction, ejaculation problems, dyspareunia and dry vagina in colon and rectal cancer survivors and a normative population; (ii) to compare sexual (dys)function between these three groups and (iii) to describe the sociodemographic, clinical and psychological correlates of sexual (dys)function in survivors.

2. Methods

2.1. Participants

The Eindhoven Cancer Registry (ECR) records data of all newly diagnosed individuals with cancer in the southern part of the Netherlands, an area with 2.3 million inhabitants, 10 hospitals with 18 locations and two large radiotherapy institutes.[17] Registered individuals diagnosed with colorectal cancer between 1998 and 2007 were eligible for participation ($n = 5580$). From these survivors, a weighted random selection of 2400 survivors based on tumour, sex and year of diagnosis was made (Fig. 1). These weights were derived from the distribution of colon and rectal cancer survivors in the normative population. Survivors with shorter duration since diagnosis were oversampled for inclusion in future follow-up assessments. After excluding survivors who had cognitive impairment or had died, data collection started in January 2009. Survivors were informed of the study via a letter from their (ex)attending surgeon. A Medical Ethics Committee approved this study. Participants provided informed consent.

The normative sample was derived from CentERdata (an online household panel) in which 1731 (81%) members of this panel completed questionnaires.[18] The description of the data collection is given elsewhere.[18] For this analysis, an age-matched normative population ($n = 400$), in which a similar distribution of ages as in the survivor sample was obtained, was included. The data will be available for non-commercial scientific research, subject to study question, privacy and confidentiality restrictions and registration (www.profilesregistry.nl).[19]

2.2. Measures

Survivors' sociodemographic and clinical information (i.e. date of diagnosis, Tumour-Node-Metastasis classification,[20] clinical stage,[20] treatment) was available from the ECR. Living situation, education, work situation, length and weight and life style factors were completed in the questionnaire. An adapted Self-administered Comorbidity Questionnaire (SCQ) was completed.[21] Disease-specific issues were assessed with the European Organisation for Research and Treatment of Cancer (EORTC) module Quality of Life Questionnaire-Colorectal 38 (QLQ-CR38).[22] The QLQ-CR38 comprises 38 questions, of which 19 are completed by all survivors and the remaining by subsets of survivors (men or women; survivors with/without a stoma). The QLQ-CR38 assesses both functioning (weight loss, body image, sexual functioning (SF), sexual enjoyment (SE), future perspective) and symptom burden (micturition problems, defecation problems, gastrointestinal symptoms, stoma-related problems, chemotherapy side

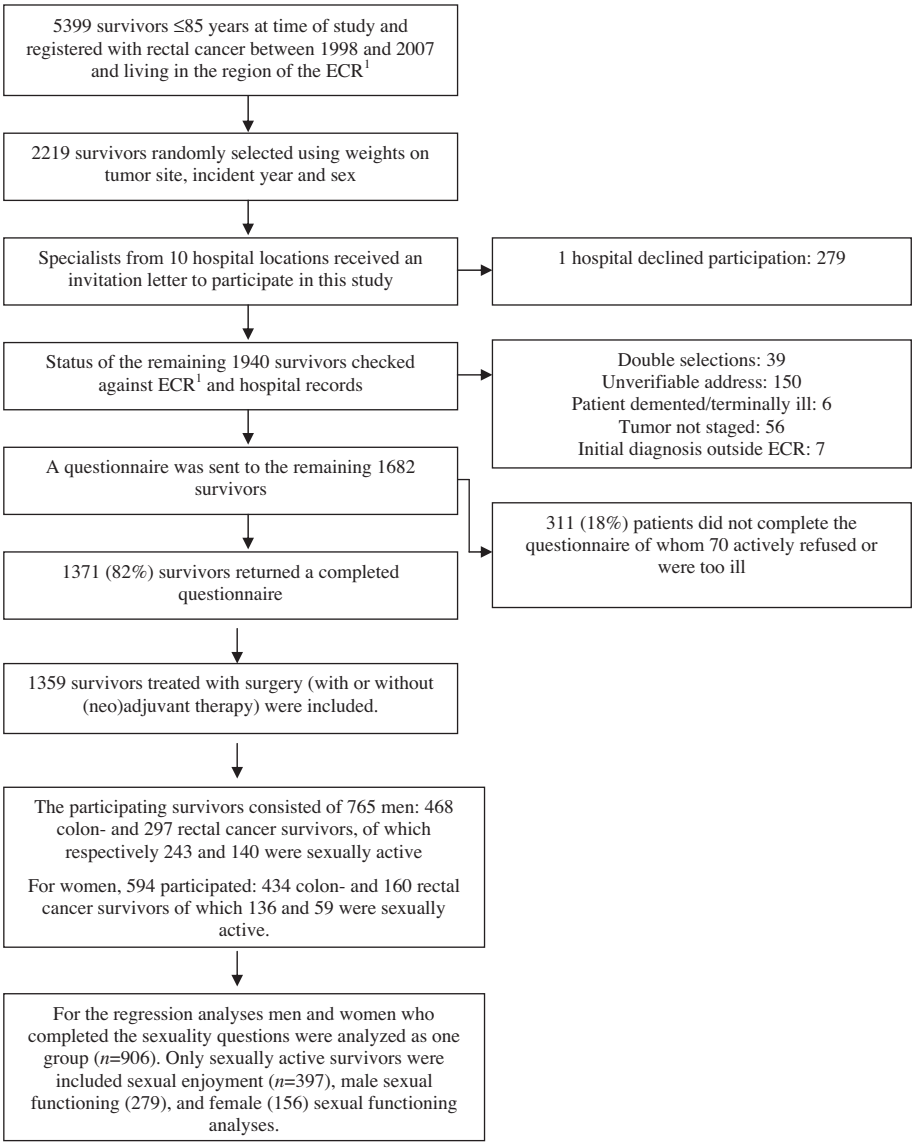

Fig. 1. Flow-chart of the data collection process in colorectal cancer survivors. [1]ECR: Eindhoven Cancer Registry.

effects, male SF, female SF). The items have a 4-point rating scale ranging from 1 (*not at all*) to 4 (*very much*). Scales were linearly converted to a 0–100 scale. Higher scores on functional items/scales indicate better functioning, while higher scores on symptom item/scale indicate higher symptom burden. In this study, SF, SE and male SF or female SF were analysed.

The Fatigue Assessment Scale (FAS)[23] is a 10-item questionnaire assessing perceived fatigue and exhaustion. Five questions of the FAS reflect physical fatigue and five assess mental fatigue. The response scale is a 5-point rating scale ranging from 1 (*never*) to 5 (*always*). Scores on the FAS range from 10 to 50. The psychometric properties are good.[24–27]

Symptoms of anxiety and depression were evaluated with the 14-item Hospital Anxiety and Depression Scale (HADS).[28] This self-report questionnaire contains two 7-item subscales designed to measure symptoms of anxiety and depression. The scale was developed for use in patients suffering from bodily disease and therefore, symptoms of somatic reference such as pain and fatigue were excluded. The psychometric properties are good.[29,30]

The normative sample completed a sociodemographic questionnaire, the SCQ and the EORTC QLQ-CR38 sexuality questions, except for the item on ejaculation difficulties since the CentERpanel strongly advised not to include this specific item due to practical and ethical considerations.

2.3. Statistical analyses

Chi-square tests and independent student *t*-tests were used to compare both sexes on sociodemographic and clinical characteristics (for colon-, rectal cancer survivors and the normative population separately) and sexually

active survivors with survivors who were not sexually active. To determine the prevalence of sexual problems, the scores on the subscales were dichotomised. Participants who reported no problems or minor problems (*not at all–a little bit*) were categorised as not having sexual problems, while patients who reported quite some problems or severe problems (*quite some–very much*) were categorised as having sexual problems. ANOVA's were conducted for the sexuality subscales, again for men and women separately. Post-hoc tests were corrected with the Bonferonni method. Finally, multivariate linear regression models (method: Enter) investigated whether a priori determined sociodemographic characteristics (age, sex, having a partner, educational level, Body Mass Index, being a smoker), clinical and psychological characteristics (site of cancer, type of treatment, years since diagnosis, disease progression, having a stoma, having cardiovascular disease, having diabetes mellitus, fatigue, anxiety and depression) were associated with SF, SE, male SF and female SF. Assumptions were checked. SF was analysed for the entire group, while the other scales were only examined for the sexually active survivors. Means and standard deviations are provided as ($M \pm SD$). Statistical differences were indicated if $p < .05$ (two-sided). A difference of ≈0.5 SD was considered indicative of clinical meaningful differences between groups.[31] All statistical analyses were performed using SPSS17.0.

3. Results

In total, 1371 (82%) survivors completed the questionnaire. Eventually, 1359 survivors treated with surgery (with or without (neo)adjuvant therapy) were included. Non-respondents were significantly older (72 ± 10) and more often women (55%) than respondents (70 ± 10, 43% female) and those with non-verified addresses (69 ± 11, 44% female). These groups did not differ on clinical aspects.

Male participants were more often partnered and more highly educated, while they less often had arthrosis and back pain than women (Table 1). In addition, female colon cancer survivors were more often depressed and less sexually active than men. Male rectal cancer survivors were more often smokers than their female counterparts.

Sexually active participants were significantly younger, more often partnered and had a higher educational level than participants who were not sexually active. In addition, sexually active men less often had a stoma and sexually active women less often reported comorbidities (Table 2).

The normative sample consisted of 224 men and 156 women (response rate 78%). Men were older (70 ± 10) than women (67 ± 11, $p = .009$), were more often partnered (80% versus 65%, $p = .001$), and were more often sexually active (64% versus 45%, $p < .001$). Further information is published elsewhere.[32,33]

3.1. Sexual dysfunction

Male colon (58%) and rectal cancer survivors (51%) were less sexually active than men from the normative population (64%, $p = .018$). For women, 54% of colon cancer survivors were sexually active compared to 23% for both rectum cancer survivors and the normative population ($p = .345$). Male rectal cancer survivors had more problems with erectile functioning (54%) than colon cancer survivors (25%) and the normative population (27%, $p < .0001$). Furthermore, male rectal cancer survivors reported more ejaculation problems (68%) than colon cancer survivors (47%, $p < .001$). Lubrication problems were more common in female colon (28%) and rectal cancer survivors (35%) than the normative population (5%, $p = .003$). In addition, female colon (9%) and rectal cancer survivors (30%) experienced more dyspareunia than the normative population (0%, $p < .001$).

Compared with male colon (29 ± 25) and rectal cancer survivors (26 ± 23), men from the normative population had higher scores on SF (38 ± 24, $p < .0001$; Fig. 2A). However, SE was similar in these groups. Finally, rectal cancer survivors (52 ± 39) reported more problems with erectile functioning than colon cancer survivors (31 ± 35, $p < .0001$) and the normative population (29 ± 34, $p < .0001$).

Female colon (15 ± 19) and rectal cancer survivors (15 ± 18), reported lower SF than the normative population (22 ± 24) ($p = .020$ and $p = .010$, respectively; Fig. 2B), as well as lower SE than the normative population (51 ± 29, 49 ± 26 and 66 ± 28, respectively). Female colon (23 ± 26) and rectal cancer (30 ± 33) survivors reported significantly more problems with female SF than the normative population (11 ± 17; $p = .002$). The differences in SF and SE in both sexes were clinically meaningful.

3.2. Correlates of SF in colorectal cancer survivors

Lower SF was significantly associated with higher age, female sex, not having a partner, low educational level, rectal cancer, depressive symptoms and fatigue, explaining 32% of the variance (R^2; $p < .0001$) (Table 3). Lower SE was associated with higher age, female sex, depressive symptoms and cardiovascular disease ($R^2 = 23\%$; $p < .0001$). A lower male SF was associated with a higher age and having a stoma ($R^2 = 28\%$; $p < .0001$). Fatigue was associated with a lower females SF ($R^2 = 24\%$; $p < .0001$).

Secondary analyses stratified by sex were conducted in order to determine the sex-specific correlates of SF and SE. For men, the results remained comparable, however, a higher BMI was also related with a lower SF ($R^2 = 32\%$, $p < .0001$). For women, only a higher age and having a partner remained significantly associated with SF ($R^2 = 29\%$; $p < .0001$). For men, lower

Table 1
Demographic and clinical characteristics of the participating cancer survivors according to site and sex.

	Colon		*p*-Value	Rectum		*p*-Value
	Men $N = 468$	Women $N = 434$		Men $N = 297$	Women $N = 160$	
Age at time of survey (mean ± SD)	70.4 ± 9.2	69.9 ±10.1	.486	68.6 ± 9.4	67.6 ± 10.1	.298
Years since initial diagnosis (mean ± SD)	3.9 ± 2.4	3.9 ± 2.5	.701	3.9 ± 2.5	4.2 ± 2.6	.168
BMI (mean ± SD)	27.0 ± 3.9	27.0 ± 5.5	.961	26.4 ± 4.2	26.0 ± 4.7	.491
	N (%)	*N* (%)		*N* (%)	*N* (%)	
Having a partner						
Yes	382 (82)	238 (55)	**<.0001**	248 (84)	107 (67)	**<.0001**
Missing	15 (3)	19 (4)		7 (2)	7 (4)	
Sexually active						
Yes	243 (52)	136 (31)	**<.0001**	140 (47)	59 (37)	**.**063
Missing	47 (10)	78 (18)		24 (8)	22 (14)	
Educational level[a]			**<.0001**			**<.0001**
Low	114 (24)	45 (10)		79 (27)	15 (9)	
Medium	251 (54)	246 (57)		168 (57)	102 (64)	
High	82 (18)	116 (27)		41 (14)	35 (22)	
Missing	21 (5)	27 (6)		9 (3)	8 (5)	
Currently smoking	53 (11)	35 (8)	.099	43 (15)	12 (8)	**.029**
Stage of cancer			.076			.731
1	119 (25)	82 (19)		123 (41)	63 (39)	
2	198 (42)	195 (45)		88 (30)	46 (29)	
3	124 (27)	136 (31)		77 (26)	48 (30)	
4	27 (6)	21 (5)		9 (3)	3 (2)	
Type of treatment			.790			.102
Surgery only	334 (71)	297 (68)		67 (23)	33 (21)	
Surgery + RT	3 (1)	4 (1)		175 (59)	89 (56)	
Surgery + CT	127 (27)	129 (30)		21 (7)	7 (4)	
Surgery + RC + CT	4 (1)	4 (1)		34 (11)	31 (19)	
Disease progression	32 (7)	30 (7)	.965	26 (9)	9 (6)	.230
Stoma status			.986			.568
Stoma at time of surgery	20 (4)	21 (5)		97 (33)	62 (39)	
Missing	126 (27)	73 (17)		62 (21)	20 (13)	
Comorbidity						
Cardiovascular disease	199 (43)	175 (40)	.503	127 (43)	76 (48)	.331
Lung disease	45 (10)	46 (11)	.624	30 (10)	11 (7)	.250
Diabetes mellitus	64 (14)	58 (13)	.891	35 (12)	21 (13)	.677
Arthrosis	90 (19)	148 (34)	**<.0001**	57 (19)	55 (34)	**<.0001**
Back pain	92 (20)	124 (29)	**.002**	60 (20)	51 (32)	**.006**
Depression	12 (3)	34 (8)	**<.0001**	29 (6)	13 (8)	.490

Abbreviations: SD = standard deviation, BMI = Body Mass Index, RT = radiotherapy, CT = chemotherapy.
[a] Educational level: low (no or primary school); medium (lower general secondary education or vocational training); high (pre-university education, high vocational training, university). *Note:* A *p*-value of <.05 is considered significant (in bold).

SE was associated with a higher age and depressive symptoms ($R^2 = 20\%$; $p < .0001$). For women, lower SE was associated with having cardiovascular disease and surgery in combination with radiotherapy and chemotherapy ($R^2 = 26\%$; $p = .05$).

4. Discussion

Male colon- and rectal cancer survivors were less sexually active and reported worse SF compared with the normative population. These differences were clinically meaningful.

The findings on the prevalence of sexual dysfunction fall within the range of previous studies.[34] However, it is not clear how to define the presence of sexual dysfunction, sexual problems and sexual disorders.[35,36] In line with the recent literature,[35,37] we have excluded the score 'a little bit' from the definition of a sexual problem. As a consequence, sexual dysfunction is only present when dysfunction is severe. Moreover, it is important to know to which extent patients are bothered by their sexual problems (i.e. their quality of sexual life). Having a sexual dysfunction may lead to a diminished quality of sexual life, though this is not a necessity. In this light, the DSM-IV formulated two separate categories to describe sexual disorders.[37] The A category focuses on defining sexual disorders per se, with the common denominator being: 'persistent or recurrent', while the B category adds a distress dimension to all dysfunctions 'the disturbance causes marked distress or interpersonal difficulty'.[36,37] These definitions are a prerequisite to distinguish a dysfunction from its emotional impact.[36]

Table 2
Demographic and clinical characteristics according to sexual activity and sex.

	Men		*p*-Value	Women		*p*-Value
	Not sexually active $N = 311$	Sexually active $N = 383$		Not sexually active $N = 299$	Sexually active $N = 195$	
Age at time of survey (mean ± SD)	72.0 ± 8.5	66.9 ± 9.4	**<.0001**	71.8 ± 8.8	62.8 ± 9.6	**<.0001**
Years since initial diagnosis (mean ± SD)	3.8 ± 2.4	3.9 ± 2.4	.480	3.9 ± 2.5	3.9 ± 2.5	.729
BMI (mean ± SD)	26.9 ± 4.0	26.8 ± 4.2	.703	27.0 ± 5.7	26.2 ± 4.7	.164
	N (%)	*N* (%)		*N* (%)	*N* (%)	
Having a partner						
Yes	239 (77)	348 (91)	**<.0001**	148 (51)	168 (87)	**<.0001**
Missing	6 (2)	4 (1)		11 (4)	1 (1)	
Educational level[a]			**<.0001**			**<.0001**
Low	65 (22)	38 (10)		99 (35)	26 (14)	
Medium	167 (56)	223 (59)		158 (55)	142 (74)	
High	69 (23)	115 (31)		28 (10)	24 (13)	
Missing	10 (3)	7 (2)		14 (5)	3 (2)	
Currently smoking	36 (12)	57 (15)	.203	24 (8)	19 (10)	.508
Rectal cancer	133 (43)	140 (37)	.096	79 (26)	59 (30)	.353
Stage of cancer			.595			.711
1	105 (34)	112 (29)		67 (22)	47 (24)	
2	113 (36)	145 (38)		127 (43)	73 (37)	
3	77 (25)	107 (28)		92 (31)	67 (34)	
4	16 (5)	19 (5)		13 (4)	8 (4)	
Type of treatment			.055			.188
Surgery only	157 (51)	195 (51)		169 (57)	91 (47)	
Surgery + RT	86 (28)	77 (20)		46 (15)	34 (17)	
Surgery + CT	55 (18)	88 (23)		66 (22)	55 (28)	
Surgery + RC + CT	13 (4)	23 (6)		18 (6)	15 (8)	
Disease progression	28 (9)	26 (7)	.279	20 (7)	14 (7)	.833
Stoma status			**.037**			.997
Stoma at time of surgery	60 (25)	53 (17)		43 (17)	31 (17)	
Missing	68 (22)	79 (21)		44 (15)	11 (6)	
Comorbidity						
Cardiovascular disease	147 (48)	158 (41)	.112	142 (48)	70 (36)	**.011**
Lung disease	37(12)	30 (8)	.071	35 (12)	14 (7)	.100
Diabetes mellitus	49 (16)	42 (11)	.063	54 (18)	14 (7)	**.001**
Arthrosis	69 (22)	72 (19)	.270	118 (40)	57 (29)	**.020**
Back pain	67 (22)	79 (21)	.768	92 (31)	63 (32)	.719
Depression	14 (5)	15 (4)	.702	28 (9)	15 (8)	.519

Abbreviations: SD = standard deviation, BMI = Body Mass Index, RT = radiotherapy, CT = chemotherapy.

[a] Educational level: low (no or primary school); medium (lower general secondary education or vocational training); high (pre-university education, high vocational training, university). *Note:* A *p*-value of <.05 is considered significant (in bold).

The current research focussed on the A category (defining sexual disorders per se). However, future research should also include the B category in order to provide a complete picture.

Consistent with previous studies, this study showed a strong relationship between male SF and age,[38,39] and the presence of a stoma.[7,40] Rather unexpected were the findings that radiotherapy, chemotherapy and having a stoma were not significantly associated with SF. Especially, since the role of radiotherapy is one of the most robust findings in the literature.[41] Perhaps, the QLQ-C38 is not the most appropriate instrument to assess this theme (see below). This study also examined the relationship between psychological factors and SF and SE, since it has been suggested that depression may be a more important factor in sexual dysfunction than clinical factors.[41,42] However, only a few studies have included this aspect.[10–12] We showed that depression was negatively associated with SF and SE. Moreover, fatigue was negatively associated with SF and female SF. These findings show that the existence of sexual problems in colorectal cancer patients should not merely be attributed to treatment damage, since sexual dysfunction is often multifactorial with biological, psychological and/or social causes.

Strengths of the current study are the fact that a normative population with a similar age- and sex-distribution is included. Up to date, no large population-based studies comparing sexual (dys)function in colorectal cancer survivors and a normative population are available. This study contributes to the debate on whether sexual dysfunction in a higher age is normal or pathological. The current study achieved a high response rate for both men (76%) and women (70%). Moreover, most studies on sexual function focus on rectal cancer survivors,[34] since it is expected that especially they will report

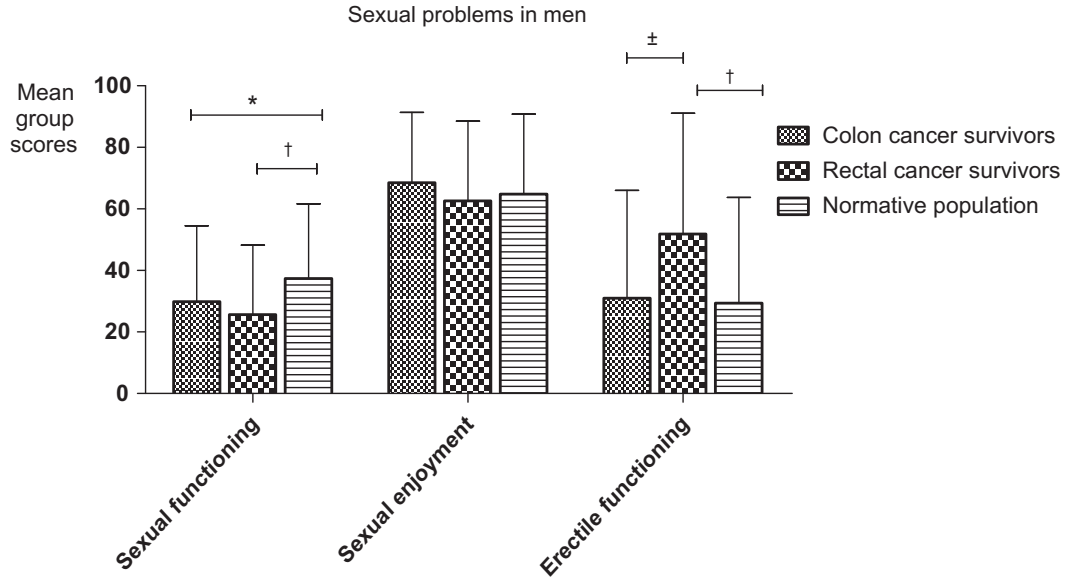

Fig. 2A. Comparison of sexual problems (mean scores) in men between (i) colon cancer survivors compared with the normative population, (ii) rectal cancer survivors compared with the normative population, and (iii) colon versus rectal cancer survivors.

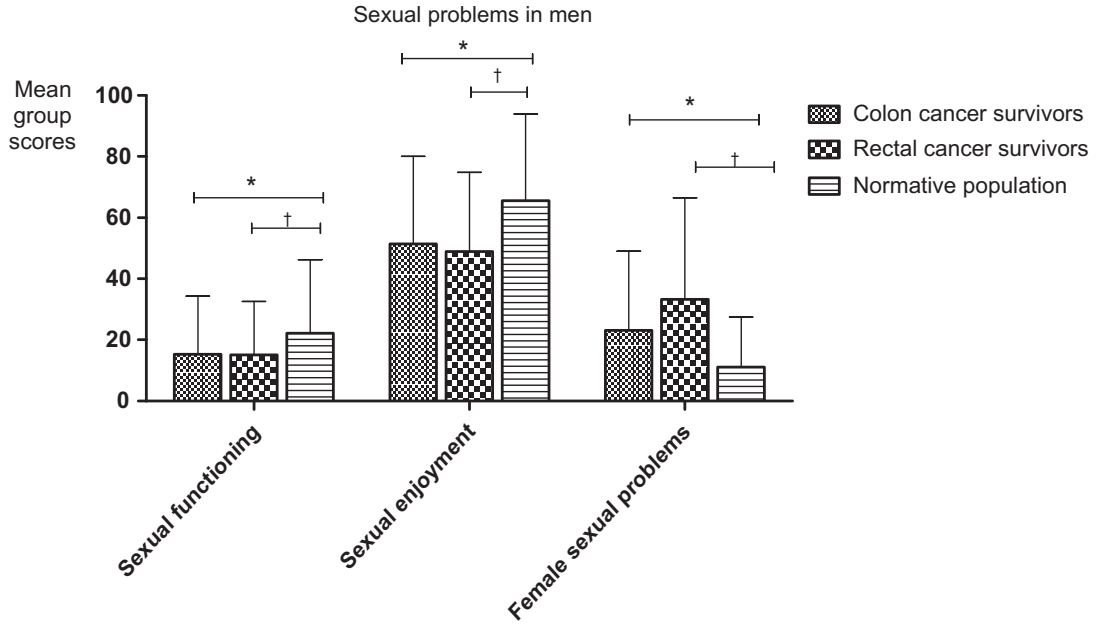

Fig. 2B. Comparison of sexual problems (mean scores) in women between (i) colon cancer survivors compared with the normative population, (ii) rectal cancer survivors compared with the normative population, and (iii) colon versus rectal cancer survivors. *The contrast is significant between patients with colon cancer and the normative population. †The contrast is significant between patients with rectal cancer and the normative population. ±The contrast is significant between patients with colon cancer and patients with rectal cancer.

more functional problems due to surgery and/or radio(chemo)therapy. This study consisted of both rectal- and colon cancer survivors. We have shown that colon cancer survivors and women also need attention for their potential sexual problems. Finally, this study had few missing data on sexual questions compared with other studies.[43,44] For instance, Bloemen et al.[43] reported that 33% of the women did not complete the sexuality items, while another study reported an even higher percentage (58%).[44] In our study, less than 10% of the men did not complete the items on sexuality, with exception of item on SE (17% was missing). Missing data in women ranged from 12% (dry vagina) to 17% (sexually active).

There are also some limitations that need to be acknowledged. First, this study is cross-sectional. As a consequence, this design does not allow making causal inferences or displaying short-term and long-term

Table 3
Multivariate regression analyses of sexual functioning, sexual enjoyment and male/female sexual problems in colorectal cancer survivors.

	Sexual functioning ($n = 829$)		Sexual enjoyment ($n = 370$)		Male sexual functioning ($n = 258$)		Female sexual functioning ($n = 144$)	
	β-Value	p-Value	β-Value	p-Value	β-Value	p-Value	β-Value	p-Value
Age at time of survey	–.274	**<.0001**	–.175	**.001**	.316	**<.0001**	.003	.975
Men (versus women)	.242	**<.0001**	.286	**<.0001**	NA	NA	NA	NA
Years since diagnosis	.038	.197	.048	.321	.047	.426	.063	.473
Having a partner	.148	**<.0001**	NA	NA	NA	NA	NA	NA
Educational level								
Low[a]	–.110	**.004**	–.053	.341	–.066	.294	.046	.670
Middle[a]	–.070	.057	–.021	.697	–.027	.653	.110	.269
BMI	–.051	.087	–.020	.693	–.042	.474	–.082	.373
Smoker	.037	.218	–.028	.586	.095	.118	.046	.609
Rectum (versus colon)	–.133	**.006**	–.054	.483	.088	.322	.028	.844
Type of treatment								
Surgery + RT[b]	.042	.364	–.029	.695	.133	.129	.224	.095
Surgery + CT[b]	.008	.792	.036	.490	–.045	.483	.163	.070
Surgery + RT + CT[b]	–.005	.891	.053	.404	.102	.163	.084	.475
Disease progression	–.027	.369	–.014	.771	.060	.300	–.060	.483
Stoma	–.016	.628	–.022	.677	.232	**<.0001**	.146	.137
Cardiovascular disease	–.006	.856	.141	**.005**	–.043	.472	–.090	.295
Diabetes mellitus	–.046	.128	–.002	.966	.062	.282	–.089	.305
Anxiety	.066	.087	.064	.316	–.118	.089	.157	.185
Depression	–.132	**.001**	–.271	**<.0001**	.058	.450	–.200	.095
Fatigue	–.175	**<.0001**	–.030	.639	.067	.362	.257	**.048**

Note: A p-value of <.05 is considered significant (in bold). For the sexual functioning and enjoyment scale a positive β-value indicates better functioning, while for the male and female sexual functioning scales a positive β-value indicates more problems.
Abbreviations: BMI = Body Mass Index, RT = radiotherapy, CT = chemotherapy, NA = not applicable.
[a] The middle and low educational levels were compared with a high educational level.
[b] These treatments were compared with surgery only.

changes in SF over time. However, knowledge about the course of sexual (dys)function will help clinicians informing their patients in what to expect during and after treatment. Second, no information was known about sexual (dys)function before diagnosis/treatment of cancer, which limits the determination of the effect of a cancer diagnosis and treatment on functioning or being able to correct for baseline functioning. Prospective studies with an assessment point prior to surgical treatment are warranted. Third, even though the EORTC QLQ-CR38 is one of the most commonly used questionnaire to assess SF, it provides only limited information. The question 'Did you experience difficulties ejaculating?' for men may be inadequate, since some men with colon or rectal cancer end up with nerve damage or changes from surgery, pelvic (chemo)radiotherapy or a combination so that they essentially have 'dry orgasms,' with pleasurable sensation and muscle contractions but no semen. As a consequence, it is unknown if men had dry orgasms or were not been able to reach orgasm. Finally, men from the normative population did not complete the question regarding ejaculation. Therefore, comparison with survivors was not possible on male SF.

Future prospective studies should investigate sexuality from a biopsychosocial model, in which the subjective evaluation of sexual (dys)function is taken into account. Thus, it would be interesting to assess the extent to which patients are bothered by sexual problems, since the presence of dysfunction may lead to a diminished quality of sexual life, though this is not a necessity.[34]

In conclusion, this study showed that male colorectal cancer survivors were less sexually active and reported worse SF compared with the normative population. These results imply that attention towards sexual (dys)function in colorectal cancer survivors, in both research and clinical practice is needed.

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Conflict of interest statement

None declared.

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