

# Body image and sexual function in women after treatment for anal and rectal cancer

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## Abstract

**Objective:** Treatment for anal and rectal cancer (ARCa) often results in side effects that directly impact sexual functioning; however, ARCa survivors are an understudied group, and factors contributing to the sexual sequelae are not well understood. Body image problems are distressing and may further exacerbate sexual difficulties, particularly for women. This preliminary study sought to (1) describe body image problems, including sociodemographic and disease/treatment correlates, and (2) examine relations between body image and sexual function.

**Methods:** For the baseline assessment of a larger study, 70 women completed the European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire and Colorectal Cancer-specific Module, including the Body Image subscale, and Female Sexual Function Index. Pearson's correlation and multiple regression evaluated correlates of body image. Among sexually active women ( $n = 41$ ), hierarchical regression examined relations between body image and sexual function domains.

**Results:** Women were on average 55 years old (standard deviation = 11.6), non-Hispanic White (79%), married (57%), and employed (47%). The majority (86%) reported at least one body image problem. Younger age, lower global health status, and greater severity of symptoms related to poorer body image ( $p$ 's < 0.05). Poor body image was inversely related to all aspects of sexual function ( $\beta$  range 0.50–0.70,  $p$ 's < 0.05), except pain. The strongest association was with Female Sexual Function Index Sexual/Relationship Satisfaction.

**Conclusion:** These preliminary findings suggest the importance of assessing body image as a potentially modifiable target to address sexual difficulties in this understudied group. Further longitudinal research is needed to inform the development and implementation of effective interventions to improve the sexual health and well-being of female ARCa survivors.

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Treatment for anal and rectal cancer (ARCa) includes pelvic radiation, chemotherapy, and/or surgery near the vaginal area (including potentially a stoma), which can lead to estrogen deprivation and damaged nerves, bowel dysfunction, and psychological morbidity, all of which may affect sexuality [1,2]. Sexual problems are prevalent and can include lubrication problems, pain, low desire, and overall sexual dissatisfaction [3,4]. ARCa survivors report levels of sexual function that are significantly below the normative population [2,5]. Given the extent of body changes ARCa survivors experience post-treatment, body image may play an important role in their sexual function and recovery.

Body image refers to a multidimensional construct of one's perceptions, attitudes, and beliefs regarding his or her body and can be a critical part of identity and self-concept, particularly for women [6,7]. ARCa survivors report significantly altered body image following treatment.

An estimated 40% of rectal cancer survivors indicate body image problems that suggest clinically meaningful deterioration in the first year post-treatment [8]. Up to 5 years post-treatment, survivors report poorer body image than population-based normative samples [9]. Likewise, women treated for anal cancer report feeling 'mutilated' and less feminine and describe body image as a recurrent problem over 3 years post-treatment [10]. In another study of anal cancer survivors, although the majority denied body image dissatisfaction, a substantial minority (23%) was *very much* dissatisfied [11]. Treatment with a stoma (a surgically created opening on the abdomen that allows stool or urine to exit the body) may further exacerbate body image concerns. Common difficulties include incontinence accidents, worries about leakage, feelings of being less attractive, embarrassment and interference during sexual activity, and limitations in social and physical activities [12].

As body image is inherently subjective [6], ARCa survivors may continue to experience body image distress despite resolution of side effects and recovery of functioning [8,9,13]. This may be particularly true for stoma patients [12,14]. For women, changes in body image may have more generalized effects on psychosocial well-being including a perceived loss of womanhood and an altered sense of one's sexual self.

The relation between body image and sexuality is well established in the general population, and a recent review concluded that body image can affect 'all domains of sexual functioning' [15]. Post-treatment sexual function is often the result of a combination of physical effects of treatment (e.g., vaginal dryness and reduced vaginal elasticity) and psychological factors including body image [16]. Patients who undergo treatments that affect sexual organs may be an especially at-risk group for developing body image problems due to the symbolic significance to femininity [17]. Surgery and radiation to the pelvic and anal area and systemic chemotherapy side effects can all cause body image concerns that may affect sexual function [2,18].

Across cancers, body image is a significant predictor of whether or not women resume sexual activity following treatment, and poorer body image correlates with lower sexual function including sexual interest, satisfaction, and discomfort. However, limited attention has focused on ARCa survivors specifically. Treatments for ARCa result in different sequelae of symptoms from other cancers that affect sexual functioning (e.g., damage to the bowel, rectum, and anal canal) [16]. Although concurrent body image problems and lowered sexual function have been documented in ARCa [10,19], the extent to which body image concerns contribute to sexual function is not well understood. As persistent sexual side effects may be distressing for survivors, even if general quality of life (QOL) is preserved [4,20], it is worthwhile to examine modifiable risk factors that lead to or exacerbate sexual difficulties. Although effective sexual health interventions exist, accrual and compliance rates are notoriously low [21], and both survivors and couples often have difficulty navigating sexual rehabilitation on their own [22]. Targeting body image concerns may be one way to improve engagement in sexual interventions and complement medical strategies (e.g., instruction in the use of vaginal dilators and lubricants).

We previously reported that body image was the strongest correlate of sexual function based on bivariate analysis of clinical and psychosocial characteristics of women enrolled in a sexual health intervention study [23]. This study aimed to build on those findings by evaluating the frequency and correlates of body image problems among female ARCa survivors and further investigating the degree to which body image may contribute to sexual function, above and beyond relevant covariates. We

hypothesized that women would report body image problems, particularly if they experienced worse treatment side effects and among stoma patients. Body image was also hypothesized to be negatively associated with all sexual function domains. This addresses a significant gap in the literature as ARCa is an understudied disease group. Potential risk factors for post-treatment body image problems are not well understood, and implications for sexual recovery have received cursory attention, particularly in a female-only sample.

## Methods

### Participants

This study was part of a larger sexual health intervention study that included women reporting low to moderate satisfaction with their sexual functioning and overall sexual life [23]. Sexual satisfaction was assessed using a pre-screening questionnaire ('Over the past 4 weeks, how satisfied have you been with your overall sexual life?'; 5 = *very satisfied* to 1 = *very dissatisfied*), and individuals scoring 5 were excluded. Research staff approached 278 eligible patients of which 105 declined participation (53% of eligible respondents), 59 did not respond, and 20 were ineligible based on further assessment. Ninety-four women completed an informed consent; however, 24 were deemed ineligible or dropped out prior to completing the baseline assessment. The final sample included 70 ARCa survivors.

All participants had completed treatment (radiation and/or surgery for stages I–III rectal adenocarcinoma or rectosigmoid cancer with an anastomosis (reattachment of the colon to the anus or rectum) at 15 cm or below and radiation and/or chemotherapy for anal cancer) and had no current evidence of disease. Inclusion criteria also required participants to be at least 21 years old, be proficient in English, and have no significant cognitive or psychiatric disturbance.

This study used data from the baseline assessment (pre-intervention).

### Measures

#### Sociodemographic and medical information

Sociodemographic information was collected using standard questionnaires. Clinical data were collected via medical chart review.

#### European organization for research and treatment of cancer core quality of life questionnaire [24] and colorectal cancer-specific module [25]

The Core Quality of Life Questionnaire (QLQ-C30) is a 30-item self-report measure that assesses multiple QOL domains in the past week. The global health status subscale and diarrhea and constipation single items were

used. The Colorectal Cancer-specific Module (QLQ-CR38) is a supplement to the QLQ-C30 with 38 additional items specific to colorectal cancer. Analyses used the QLQ-CR38 body image and five symptom subscales (micturition problems, gastrointestinal tract symptoms, chemotherapy side effects, problems with defecation, and stoma-related problems). Responses are on a 4-point Likert scale ('not at all' to 'very much'). Higher scores represent better outcomes with respect to body image and global health status but indicate greater symptomatology (*worse* outcomes) for the symptom subscales and diarrhea and constipation items. The body image subscale asks participants to rate if they have been feeling physically less attractive, less feminine, and dissatisfied with their bodies as a result of cancer (three items). Body image problems were defined as present if participants endorsed 'a little', 'quite a bit', or 'very much' and as *more severe* if responses were among the top two options. Internal consistency reliability was established for all of the subscales in the current sample (Cronbach's alphas range 0.63–0.88; body image alpha=0.88) with the exception of chemotherapy side effects, which were not included in further analysis (Cronbach's alpha=0.47).

#### Female sexual functioning index [26]

Sexual function was measured using the Female Sexual Functioning Index (FSFI), a 19-item scale with six subscales: desire, arousal, lubrication, orgasm, satisfaction, and pain/discomfort. Items refer to the past 4 weeks, and responses are on 5-point or 6-point Likert scales. Higher scores indicate better sexual function in all FSFI domains, and the total score ranges from 2 to 36. The total score and all subscales demonstrated good internal reliability in this sample (Cronbach's alphas range 0.76–0.96).

#### Statistical analysis

Bivariate relations between sociodemographic and medical factors and body image were assessed using Pearson's correlation and independent-samples *t*-tests for continuous and categorical variables, respectively. Factors significant at the  $p < 0.05$  level were fit to a multiple regression model with body image as the dependent variable to determine the strongest correlates of body image in the presence of other related factors.

Regression models examined the extent to which body image related to different domains of sexual function, controlling for age and global health status (chosen a priori based on findings from Milbury *et al.* [27]). Age, global health status, and body image were entered as predictors, and sexual function domains were specified as outcomes. Analyses of sexual function were limited to participants who endorsed being sexually active at the time of the assessment ( $n = 41$ ) as the FSFI is most relevant and valid for sexually active women [28].

## Results

Women ( $N = 70$ ) were on average 55.4 years old (standard deviation [SD]=11.6) and mostly non-Hispanic White (79%), married (57%), and employed (47%). Most were rectal cancer survivors (69%) and on average 4.3 years (SD=3.3, median=4) post-treatment. Seventy-one percent of women underwent both radiation and chemotherapy, and 73% percent had surgery. Ten participants had a temporary or permanent stoma (12%) (Table 1).

Sixty-seven percent of women ( $n = 47$ ) reported at least some degree of interest in sex (41.2% were *a little*, 13.4% were *quite a bit*, and 2.4% were *very much* interested). However, only 57% ( $n = 41$ ) reported they were sexually active at the time of the assessment, of which 68% ( $n = 28$ ) were married or in a committed relationship. The majority of sexually active women ( $n = 33$ ; 81%) had

**Table 1.** Sociodemographic and medical characteristics of the total sample ( $N = 70$ ) and sexually active subgroup ( $n = 41$ )

Sociodemographics	Total sample ( $N = 70$ )	Sexually active only ( $n = 41$ )
Age (years)	$M = 55.43$ (SD = 11.6)	$M = 53.6$ (SD = 12.5)
Race <sup>a</sup>		
White	79%	85%
African American	9%	2%
Ethnicity <sup>a</sup>		
Hispanic	7%	6%
Education <sup>a</sup>		
Completed high school only	7%	5%
Completed college or higher	57%	83%
Employment status		
Employed	47%	49%
Retired	20%	10%
Annual income <sup>a</sup>		
Less than \$50,000	24%	22%
Relationship status		
Married	57%	68%
Divorced, separated, or widowed	27%	22%
Single	16%	10%
Medical information		
Cancer type <sup>a</sup>		
Anal cancer	29%	27%
Rectal cancer	69%	71%
Presurgical stage <sup>a</sup>		
1	31%	24%
2	14%	5%
3	41%	34%
Treatment neoadjuvant/adjuvant <sup>a</sup>		
Radiation only	1%	2%
Chemotherapy only	11%	15%
Radiation/chemotherapy	71%	70%
Surgery <sup>a</sup>		
Surgical treatment	73%	76%
Permanent stoma	14%	15%
Time since treatment (years) <sup>a</sup>	$M = 4.3$ (SD = 3.3)	$M = 4.4$ (SD = 3.7)

<sup>a</sup>Data not available for all participants.

clinically significant sexual problems based on the FSFI total score clinical cutoff of  $\leq 26.55$  for diagnostic classification of sexual dysfunction (FSFI total,  $M=21.7$ ,  $SD=6.5$ ) [29]. The sexually active versus sexually inactive subgroups did not differ on any of the sociodemographic or clinical variables ( $p$ 's  $> 0.05$ ) with the exception that sexually active women were more likely to be married or in an equivalent relationship ( $\chi^2=5.02$ ,  $p=0.03$ ; Table 1). Body image scores were comparable between sexually active ( $M=64.7$ ,  $SD=33.9$ ) and sexually inactive women ( $M=75.5$ ,  $SD=25.3$ ;  $t[67]=1.44$ ,  $p=0.15$ ).

### Body image

The nature and prevalence of body image problems were analyzed for the entire sample ( $N=70$ ). Average body image scores ( $M=69.2$ ,  $SD=30.9$ ) indicated impairment that was similar to or worse than reported in the literature of ARCA survivors [2,19,30]. Eighty-six percent of women reported at least one body image problem (Table 2). Forty-two percent experienced two or more body image problems, and 40% reported at least one problem as being more severe. The most common problem was body dissatisfaction (61%), and 28% of women indicated more severe levels of dissatisfaction. Thirty-four percent of women reported feeling less attractive, and 40% reported feeling less feminine. Problems with attractiveness and femininity were rated as more severe by 20% and 21% of women, respectively.

Unadjusted associations indicated that poorer body image was related to younger age ( $r=0.29$ ,  $p=0.02$ ), worse global health status ( $r=0.59$ ,  $p<0.001$ ), and more severe symptoms including gastrointestinal symptoms ( $r=-0.49$ ,  $p<0.001$ ), diarrhea ( $r=-0.44$ ,  $p<0.001$ ), and problems

**Table 2.** Frequency of body image problems in women after treatment for anal and rectal cancers

Body image problems	Responses	n <sup>a</sup>	%
Feeling less attractive	Not at all/a little	52	63
	Quite a bit/very much	16	20
Feeling less feminine	Not at all/a little	52	63
	Quite a bit/very much	17	21
Feeling dissatisfied with one's body	Not at all/a little	46	56
	Quite a bit/very much	23	28
Sexual function <sup>b</sup>	Mean (SD)		
Desire	3.09 (.99)		
Arousal	3.53 (1.31)		
Lubrication	3.61 (1.77)		
Orgasm	4.10 (1.47)		
Sexual/relationship satisfaction	3.99 (1.44)		
Pain	3.44 (2.18)		
FSFI total	21.66 (6.52)		

FSFI, Female Sexual Functioning Index.

<sup>a</sup>Data were not available for all participants.

<sup>b</sup>Data represent the subset of participants who reported to be sexually active at the time of the assessment ( $n=41$ ).

with defecation (only for participants with intact sphincters,  $n=59$ ;  $r=-0.55$ ,  $p<0.001$ ). Body image was not related to education ( $r=-0.10$ ,  $p=0.42$ ), income ( $r=0.18$ ,  $p=0.20$ ), ethnicity (White vs. non-White/minority;  $t[63]=-1.67$ ,  $p=0.11$ ), cancer type ( $t[65]=0.75$ ,  $p=0.46$ ), years since treatment ( $r=0.12$ ,  $p=0.33$ ), or constipation ( $r=-0.08$ ,  $p=0.55$ ).

All factors found to be related to body image in bivariate analysis ( $p<0.05$ ) were tested in a regression model to determine which may be the most important correlates (Table 3). This model included age, global health status, gastrointestinal tract symptoms, and diarrhea. Stoma-related problems and the problems with defecation subscales were not included due to the lower numbers of participants who completed these subscales and power considerations (stoma patients,  $n=10$ ; participants with intact sphincters,  $n=59$ ). Age ( $\beta=0.22$ ,  $p=0.02$ ), global health status ( $\beta=0.30$ ,  $p=0.02$ ), and gastrointestinal symptoms ( $\beta=-0.25$ ,  $p=0.04$ ) all remained significant predictors of body image in this overall model, suggesting these factors may be most critical in determining the development of body image problems over time. The model accounted for 44% of the variance in body image ( $F[4, 63]=12.49$ ,  $p<0.001$ ).

### Body image and sexual function

The relation between body image and sexual function was analyzed in women who reported to be sexually active at the time of the assessment ( $n=41$ ; Table 4). Preliminary analyses indicated that all unadjusted relations between body image and sexual outcomes were significant (ranged from  $r=0.37$  to  $0.70$ ,  $p$ 's  $< 0.05$ ), with the exception of pain ( $r=0.20$ ,  $p=0.22$ ). Regression models were specified, relating body image with sexual outcomes after controlling for the effects of age and global health status (selected *a priori*). All FSFI models were significant, and poorer body image was related to worse outcomes in all domains. The strongest association was with sexual/relationship satisfaction ( $\beta=0.70$ ,  $p<0.001$ ), followed by desire ( $\beta=0.63$ ,  $p=0.001$ ), lubrication ( $\beta=0.61$ ,  $p=0.002$ ), arousal ( $\beta=0.58$ ,  $p=0.002$ ), and orgasm ( $\beta=0.50$ ,  $p=0.01$ ). Body image accounted for 34% of the

**Table 3.** Multiple regression analysis of body image ( $F[4,63]=12.49$ ,  $p<0.001$ )

Variables	Body image $N=70$ , $R^2=0.44$ (adj. $R^2=0.41$ )				
	B	SE	$\beta$	t	p
Intercept	7.34	22.64			
Age	0.59	0.26	0.22	2.31	0.02
Global health status	0.53	0.23	0.30	2.31	0.02
Gastrointestinal tract symptoms	-0.38	0.18	-0.25	-2.12	0.04
Diarrhea	-0.19	0.12	-0.18	-1.64	0.11

SE, standard error.



**Table 4.** Multiple regression analysis of the relations between body image and sexual domains among sexually active women ( $n = 41$ ), controlling for age and global health status

Variables <sup>a</sup>	R <sup>2</sup>	R <sup>2</sup> $\Delta$	B	SE	$\beta$
Desire ( $F[3,36] = 4.34, p = 0.01$ )	0.27				
Intercept			1.923	0.36	
Age			-0.01	0.01	-0.07
Global health status			-0.02	0.01	-0.27
Body image		0.26	0.02	0.01	0.63***
Arousal ( $F[3,36] = 4.90, p = 0.01$ )	0.29				
Intercept			2.16	0.46	
Age			-0.01	0.02	-0.07
Global health status			-0.003	0.01	-0.04
Body image		0.22	0.02	0.01	0.58**
Lubrication ( $F[3,36] = 4.0, p = 0.02$ )	0.250				
Intercept			1.58	0.65	
Age			-0.03	0.02	-0.19
Global health status			-0.04	0.02	-0.35*
Body image		0.246	0.03	0.01	0.61**
Orgasm ( $F[3,36] = 2.86, p = 0.05$ )	0.19				
Intercept			2.69	0.56	
Age			0.01	0.02	0.07
Global health status			-0.02	0.02	-0.25
Body image		0.16	0.02	0.01	0.50*
Satisfaction ( $F[3,32] = 10.44, p < 0.001$ )	0.50				
Intercept			2.28	0.42	
Age			-0.01	0.01	-0.08
Global health status			0.003	0.01	0.03
Body image		0.32	0.03	0.01	0.70***
Pain ( $F[3,36] = 1.50, p = 0.23$ )	0.06				
Intercept			2.26	0.89	
Age			-0.05	0.03	0.10
Global health status			-0.003	0.02	0.91
Body image		0.05	0.02	0.01	0.16
FSFI total ( $F[3,36] = 7.09, p = 0.001$ )	0.37				
Intercept			12.94	2.18	
Age			-0.09	0.07	-0.17
Global health status			-0.08	0.06	-0.22
Body image		0.34	0.14	0.03	0.72***

SE, standard error.

<sup>a</sup>Higher scores indicate better functioning for the body image, global health status, and Female Sexual Functioning Index (FSFI).<sup>b</sup>Covariates (age and global health status) were centered to facilitate interpretation.\* $p < 0.05$ ;\*\* $p < 0.01$ ;\*\*\* $p < 0.001$ .

variance in the FSFI total model ( $\beta = 0.72, p < 0.001$ ). Global health status was related to sexual/relationship satisfaction in the first step ( $\beta = 0.42, p = 0.01$ , respectively) but dropped to non-significant when body image was added to the model. Global health status was also a predictor of lubrication ( $\beta = -0.35, p = 0.05$ ). Age and global health status were not related to any of the other sexual outcomes with the inclusion of body image in the model.

### Considering the role of negative affect

It is well recognized that sexual dysfunction and negative affect are closely intertwined, often comorbid, and may share common etiological factors [31]. Exploratory

analyses specified separate regression models to test whether relations between body image and sexual function domains held with the inclusion of the Brief Symptom Inventory depression and anxiety subscales as covariates (in addition to age and global health status) [32]. Consistent with the main analyses, body image remained a correlate of all sexual function domains except pain (Tables 1 and 2 in the supporting information). These findings suggest that problems with body image may contribute to sexual difficulties above and beyond the effects of negative affect.

### Discussion

These findings report on the body image concerns and sexual function of women following treatment for ARCA. Forty-nine percent of our sample endorsed two or more body image problems, and 28% described feeling *quite a bit* or *very much* concerned about at least one problem. Younger age, lower global health status, and worse gastrointestinal tract symptoms, in particular, related to poorer body image. Body image was inversely related to all aspects of sexual function except pain. Eighty-one percent of sexually active women indicated clinically significant levels of sexual dysfunction. This rate is higher than a cohort of primarily gynecologic and cervical cancer survivors in which 52% met diagnostic criteria for sexual dysfunction based on the FSFI [28]. These preliminary findings suggest the importance of assessing body image as a potentially modifiable target of intervention to improve sexual health among ARCA survivors.

Comparing our sample to the small literature of body image in ARCA survivorship, mean levels of body image problems were comparable with or greater than other reports [2,19,30]. This may be due to our women-only sample and to our targeted recruitment of participants with low to moderate sexual satisfaction. Previous findings suggest body image problems may be greater in female survivors than in male survivors, particularly if there is body shame or self-consciousness in sexual situations [33]. Although not assessed directly, ARCA survivors with unpleasant or embarrassing symptoms (e.g., bowel incontinence, stoma leakage, or smell) may likewise feel self-conscious or body shame during intimacy. Our results are also notable given that women in this study were over 4 years post-treatment. ARCA survivors who experience persistent long-term or late effects of treatment, such as bowel dysfunction, may develop body image difficulties over time. Importantly, because of its subjective nature, even objectively mild impairments may lead to negative feelings about one's body. The importance of body image lies in survivors' perceptions. Assessment of symptoms alone (e.g., objective measures of occurrence or frequency) may not fully represent the extent to which QOL is

affected, particularly with respect to different domains of sexuality.

Controlling for the effects of age and global health status, poorer body image was related to worse sexual outcomes including lower desire, arousal, and lubrication, orgasm problems, and lower sexual and relationship satisfaction and sexual enjoyment. The only sexual domain unrelated to body image was pain. It may be that body image concerns correlate more with psychological aspects of sexuality than physiologic responsiveness. Evidence suggests body image may affect sexual desire and interest more so than predicting actual sexual behavior (e.g., intercourse frequency) or excitement (e.g., arousability) [34]. Pain may be more closely tied to sexual behavior and less susceptible to direct effects of body image problems. In a validation study of the FSFI in cancer survivors, the pain subscale was related to measures of physical well-being but inconsistently related to various indicators of psychological well-being [28]. Items from the pain subscale also demonstrated the weakest correlations with the FSFI total score compared with the other items [28], suggesting that pain may represent a more distinct aspect of sexual dysfunction. Alternatively, pain or discomfort during sex may not have been the primary concern for the majority of women in our sample. Although 17% ( $n=7$ ) of sexually active women rated their level of pain/discomfort during or following vaginal penetration as *very high* to *high*, 49% ( $n=20$ ) indicated no pain at all or *very low* to *low* pain. Future work should explore these relations further to determine the extent to which body image problems may truly diminish sexual responsiveness, which may have implications for clinical intervention.

Targeting body image may be one way to improve sexual outcomes through improved psychological well-being (e.g., greater acceptance of cancer-related body changes) and increased engagement in sexual rehabilitative strategies. Many of the sexual problems that occur following ARCa treatment are difficult to treat, and sexual health interventions have achieved modest results [35]. For women who have received pelvic radiation, interventions typically promote vaginal dilator use, but compliance rates are low [35]. Observational improvements in body image relate to improved sexual function as well as mental and physical function in women after colorectal surgery [36]. In addition to standard sexual rehabilitative strategies, sexual health interventions may help women address treatment-related body changes, symptom management, and negative body perceptions that affect sexual function.

Most psychosocial interventions shown to improve body image in cancer survivors have been in breast cancer [17]. Further research is needed to determine whether findings would generalize to ARCa survivors. Other considerations include mechanisms by which interventions may enact changes. We found that body image was most strongly correlated with the FSFI sexual/relationship

satisfaction subscale. Emotional intimacy, specifically, may be a distinct factor related to women's sexual function [22]. Women formulate and adjust their perceptions of their bodies within the context of their relationship and through interactions with their partners, suggesting that partner support may be a resource to call upon. Limited evidence suggests that couples-based interventions may be more effective in producing long-term improvements in body image than women-only interventions [37]. On the other hand, individual interventions may elicit more honest accounts of body image concerns if feelings of embarrassment or shame inhibit full disclosure. Future research should explore differences between individual-based and couple-based approaches and implications for generalizing benefits to single women.

It is clinically relevant to identify factors that may predict the development of body image problems following treatment and points to target in future interventions. Unpleasant and potentially embarrassing symptoms such as gastrointestinal tract problems or diarrhea may significantly affect how a woman feels during sexual activity. Confidence and sexual self-esteem are important for women to feel comfortable during sex [15]. The inability to relax and enjoy sex was a problem for 71% ( $n=17$ ) of anal cancer survivors [20]. Women who are unable to trust their bodies and relax during physical intimacy may experience cognitive distraction, decreased desire, arousal difficulties, and muscle tension that exacerbates discomfort or pain. Negative sexual experiences may confirm negative body attitudes and lead to low sexual self-esteem, fear and anxiety related to sex, avoidance of future sexual activity, and greater sexual dysfunction [15].

Stoma patients may have additional concerns about odor, leakage, gas, and diarrhea during sexual activity. Women may worry how sexual partners will react to their stoma and potential rejection from partners [38]. Although our sample included a small number of stoma patients, 7 of the 10 women with a permanent stoma indicated they felt *quite a bit* or *very much* embarrassed because of it. Although findings are mixed regarding the effects of having a stoma on sexual function [39] and general QOL [40], stoma patients consistently report poorer body image than non-stoma patients [14,41]. Stoma-related problems also add to the myriad of other cancer-related difficulties survivors' may be coping with, suggesting a heightened need to assess and address the range of potential concerns about body functioning and appearance to avoid greater functional impairment.

Our study highlights the importance of addressing sexual concerns among women who are not currently sexually active. Forty-one percent of our sample was not sexually active but still participated in an intervention to improve their sexual function and vaginal health. Consistent with prior research [4], sexually inactive women reported worse sexual function than sexually active

women. This may indicate such severe symptomatology that women avoided sexual activity. Lower scores may also reflect the FSFI scoring algorithm in which sexual inactivity due to sexual dysfunction versus other non-related factors (e.g., lack of a partner) is confounded [28]. Low response rate and missing data may also contribute to artificially low scores or non-representative measurement in the literature. A strength of our study is that we had a near-complete response rate for all items of the FSFI. More research is needed to better characterize women who are not currently sexually active but concerned about their sexual recovery and interested in being sexually active in the future. Avoidance of sexual activity may also signal other behaviors such as avoidance of gynecologic or pelvic exams, which have important health implications regardless of women's interest in sexual activity.

There are several limitations to this study. Importantly, our sample was made up of women who agreed to participate in a sexual health intervention study, which may under-represent women who are similarly affected but not seeking treatment. The cross-sectional design precludes causal inferences. Although theoretical models present body image as a precursor to negative emotional and behavioral responses [6], more recent conceptualizations acknowledge the overlap among body image and QOL outcomes [42]. Negative mood may be an underlying mechanism of body image problems and/or sexual dysfunction, but concerns about multicollinearity and sample size precluded further investigation. We were also not powered to control for other conceptually relevant covariates. Conclusions regarding stoma patients should be made with caution given the small numbers in our sample. Prospective studies are needed to better determine the interaction of body image concerns and sexual dysfunction in ARCa survivorship with consideration to other important factors such as mood and treatment-related symptom burden.

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## Conclusions

These preliminary findings suggest that negative perceptions and attitudes regarding cancer-related changes to one's body are prevalent among ARCa survivors who experience sexual dissatisfaction, even 4 years after treatment. Further work is needed to understand the trajectories of body image concerns and prospective relations with sexual functioning. Pre-treatment factors may contribute to and interact with post-treatment experiences (e.g., unrealistic expectations for post-treatment recovery) [17]. Research is also needed to determine whether improving body image directly relates to improved sexual health. Targets of intervention may include self-acceptance of body functioning and appearance and communication with partners around body image difficulties. Body image problems may also be a barrier to participation in sexual health interventions (e.g., cognitions leading to avoidance), and addressing such problems may complement other more traditional strategies of sex therapy.

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## Ethical approval

This study is in full compliance with institutional review board guidelines for protection of human subjects.

## Conflict of interest

The authors report no conflicts of interest related to this research.

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