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Effect of Age and Race Upon Quality of Life of Young Breast Cancer Survivors

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Abstract

Background—Given their early age of diagnosis, young breast cancer (BC) survivors face issues that differ widely from their older counterparts.

Patients and Methods—We mailed a survey to 2209 patients who were ≤45 years at time of BC diagnosis. Each survey was comprised of: the Quality of Life in Adult Cancer Survivors instrument, Menopause Symptom Scale, and questions aimed at obtaining pertinent background information.

Results—1090 patients completed the survey. Mean age at time of diagnosis was 39.5 years; median years from diagnosis was 6.6 years. Distress related to vaginal dryness (p=0.0002) and pain from intercourse (p=0.0014) was significantly higher in patients who were <5 years from diagnosis, compared to those >10 years from diagnosis. In the area of financial problems, black women had greater distress than white women (p=0.0010). Compared to white women, Hispanic

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Conflict of Interest

Phuong Khanh H. Morrow is employed by and owns stock in Amgen, Inc. This work was completed while she was an Assistant Professor at the University of Texas MD Anderson Cancer Center.

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women had worse family distress scores (p=0.0028) and summary cancer specific scores (p=0.0076). Patients >10 years from diagnosis had poorer sexual interest (p=0.003) than women who were closer to diagnosis. Women ≥40 years at diagnosis had significantly lower sexual interest (p=0.0016) than women <40 years. Stage and neoadjuvant chemotherapy did not have a significant effect on QOL.

Conclusion—Even in comparison to stage and neoadjuvant chemotherapy, race, age at diagnosis, and time from diagnosis have significant long term effects on QOL following BC treatment.

Introduction

Approximately 1 in every 207 women who are <40 years will be affected with invasive breast cancer (BC) in the United States.[1] Compared to an age-matched cohort without BC, young breast cancer survivors (YBCS) demonstrate significant declines in health-related quality of life due to changes in functional capacity, social functioning, and mental health.[2] When compared to older BC survivors, YBCS experience a greater degree of treatment effects, disturbances in quality of life (QOL), and overall symptom distress.[2,3] Given their early age of diagnosis, these women face issues that differ widely from their older counterparts. As BC treatment increases risk of premature menopause, these patients must deal with vasomotor symptoms, sexual dysfunction, and infertility at an early age.[3-5] The progression to a temporary or permanent menopausal state is often an abrupt one, resulting in more severe symptoms than those associated with normal aging progression through menopause.[2,3,6,7] As a result, sexual dysfunction and/or symptoms are particularly problematic in YBCS.[2,9-12] Concerns about delaying pregnancy, infertility, and the impact of a BC diagnosis on the family are common concerns among YBCS.[10,13,14]

Beyond their medical symptoms, YBCS also encounter issues with child-rearing, employment, and changes in budding relationships or marriages.[6] Stressors associated with these psychosocial concerns and long term treatment effects place YBCS at increased risk for psychological distress, which may last years beyond the cancer diagnosis.[10,15]

Several studies have examined the effect of BC diagnosis and treatment upon QOL in YBCS.[2,3,12,16,17] However, given the rarity of the disease in this young population, the studies have generally been smaller in scale. Additionally, studies exploring the long term effects of treatment in YBCS have varied widely in eligibility criteria, time since diagnosis, and definition of *young*. Given the paucity of research with this young population, we performed a large study evaluating the long term effects of BC diagnosis and treatment on YBCS who were diagnosed ≤45 years of age and were >1 year from diagnosis.

Patients and Methods

Patient Eligibility

Eligible women were ≤45 years of age at the time of BC diagnosis, ≥18 yrs of age at the time of the study, had history of histologically or cytologically confirmed breast carcinoma, were ≥12 months post BC diagnosis, and may have received or were currently undergoing surgery, chemotherapy, radiation, or adjuvant endocrine therapy for BC. All eligible patients

were seen at the U.T. M.D. Anderson Cancer Center (UTMDACC) for evaluation and/or management of BC.

Study End Points

The primary objective of the study was to describe the QOL of YBCS (aged ≤45 years at diagnosis) as measured by the QOL in Adult Cancer Survivors (QLACS) instrument. Secondary objectives of the study were: to measure differences in QOL between ethnic groups and to describe effects of BC diagnosis and treatment upon menopausal symptoms and fertility in YBCS.

Procedure

The UTMDACC Department of Breast Medical Oncology, in collaboration with the YBCS Program, maintains a database of YBCS, who were ≤45 years at time of BC diagnosis. At the time of the study, the Breast Cancer Management System (BCMS) contained 3075 women who were diagnosed prior to July 2007, were alive, and were ≤ 45 years old at the time of BC diagnosis. Following approval of the protocol by the UTMDACC Institutional Review Board, the BCMS was utilized to identify eligible YBCS. Women (n = 2,387) who met the inclusion criteria received an advance letter announcing the upcoming survey. One week later, the patients received a cover letter, a postage-paid postcard enabling the patient to decline the study, and the study survey, which was comprised of: the QLACS survey, Menopause Symptom Scale (MSS), and questions aimed at obtaining pertinent background information. It was requested that the study participant return the completed surveys to The Patient Reported Outcomes, Survey and Population Research (PROSPR) program in the UTMDACC Department of Behavioral Science via a postage-paid return envelope provided by the study team. No monetary incentives were given. However, a paper mache pink ribbon seeded with Forget-Me-Not seeds was included as a token of appreciation and sent to all patients.

Four weeks after the initial survey was mailed, the study survey and cover memo were mailed again to non responders. In collaboration with the Department of Health Disparities Research, the second mailing included a letter of support from a minority community leader, in order to increase awareness of support of these leaders and potentially maximize responses among minority YBCS. Only minority non responders received letters from minority community leaders, matched by race/ethnicity. To optimize correct identification of a potential participant's ethnicity, the list of medical record numbers was cross-referenced with the UTMACC Patient History Database (PHDB) residing in the UTMDACC Department of Epidemiology, which contains archived patient ethnicity information that is self-reported by the patient.

Participants were asked to write their names or initials on the surveys. Each YBCS was mailed a survey that was coded with a study identification number (ID). This study ID was matched to the patient medical record number. The identifiers were kept securely in a database designated for survey data entry. An analysis dataset was prepared with no patient identifiers.

Measures

QOL of Cancer Survivors—The QLACS survey is a 47 item, self-report questionnaire that was validated by Nancy Avis and colleagues.[18] _ENREF_2 It was designed specifically for use with persons who were >5 years post cancer diagnosis. Five cancer-specific domains were identified (appearance concerns, financial problems, distress over recurrence, family-related distress, and benefits of cancer) along with 7 generic QOL domains (negative feelings, positive feelings, cognitive problems, sexual problems, physical pain, fatigue, and social avoidance). Each has a separate subscale. The QLACS survey employs a 5-point Likert scale, with 0 corresponding to “never” and 5 corresponding to “always.” Internal reliability and consistency demonstrated that coefficient alpha exceeded 0.71 for each subscale. While the QLACS was validated in breast cancer survivors (BCS) who were >5 years from diagnosis, it has been used in other research with BCS who were closer to the time of diagnosis.[19]

Menopausal symptoms—The MSS was derived from the Breast Cancer Prevention Trial Symptom Checklist.[20] For a collection of seven menopause symptoms, patients utilize a 5-point Likert scale of severity, ranging from 0 (not at all) to 4 (extremely), to describe how bothered they are by each problem during the past 4 weeks. A summary scale for all seven symptoms is derived by summing the individual severity scores and determining the mean severity score for each item; this mean score is termed the Symptom Scale Score. The Cronbach alpha scores 3, 4 for each subscale, respectively, were hot flash subscale = 0.76; vaginal subscale = 0.73; urinary subscale = 0.76; and the Symptom Scale Score of all symptoms = 0.50.

Reproductive concerns—The survey included questions involving children, fertility, and desire for children. Five questions about reproduction were derived from the Reproductive Concerns Scale (RCS_ENREF_5), which is a 14-item scale that examines distress among cancer survivors whose reproductive ability may be impaired by their disease and/or treatment.[21] Based on a sample of 231 long-term female cancer survivors, internal consistency for the RCS was 0.91.

Demographics—Information regarding the patient's relationship status, education, and menstrual status was gathered from the study survey. BC treatment history was collected from the medical record.

Statistical Methods

The demographic and clinical characteristics for non-responders and responders were tabulated separately. Differences between responders and non-responders were tested with respect to age, age at diagnosis, time since diagnosis, recurrence status, estrogen receptor/progesterone receptor (ER/PR) status, stage, type of treatment, and time since treatment. Descriptive statistics summarized the QLACS score overall and by race/ethnic group. In addition, descriptive statistics summarized each domain score of the QLACS overall and by race/ethnic group. Mean score for each domain was estimated with a 95% confidence interval. Domains of the QLACS consisted of: generic domains (physical pain, negative feelings, positive feelings, cognitive problems, sexual problems, social avoidance, and

fatigue) and cancer-specific domains (financial problems, distress about family, distress about recurrence, appearance concerns, and benefits of cancer). Descriptive statistics summarized the generic summary score by summing the 7 constituent domain scores (reversing the score for Positive Feelings). Descriptive statistics summarized the Cancer-Specific summary score by summing the constituent domain summary scores excluding the Benefit of Cancer domain. Analysis of variance (ANOVA) methods were used to model the MSS and QLACS domain scores as a function of years since diagnosis of BC, time since treatment, race/ethnicity, age at diagnosis, adjuvant therapy use, neoadjuvant chemotherapy use, and stage. Tukey's honestly significant difference was used to conduct pair-wise comparisons for those factors with >2 categories, which statistically significant when testing the global hypothesis. As multiple exploratory tests were conducted, Bonferroni correction was used to the usual significance level of 0.05 to test each hypothesis.

Results

Responder Characteristics

A total of 2209 YBCS were invited to participate in the study; 1090 patients responded to the survey. The remaining 1119 patients either declined (n = 23), did not respond to the survey (n = 896), were deceased (104) or were lost to follow-up (n = 96). Responder characteristics are listed in Table 1. The majority of the respondents were white (78%); black and Spanish/Hispanic patients each accounted for 9-10% of the study cohort. Mean age at time of diagnosis was 39.5 years, and mean age when responding to the survey was 47.6 years.

Prior to diagnosis, 78% of patients were married, 9% were single, 6% were involved in a committed relationship, 6.5% were divorced or separated, and 0.5% were widowed. At the time of the survey, these numbers had shifted as follows: 75%, married; 9.5%, single; 5%, in a committed relationship; 10%, divorced or separated, 0.5%, widowed.

For 54% of patients, the trigger event leading to the diagnosis of BC was the self-discovery of a lump in the breast; 23% patients cited an abnormal mammogram as the trigger event. The most common tumor histology noted was invasive ductal carcinoma (81%). Fifty-two percent of the tumors were ER/PR positive, 22% were ER/PR negative, 15% were ER or PR positive, and the remainder had incomplete data.

More than half (59%) of the patients had undergone mastectomy for their BC. Fifty-six percent of patients received adjuvant chemotherapy. In addition, a 55% of patients underwent endocrine therapy; among them, 49% of women received tamoxifen.

Comparison of Responder to Non-Responder Profile

Characteristics of the 1090 patients who responded to the study were compared to those of the 1119 patients who did not return the survey. Respondents were less racially diverse ($p<.001$), with fewer black (8.6% versus 15.6%) and Hispanic (10.0% versus 15.5%) patients. Respondents were also slightly older (mean, 39.5 years versus 38.6 years, $p<.001$) at time of diagnosis and at time of survey (mean 47.6 years versus 46.3 years, $p<0.001$). The respondent group contained more patients who had received endocrine therapy (56.2%

versus 47%, p=0.003). The groups were similar in menopausal status, trigger event, stage, ER/PR status, and use of adjuvant chemotherapy, and years since diagnosis.

Reproductive Findings

Prior to BC diagnosis, 77% of all patients had regular menstrual cycles, and 8% of patients had irregular menstrual cycles. Of the remaining patients, 1% had no menses during the year prior to their BC diagnosis , .9% had undergone natural menopause, 5.4% had undergone a hysterectomy without oophorectomy, 1.9% had undergone hysterectomy and unilateral salpingo-oophorectomy, 3.9% had undergone a hysterectomy and bilateral salpingo-oophorectomy , .1% had chemically induced menopause (.1%), .1% responded as having "other" menstrual findings (.1%), and 1.1% did not respond.

Thirty-six percent of patients developed menopause due to BC treatment, 33% of patients indicated no desire to become pregnant after BC treatment, 1% had been trying to become pregnant but had not yet become pregnant, 4% had become pregnant since their diagnosis, 6% were worried that becoming pregnant could trigger a new episode of BC, 9% were told by their physician that they should not become pregnant after their diagnosis, and 11% of patients did not answer questions regarding pregnancy.

Prior to BC diagnosis, 13% of patients had undergone treatment for infertility. At the time of diagnosis, 34% of patients stated that someone had discussed the potential effect of BC treatment upon their fertility. Approximately 5% of women had undergone a procedure to preserve fertility prior to starting treatment, which included: freezing of unfertilized eggs (0.1%), in vitro fertilization (0.8%), taking medications during chemotherapy to protect the ovaries (1.0%), and unspecified procedures (2.8%). Since their diagnosis, 3.8% of patients had seen a doctor to be evaluated for infertility.

Table 2 demonstrates the menopausal status by age (< 40 years versus ≥40 years), and table 3 shows menopausal status by years from diagnosis (<5 years, 5-10 years, >10 years). Compared to older patients, women ≤40 years demonstrated a significantly higher degree of distress from hot flashes (p=0.0007). Also, levels of distress related to vaginal dryness (p<0.0001) and dyspareunia (p=0.0014) were significantly higher in patients who were <5 years from diagnosis, compared to those were >10 years from diagnosis.

Eighteen percent of patients reportedly currently taking prescription medications for depression, and 15% of patients were taking prescription medicine for anxiety. Eleven percent of patients were taking medications for hot flashes.

QOL Domains

Table 4 demonstrates the effects of race and age upon QOL. Black women scored higher (i.e., greater distress) than white women in the area of financial problems (p=0.001). In comparison to white women, Hispanic women had worse family distress scores (p=0.0028). The distress about family score represents a summary of: whether patients were worried that their family members were at risk of developing cancer, concern that family members may have cancer-causing genes, and worries about whether family members should have genetic

tests for cancer. No other statistically significant differences were seen among the two ethnicities.

Stage and neoadjuvant chemotherapy did not have a significant effect on QLACS in this study. However, patients who were >10 years from diagnosis had significantly poorer sexual interest (p=0.0003) than women were closer to their diagnosis (table not shown). Also, patients <40 years at time of diagnosis had significantly poorer sexual interest (p=0.0016) than women > 40 years at the time of diagnosis.

Discussion

This is the largest cross-sectional survey to date to evaluate the long-term effects of BC diagnosis and treatment in YBCS. However, the cross-sectional nature of the study itself, as well as the fact that the data came from a single insitutition, were limitations of this study;. In addition, our study was limited by the fact that our patient population stemmed from patients who were referred to a tertiary cancer center, which may have affected the demographics and treatment patterns noted in the study. Rates of mastectomy were high, possibly reflecting the concerns about risk of recurrence in the ipsilateral or contralateral breast related to genetics. In addition, more than half of patients received chemotherapy and/or endocrine therapy.

Our study found that approximately one-third of these young patients developed menopause due to BC treatment. Only 34% noted that the topic of infertility had been discussed with them prior to initiation of therapy. This percentage is substantially lower than estimates found in other studies, such as by Partridge and colleagues.[7] Potentially, recall bias may have affected this discrepancy, as these data were reported several years after diagnosis. Nevertheless, as many of these patients were diagnosed prior to the emergence of guidance regarding fertility discussions by the American Society of Clinical Oncology (ASCO) in 2006, it may be useful to perform a future study to determine whether an evolution in the incidence of fertility discussions has occurred since then.[22] Among those who performed a procedure to preserve fertility, there was wide variation involving the type of procedures, with no clear preferred intervention noted in this group.

This study demonstrated a significant effect of race, age, and year of diagnosis upon discrete domains; these factors affected QOL to a greater degree than other important aspects of BC diagnosis and treatment, such as stage and chemotherapy. While the study was limited by the paucity of normative values for these QOL measures, the study did demonstrate that black women demonstrated significantly higher levels of distress involving financial problems than their white or Hispanic counterparts, pointing to a need for targeted counseling in this area. In addition, Hispanic women expressed greater concerns regarding their family's predisposition for malignancy, as well as cancer-specific subscores, highlighting a greater need for genetic education and intervention in these domains. The significant differences across ethnicities discovered in our study, in addition to recent research in this area, point to the need for studies with larger numbers of minority YBCS. [23-25]

Furthermore, age at diagnosis and years from diagnosis also had a profound effect upon QOL, with younger women noting greater distress related to vasomotor dysfunction and dyspareunia, and women who were < 5 years from diagnosis noting more concerns related to vaginal dryness and dyspareunia. These findings are consistent with previous research describing treatment effects on reproductive health of YBCS.[3,10,12,14] Unlike our study, these studies included YBCS who were <12 months from diagnosis. Our findings further demonstrate the persistence of these symptoms in long term YBCS and the need for continued symptom assessment. In addition, the negative effect of greater years of diagnosis upon sexual interest appears initially counterintuitive, but may be related to continued fear of recurrence and the fear of pregnancy's impact upon this risk.[8] In addition, the findings also confirm that simply time from diagnosis does not alleviate impact on sexual interest. These levels of suffering reflect the need for more focused sexual counseling and education for these groups of women, whose surveys revealed that these difficulties outweighed distress related to potentially equally important concerns, such as fertility and body image.

Despite our attempts to increase the minority population in this study by using race/ethnic concordant letters of support from community leaders, our study was limited by fewer black and Hispanic patients. The lower response rate from minority survivors indicates the need for concerted educational and collaborative partnerships with these communities to increase relevance and trust. However, our study clearly demonstrates the need for improved targeted interventions, based upon factors such as race, age, and time from diagnosis. In addition, it is noted that, despite the suboptimal recruitment of minority patients, differences in areas of distress involving finances, family predisposition, and cancer-specific subscores remained significant. Although our findings add to the continuing research exploring treatment effects in minority BCS, further research is warranted with larger numbers of ethnically diverse YBCS. For just as BC treatment has evolved and improved through targeted therapies to address areas of disease such as her-2/neu positive disease, there is an unmet need for targeted psychosocial interventions to assist important segments of our BC population.

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Table 1

Demographic Information

	Survey Responder			
	No (n=1119)		Yes (n=1090)	
	N	%	*N*	%
Race (				
Asian/Pacific Islander	50	4.5	37	3.4
Black	175	15.6	94	8.6
Native American	2	0.2	1	0.1
Spanish, Hispanic	173	15.5	109	10.0
White	708	63.3	846	77.6
Other	11	1.0	3	0.3
Menopausal Status at DX)				
Peri	18	1.6	14	1.3
Post	131	11.7	141	12.9
Pre	881	78.7	893	81.9
Pregnant	6	0.5	5	0.5
Unknown	1	0.1	0	0.0
Missing	85	7.6	37	3.4
Histology				
Invasive Ductal	877	78.4	877	80.5
Invasive Lobular	36	3.2	58	5.3
Invasive Micropapillary	4	0.4	3	0.3
Invasive Mixed Ductal/Lobular	47	4.2	55	5.0
Invasive Papillary	1	0.1	3	0.3
Medullary	4	0.4	3	0.3
Metaplastic/Sarcomatoid	5	0.4	4	0.4
Invasive Mucinous	17	1.5	8	0.7
Invasive Tubular	6	0.5	9	0.8
Other	122	10.9	70	6.4
Trigger Event				
Abnormal Mammogram	211	18.9	246	22.6
Abnormal Ultrasound	3	0.3	5	0.5
Axillary Mass (palpated on clinical exam)	0	0.0	2	0.2
Axillary Mass (self-palpated)	23	2.1	16	1.5
Bloody Nipple Discharge (self palpated)	11	1.0	10	0.9
Breast Pain or Discomfort	46	4.1	41	3.8
Inverted Nipple	7	0.6	9	0.8
Lump in Breast (palpated on clinical exam)	33	3.0	47	4.3
Lump in Breast (self palpated)	611	54.6	587	53.9
Lump in Breast (NOS)	0	0.0	2	0.2
Non-Bloody Nipple Discharge	8	0.7	10	0.9

	Survey Responder			
	No (n=1119)		Yes (n=1090)	
	N	%	*N*	%
Swelling	16	1.4	15	1.4
Other	25	2.2	18	1.7
Unknown/Missing	125	11.2	82	7.5
Clinical Stage				
I	266	23.8	305	28.0
II	400	35.7	372	34.1
III	162	14.4	144	13.2
IV	82	7.3	60	5.5
Unknown/Missing	209	18.7	209	19.2
ER/PR Status				
Neg/Neg	267	23.9	237	21.7
Neg/Pos	33	2.9	34	3.1
Neg/Missing	0	0.0	1	0.1
Pos/Neg	120	10.7	108	9.9
Pos/Pos	524	46.8	565	51.8
Pos/Missing	9	0.8	19	1.7
Unk/Unk	6	0.5	6	0.6
Missing/Missing	160	14.3	120	11.0
Endocrine Therapy *				
No	505	45.1	441	40.5
Yes	535	47.8	612	56.2
Anastrozole	33		50	
Exemestane	4		2	
Goserelin	7		6	
Letrozole	6		6	
Leuprolide acetate	3		1	
Tamoxifen	480		539	
Other	2		8	
Missing	79	7.1	37	3.4
(Neoadjuvant/adjuvant Chemo				
No	452	40.4	442	40.6
Yes	588	52.6	611	56.1
Missing	79	7.0	37	3.4
Type of Surgery				
Axillary lymph node dissection (ALND)	3	0.3	0	0.0
Excisional biopsy	11	1.0	27	2.5
Breast-conserving surgery (BCS), NOS	164	14.7	184	16.9
BCS with ALND	206	18.4	172	15.8
BCS without ALND	4	0.4	3	0.3
Re-excision +ALND (post BCS)	3	0.3	1	0.1

	Survey Responder			
	No (n=1119)		Yes (n=1090)	
	N	%	*N*	%
Re-excision post BCS	9	0.8	9	0.8
Re-excision post-mastectomy	3	0.3	3	0.3
Mastectomy with ALND	77	6.9	61	5.6
Mastectomy without ALND	65	5.8	83	7.6
Mastectomy NOS	303	27.1	302	27.7
Radical mastectomy with ALND	4	0.4	5	0.5
Skin sparing mastectomy with ALND	80	7.1	86	7.9
Skin sparing mastectomy without ALND	87	7.8	100	9.2
Missing	100	8.9	54	5.0
Age at Diagnosis				
N	1119		1090	
Mean	38.6		39.5	
Std Dev	5.1		4.8	
Min	22.0		21.0	
Median	40.0		41.0	
Max	45.0		45.0	
Age when Answered Survey				
N	1040		1053	
Mean	46.3		47.6	
Std Dev	6.6		6.8	
Min	26.4		23.8	
Median	46.5		47.7	
Max	74.5		80.4	
Years Since Diagnosis				
N	1040		1053	
Mean	7.3		7.6	
Std Dev	4.7		5.1	
Min	1.3		1.3	
Median	6.3		6.6	
Max	40.7		44.0	

* Endocrine therapy refers to treatment at any time prior to the survey.

Table 2

Relationship of Menopausal Symptoms to Age at Diagnosis

Domain	N	Mean	SD	Min	Median	Max	95% CI	*p-value*[*]
Age < 40 Years								
1. Hot flashes?	448	1.2	1.3	0	1	4	1.1 – 1.3	0.0007
2. Difficulty with bladder control (when laughing or crying)?	451	0.6	1.1	0	0	4	0.5 – 0.7	0.3078
3. Difficulty with bladder control (at other times)?	450	0.6	1.1	0	0	4	0.5 – 0.7	0.0199
4. Genital itching/irritation?	449	0.6	1.1	0	0	4	0.5 – 0.7	0.6769
5. Vaginal dryness?	445	1.4	1.5	0	1	4	1.3 – 1.6	0.0330
6. Pain with intercourse?	434	1.0	1.5	0	0	4	0.9 – 1.1	0.0070
7. Night sweats?	450	1.1	1.4	0	0	4	1.0 – 1.3	0.4159
MSS Total Score	429	6.6	5.7	0	6	26	6.0 – 7.1	0.0035
Age ≥ 40 Years								
1. Hot flashes?	632	1.5	1.4	0	1	4	1.4 – 1.6	---
2. Difficulty with bladder control (when laughing or crying)?	633	0.7	1.2	0	0	4	0.6 – 0.8	---
3. Difficulty with bladder control (at other times)?	629	0.7	1.1	0	0	4	0.6 – 0.8	---
4. Genital itching/irritation?	631	0.6	1.0	0	0	4	0.5 – 0.6	---
5. Vaginal dryness?	626	1.6	1.5	0	1	4	1.5 – 1.7	---
6. Pain with intercourse?	607	1.3	1.6	0	0	4	1.1 – 1.4	---
7. Night sweats?	627	1.2	1.4	0	1	4	1.1 – 1.3	---
MSS Total Score	589	7.6	5.7	0	7	26	7.2 – 8.1	---

[*] p-value for comparing scores between patients age < 40 years and patients age ≥ 40 years. Using a Bonferroni correction due to performance of 8 tests suggests using a significance level of 0.05/8 = 0.00625 for each test.

Table 3

Relationship of Menopausal Symptoms to Years from Diagnosis

Domain	N	Mean	SD	Min	Median	Max	95% CI	*p-value*[*]
< 5 Years Since Diagnosis								
1. Hot flashes?	399	1.5	1.4	0	1	4	1.3 – 1.6	0.0153
2. Difficulty with bladder control (when laughing or crying)?	400	0.6	1.1	0	0	4	0.5 – 0.7	0.1729
3. Difficulty with bladder control (at other times)?	398	0.5	1.0	0	0	4	0.4 – 0.6	0.0055
4. Genital itching/irritation?	397	0.6	1.1	0	0	4	0.5 – 0.7	0.2309
5. Vaginal dryness?	395	1.3	1.5	0	1	4	1.2 – 1.5	< 0.0001
6. Pain with intercourse?	390	1.0	1.4	0	0	4	0.8 – 1.1	0.0014
7. Night sweats?	399	1.2	1.4	0	1	4	1.1 – 1.4	0.0571
MSS Total Score	381	6.8	5.6	0	6	26	6.2 – 7.4	0.2311
5 – 10 Years Since Diagnosis								
1. Hot flashes?	361	1.4	1.4	0	1	4	1.2 – 1.5	---
2. Difficulty with bladder control (when laughing or crying)?	363	0.7	1.2	0	0	4	0.6 – 0.8	---
3. Difficulty with bladder control (at other times)?	361	0.7	1.2	0	0	4	0.6 – 0.8	---
4. Genital itching/irritation?	363	0.5	1.0	0	0	4	0.4 – 0.6	---
5. Vaginal dryness?	361	1.6	1.6	0	1	4	1.4 – 1.7	---
6. Pain with intercourse?	354	1.2	1.6	0	0	4	1.0 – 1.4	---
7. Night sweats?	359	1.2	1.4	0	1	4	1.1 – 1.4	---
MSS Total Score	347	7.4	5.8	0	7	26	6.8 – 8.0	---
> 10 Years Since Diagnosis								
1. Hot flashes?	284	1.2	1.3	0	1	4	1.0 – 1.3	---
2. Difficulty with bladder control (when laughing or crying)?	285	0.8	1.2	0	0	4	0.6 – 0.9	---
3. Difficulty with bladder control (at other times)?	284	0.8	1.2	0	0	4	0.6 – 0.9	---
4. Genital itching/irritation?	284	0.5	1.0	0	0	4	0.4 – 0.6	---
5. Vaginal dryness?	280	1.8	1.5	0	2	4	1.7 – 2.0	---
6. Pain with intercourse?	265	1.4	1.6	0	0	4	1.2 – 1.6	---
7. Night sweats?	283	1.0	1.3	0	0	4	0.9 – 1.2	---
MSS Total Score	258	7.5	5.6	0	7	25	6.8 – 8.2	---

[*] p-value for comparing scores across categories. Using a Bonferroni correction due to performance of 8 tests suggests using a significance level of 0.05/8 = 0.00625 for each test. For “Vaginal dryness?” and “Pain with intercourse?” the “< 5 Years Since Diagnosis” and “>10 Years Since Diagnosis” groups are significantly different from one another, but neither of these groups is significantly different from the “5 – 10 Years Since Diagnosis” group.

Table 4

Effects of Race and Age upon Quality of Life (QOL)

	Domain	N	SD	Min	Median	Max	95% CI	*p-value* *
White								
	Negative Feelings	846	11.2	4.2	4	10	28	10.9 – 11.5	0.4065
rev	Positive Feelings	799	10.7	5.0	4	10	28	10.4 – 11.1	0.5147
	Cognitive Problems	826	12.0	5.0	4	11	28	11.6 – 12.3	0.1566
	Physical Pain	822	9.3	5.2	4	8	28	9.0 – 9.7	0.0626
	Sexual Interest	803	7.4	3.8	2	7	14	7.2 – 7.7	0.1343
	Sexual Function	819	6.3	3.6	2	6	14	6.1 – 6.5	0.0988
rev	Fatigue [a]	830	12.1	5.3	4	11	27	11.7 – 12.5	0.0523
	Social Avoidance	798	8.8	4.9	4	8	28	8.5 – 9.2	0.0058
	Financial Problems	825	9.5	6.5	4	7	28	9.1 – 9.9	0.0010
rev	Benefits of Cancer	830	12.9	6.0	4	12	28	12.4 – 13.3	0.0105
	Distress about Family [b]	834	12.9	6.9	4	10.7	28	12.5 – 13.4	0.0028
	Appearance Concerns	822	11.6	6.0	4	10	28	11.2 – 12.0	0.5331
	Distress about Recurrence	816	13.7	6.2	4	12	28	13.3 – 14.1	0.5284
	Summary Score: Generic [c]	721	77.0	26.7	28	73	166	75.1 – 79.0	0.3701
	Summary Score: Cancer Specific [d]	785	44.1	17.9	15	41	102	42.8 – 45.3	0.0086
Spanish / Hispanic								
	Negative Feelings	106	11.6	5.2	4	11	26	10.6 – 12.6	---
rev	Positive Feelings	102	10.0	5.7	4	8	26	8.8 – 11.1	---
	Cognitive Problems	106	12.3	5.7	4	11	28	11.2 – 13.4	---
	Physical Pain	105	9.7	5.	4	9	25	8.7 – 10.7	---
	Sexual Interest	98	6.7	4.1	2	6	14	5.9 – 7.5	---
	Sexual Function	103	6.0	3.8	2	5	14	5.3 – 6.7	---
rev	Fatigue [a]	106	12.6	5.6	4	12	28	11.5 – 13.7	---
	Social Avoidance	97	9.6	5.6	4	8	26	8.4 – 10.7	---
	Financial Problems	103	11.2	7.1	4	9	28	9.8 – 12.5	---
rev	Benefits of Cancer	107	11.1	6.5	4	9	28	9.9 – 12.4	---
	Distress about Family [b]	109	15.2	7.7	4	13.3	28	13.8 – 16.7	---
	Appearance Concerns	104	12.2	6.3	4	11.5	28	11.0 – 13.4	---
	Distress about Recurrence	104	14.5	6.7	4	14	28	13.2 – 15.8	---
	Summary Score: Generic [c]	83	80.0	32.7	29	74	168	72.8 – 87.1	---
	Summary Score: Cancer Specific [d]	96	49.1	18.9	15	45.5	102	45.3 – 53.0	---
Black								
	Negative Feelings	88	12.0	5.5	4	10.5	26	10.8 – 13.1	---
rev	Positive Feelings	84	10.5	5.4	4	9	25	9.3 – 11.7	---
	Cognitive Problems	88	12.5	6.2	4	11	27	11.2 – 13.8	---

Domain			N	SD	Min	Median	Max	95% CI	*p-value* *
	Physical Pain	87	10.9	6.7	4	9	27	9.5 – 12.3	---
	Sexual Interest	88	6.9	4.0	2	6	14	6.0 – 7.7	---
	Sexual Function	90	5.4	3.7	2	4	14	4.6 – 6.1	---
rev	Fatigue [a]	91	13.2	5.9	4	12	26	11.9 – 14.4	---
	Social Avoidance	87	10.8	6.7	4	9	28	9.4 – 12.2	---
	Financial Problems	90	12.1	7.6	4	10	28	10.5 – 13.7	---
rev	Benefits of Cancer	90	11.4	5.9	4	11	28	10.2 – 12.7	---
	Distress about Family [b]	91	14.7	7.6	4	12	28	13.1 – 16.2	---
	Appearance Concerns	89	12.1	6.6	4	11	28	10.7 – 13.5	---
	Distress about Recurrence	90	14.1	6.4	4	13	28	12.7 – 15.4	---
	Summary Score: Generic [c]	70	81.3	36.2	33	67.5	173	72.6 – 89.9	---
	Summary Score: Cancer Specific [d]	85	49.1	20.4	15	47	105	44.7 – 53.5	---
Asian / Pacific Islander									
	Negative Feelings	36	11.6	4.4	4	11	25	10.1 – 13.1	---
rev	Positive Feelings	35	10.3	4.6	4	10	20	8.8 – 11.9	---
	Cognitive Problems	37	10.3	4.4	4	9	21	8.8 – 11.7	---
	Physical Pain	37	9.3	5.0	4	8	28	7.6 – 11.0	---
	Sexual Interest	34	6.6	3.6	2	6	14	5.4 – 7.9	---
	Sexual Function	35	5.8	3.2	2	5	14	4.7 – 6.9	---
rev	Fatigue [a]	37	10.4	4.9	4	10	23	8.8 – 12.0	---
	Social Avoidance	35	9.5	3.9	4	9	17	8.2 – 10.8	---
	Financial Problems	35	9.7	6.1	4	9	23	7.7 – 11.8	---
rev	Benefits of Cancer	37	12.3	6.3	4	13	25	10.2 – 14.4	---
	Distress about Family [b]	37	12.6	6.4	4	12	28	10.5 – 14.8	---
	Appearance Concerns	37	10.8	5.6	4	10	24	8.9 – 12.7	---
	Distress about Recurrence	37	13.1	6.6	4	12	28	10.9 – 15.3	---
	Summary Score: Generic [c]	31	72.4	27.2	34	68	153	62.4 – 82.3	---
	Summary Score: Cancer Specific [d]	35	42.8	20.4	15	40	92	35.8 – 49.8	---
Age < 40 Years									
	Negative Feelings	441	11.7	4.5	4	11	26	11.2 – 12.1	0.0532
rev	Positive Feelings	426	10.6	5.1	4	10	28	10.2 – 11.1	0.9024
	Cognitive Problems	443	12.1	5.3	4	12	26	11.6 – 12.5	0.6642
	Physical Pain	443	9.0	5.2	4	8	28	8.6 – 9.5	0.0300
	Sexual Interest	430	6.8	3.9	2	6	14	6.5 – 7.2	0.0016
	Sexual Function	442	5.9	3.5	2	5	14	5.6 – 6.2	0.0523
rev	Fatigue [a]	445	12.1	5.2	4	11	27	11.6 – 12.6	0.6441
	Social Avoidance	431	9.1	5.2	4	8	28	8.6 – 9.6	0.9173
	Financial Problems	441	10.2	6.9	4	8	28	9.6 – 10.9	0.1400
rev	Benefits of Cancer	444	12.1	6.0	4	11	28	11.6 – 12.7	0.0484

Domain		N	SD	Min	Median	Max	95% CI	*p-value* *
	Distress about Family [b]	447	13.5	7.1	4	12	28	12.9 – 14.2	0.3587
	Appearance Concerns	442	12.0	6.1	4	11	28	11.4 – 12.6	0.1234
	Distress about Recurrence	435	14.3	6.5	4	13	28	13.6 – 14.9	0.0498
	Summary Score: Generic [c]	390	77.3	28.3	28	71.5	166	74.5 – 80.1	0.9011
	Summary Score: Cancer Specific [d]	417	46.2	18.7	15	44	102	44.4 – 48.0	0.0611
Age ≥ 40 Years									
	Negative Feelings	614	11.1	4.4	4	10	28	10.8 – 11.5	---
rev	Positive Feelings	598	10.6	5.1	4	9	25	10.2 – 11.0	---
	Cognitive Problems	618	11.9	5.2	4	11	28	11.5 – 12.3	---
	Physical Pain	612	9.8	5.4	4	8	28	9.3 – 10.2	---
	Sexual Interest	597	7.6	3.8	2	7	14	7.3 – 7.9	---
	Sexual Function	609	6.4	3.7	2	6	14	6.1 – 6.6	---
rev	Fatigue [a]	623	12.2	5.6	4	11	28	11.8 – 12.7	---
	Social Avoidance	590	9.1	5.1	4	8	28	8.7 – 9.5	---
	Financial Problems	616	9.6	6.6	4	7	28	9.1 – 10.1	---
rev	Benefits of Cancer	624	12.9	6.1	4	12	28	12.4 – 13.3	---
	Distress about Family [b]	628	13.1	7.0	4	10.7	28	12.6 – 13.7	---
	Appearance Concerns	614	11.4	6.0	4	10	28	10.9 – 11.9	---
	Distress about Recurrence	616	13.5	6.0	4	12	28	13.0 – 14.0	---
	Summary Score: Generic [c]	519	77.5	28.0	28	73	173	75.1 – 80.0	---
	Summary Score: Cancer Specific [d]	588	44.0	18.1	15	40	105	42.5 – 45.5	---

[a] (reverse Q1) + Q5 + Q11 + Q14

[b] Q31 + Q34 + Q42 +Mean(Q31, Q34, Q42)

[c] Sum (Negative Feelings Subscale, Positive Feelings Subscale (reversed), Cognitive Problems Subscale, Physical Pain Subscale, Sexual Problems Subscale, Energy/Fatigue Subscale (reverse Q1), Social Avoidance Subscale)

[d] Sum (Financial Subscale, Distress Family Subscale (Q31 + Q34 + Q42), Appearance Subscale, Distress Recurrence Subscale)

* p-value for comparing scores for patients age < 40 years at diagnosis versus patients age ≥ 40 years at diagnosis. Using a Bonferroni correction due to performance of 15 tests suggests using a significance level of 0.05/15 = 0.0033 for each test.