

## BACKGROUND/PURPOSE

- **Health-related quality of life (HRQOL)** is associated with mortality risk in breast cancer survivors and it is increasingly considered an important endpoint in cancer clinical trials to inform patient-centered care, clinical decision-making, and health policy or reimbursement decisions.
- Our study aimed **to describe physical and mental HRQOL in a nationwide sample of U.S. female breast cancer survivors.**
- We examined the associations between HRQOL and breast cancer clinical characteristics, prognostic factors, and treatments. In addition, associations between poor HRQOL after diagnosis and all-cause mortality were assessed.

## METHODS

### Population for Analysis

- Female breast cancer survivors (n= 2,445) who were ≥ 1-year post-diagnosis and responded to a Survivorship Survey in 2012 were identified from the Sister and Two Sister Study.
- Women with unknown race (n=2), unknown cancer stage (n=30) or unstageable cancer breast cancer (n=9) were excluded.

### Measures

- **Demographic/Breast Cancer-related Characteristics:** Demographics were ascertained from questionnaires completed at Sister and Two Sister Study enrollment. Medical records were used to ascertain clinical characteristics (age at breast cancer diagnosis, cancer type, cancer stage, and hormone receptor status) and cancer treatment data (breast surgery, radiation, chemotherapy, and endocrine therapy).
- **HRQOL Outcomes:** The 10-item Patient-Reported Outcomes Measurement Information System Global Health Scale (PROMIS Global 10) was used to assess HRQOL domains including general health, physical health, mental health, social health, pain, and fatigue. The physical and mental HRQOL summary scores were calculated and transformed to T-score distributions with a mean of 50 and a standard deviation (SD) of 10. T-scores < 1 SD below U.S. population mean (T-scores <40) were considered poorer functioning.
- **Mortality Risk:** Participant's mortality and cause-of-death data were ascertained from a copy of the death certificate and/or linkages to the National Death Index.

### Statistical Analysis

- **Factors associated with Poor HRQOL:** Multivariable logistic regression models were used to assess predictors associated with physical and mental HRQOL after conditioning on age at diagnosis, race, AJCC stage, and history of other cancer diagnosis (other than breast cancer or nonmelanoma skin cancer).
- **Poor HRQOL and All-cause mortality:** Cox proportional hazard regression models were used to examine the association between poorer HRQOL and time-to-death. All Cox models were adjusted for survivor's age at diagnosis, time since diagnosis, AJCC stage, cancer treatment, Charlson Comorbidity Index (CCI) score, and recent recurrence, metastasis, or secondary malignancy.

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## RESULTS

### Breast cancer-related factors associated with Poor Physical and Mental HRQOL – Estimated Odds Ratios and 95% CIs

Predictors	(Index vs. Referent)	Adjusted OR	Poor Physical	Adjusted OR	Poor Mental
Cancer type	Invasive vs. DCIS	1.50		1.44	
AJCC stage	I vs. 0	1.26		1.31	
	II vs. 0	1.63		1.48	
	III vs. 0	2.85		2.16	
Hormone receptor status	Positive vs. Negative	0.92		0.84	
Cancer treatment	Any chemotherapy vs. Mastectomy only	1.16		1.01	
	Radiation w/ or w/o mastectomy vs. Mastectomy only	0.80		0.99	
Breast reconstruction surgery	Yes vs. No	0.77		0.90	
Endocrine therapy	Yes vs. No	0.88		0.89	
CCI score	1 vs. 0	2.63		1.76	
	2+ vs. 0	9.03		3.43	
Lymphedema	Yes vs. No	1.98		1.63	
Neuropathy	Yes vs. No	3.13		2.15	
Heart Disease	Yes vs. No	2.79		1.28	
Osteoporosis	Yes vs. No	1.59		1.32	
Depression	Yes vs. No	3.65		4.15	
Anxiety	Yes vs. No	2.64		3.86	
Recent recurrence, metastasis, or secondary malignancy	Yes vs. No	2.50		2.00	
Breast surgery complications	Yes vs. No	1.87		1.68	
Satisfaction with mastectomy	Dissatisfied vs. Satisfied	6.30		7.34	
	Neither vs. Satisfied	0.92		1.78	
Satisfaction with reconstruction surgery	Dissatisfied vs. Satisfied	2.99		3.74	
	Neither vs. Satisfied	2.40		1.42	

Note: Models for the associations of cancer type and AJCC stage with poor HRQOL were adjusted for age at diagnosis, race, and history of cancer. Other models were additionally adjusted for AJCC stage.

### Prevalence of Poor HRQOL among Breast Cancer Survivors from the Survivorship Survey as measured by the PROMIS Global 10 (N=2,445)

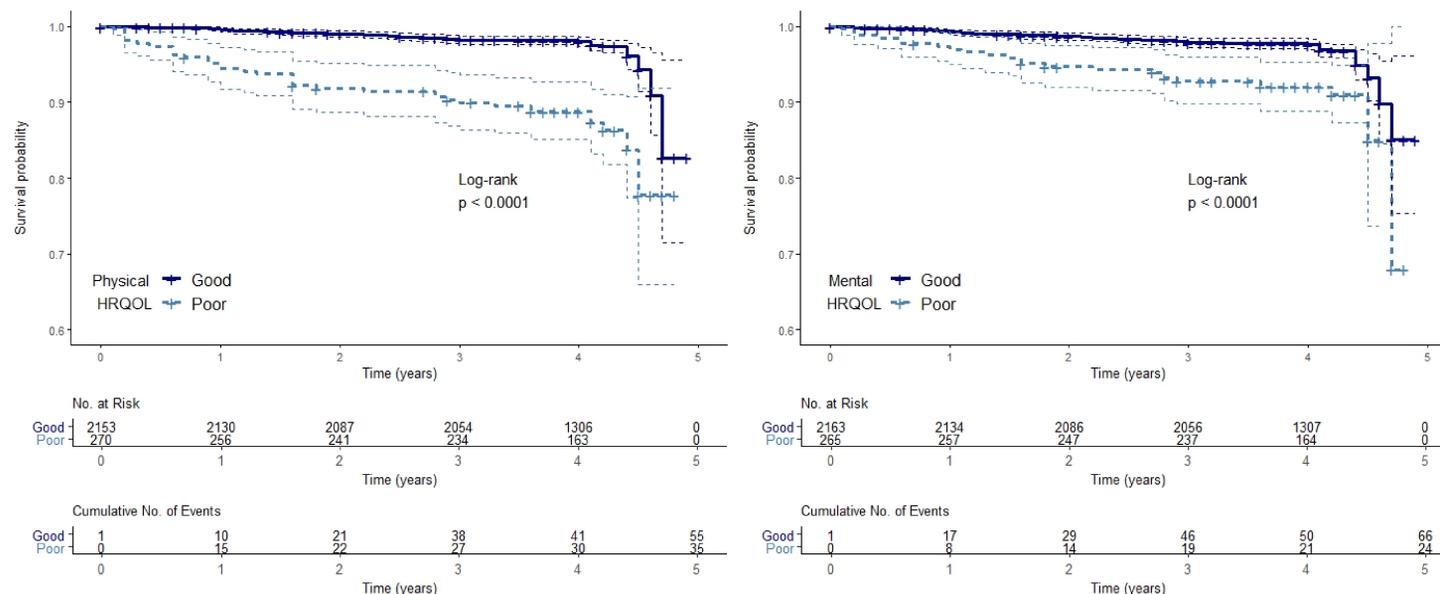
	n/N	%
<b>Physical HRQOL score</b>		
Poor (PROMIS T score <1 SD below U.S. population mean)	270/2423	11.1%
Unknown score	22	
<b>Mental HRQOL score</b>		
Poor (PROMIS T score <1 SD below U.S. population mean)	265/2428	10.9%
Unknown score	17	
<b>Physical and mental HRQOL scores</b>		
Poor (PROMIS T score <1 SD below U.S. population mean)	120/2421	5.0%
Unknown score	24	

### Association between Poor HRQOL and All-cause mortality among Breast Cancer Survivors from the Survivorship Survey (N=2,445)

	All-cause death (n=92)		Adjusted HR	
	n/N	%	HR	95% CI
<b>Physical HRQOL score</b>				
Good (PROMIS T score ≥1 SD below U.S. population mean)	55/2153	2.6%	Ref.	
Poor (PROMIS T score <1 SD below U.S. population mean)	35/270	13%	2.85	1.80 4.53
Unknown score	2/22			
<b>Mental HRQOL score</b>				
Good (PROMIS T score ≥1 SD below U.S. population mean)	66/2163	3.1%	Ref.	
Poor (PROMIS T score <1 SD below U.S. population mean)	24/265	9.1%	2.18	1.34 3.55
Unknown score	2/17			

Note: Hazard ratios were adjusted for age at diagnosis, time since diagnosis, AJCC stage, cancer treatment, CCI score, and recent recurrence, metastasis, or secondary malignancy.

### Kaplan-Meier Survival Curves for All-cause mortality associated with Poor Physical and Mental HRQOL



Note: The time-to-event was defined as the time from the Survivorship Survey completion to death or to last follow-up date known to be alive (censored).

## CONCLUSIONS

- Higher AJCC stage at diagnosis, higher CCI score at survey, experience of surgical complications during or after a breast surgery, and dissatisfaction with mastectomy or reconstruction surgery were associated with decreased HRQOL among breast cancer survivors.
- Survivors diagnosed with a specific comorbidity, particularly lymphedema, neuropathy, heart disease, osteoporosis, anxiety, and depression, had greater odds of poor HRQOL than survivors without the comorbidity.
- Poor HRQOL was significantly associated with an increased all-cause mortality among breast cancer survivors.