

Associations of Demographic and Social Factors on Health-Related Quality-of-Life Changes Among Older Women With Breast or Gynecologic Cancer

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OBJECTIVES: To examine associations of sociodemographic factors and social limitations with health-related quality of life (HRQOL) from pre- to postdiagnosis in older female cancer survivors.

SAMPLE & SETTING: 9,807 women aged 65 years or older with breast or gynecologic cancer from the Surveillance, Epidemiology, and End Results–Medicare Health Outcomes Survey.

METHODS & VARIABLES: Physical and mental HRQOL were assessed using the physical component summary (PCS) and mental component summary (MCS) of the Veterans RAND 12-Item Health Survey. Descriptive statistics and mixed-effects models for repeated measures were used.

RESULTS: Social limitations were the only significant factor associated with changes in MCS scores. Race and ethnicity, rurality, and social interference were associated with significant decreases in PCS scores.

IMPLICATIONS FOR NURSING: Nurses can assess mental and physical HRQOL after diagnosis and advocate for appropriate referrals. Oncology care should be tailored to cultural considerations, including race and ethnicity, rurality, and social support.

KEYWORDS health-related quality of life; older adults; breast cancer; gynecologic cancer

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With the aging U.S. population and advances in the prevention, screening, and treatment of cancer continuing to accumulate, quality and length of life in cancer survivorship has become a pressing issue. Of particular interest are older cancer survivors (aged 65 years or older), who are a rapidly growing segment of the cancer survivor population (Bluethmann et al., 2016). In 2022, an estimated 67% of the more than 18 million cancer survivors living in the United States were aged 65 years or older. By 2040, these figures are projected to increase to 26.1 million cancer survivors, of whom an estimated 73% will be aged 65 years or older. In addition, there is a growing population of older breast and gynecologic cancer survivors, accounting for about 43% of new cancer diagnoses in U.S. women (Siegel et al., 2024). In addition to the hallmarks of aging, which include declines in functional capacity and a greater prevalence of preexisting comorbidities, older cancer survivors also contend with social vulnerabilities (i.e., social influences on health) that may jeopardize their cancer survivorship experience (Rowland & Bellizzi, 2014; Williams et al., 2016).

Health-related quality of life (HRQOL) is an individual's perceived physical and mental health, which can be influenced by an individual's clinical status and demographic background (Reeve et al., 2009). HRQOL has been associated with a myriad of longitudinal outcomes among older adults, including overall cancer risk and survival (Klapheke et al., 2020b; Mukand et al., 2022; Park et al., 2021; Smith

et al., 2008). Higher HRQOL is also associated with more frequent social and emotional support received by adult cancer survivors (Gudina et al., 2021). In addition, older cancer survivors have considered HRQOL as more important than survival gains when making decisions about cancer treatment (Bhandari et al., 2020; Dos Santos Hughes & Malone, 2023; Kent et al., 2015). Tracking changes in HRQOL could offer potential opportunities for early identification of and appropriate interventions for patients at risk for poor outcomes (Bhandari et al., 2020).

Despite the need for longitudinal exploration, a majority of research on HRQOL includes single assessments of post-cancer diagnosis HRQOL and makes comparisons to disease-free older adults. The small number of studies that have focused on pre- and postdiagnosis HRQOL found significant changes in HRQOL over time and lower HRQOL among older cancer survivors compared to the general older adult population (Klapheke et al., 2020b; Stover et al., 2014). In addition, there was considerable variability in HRQOL trajectories among cancer survivors (Durá-Ferrandis et al., 2017; Jones et al., 2015) in part because of sociodemographic factors. An unexplored area in this population is how self-reported sociodemographic characteristics (e.g., race and ethnicity, rurality) and social limitations (i.e., health interfering with social activities) are associated with changes in HRQOL. Previous cross-sectional research found that members of racial and ethnic minority groups and those living in rural areas have lower HRQOL compared to their non-Hispanic White and/or urban-dwelling peers (Moss et al., 2021; Pinheiro et al., 2015; Rao et al., 2008). In addition, older cancer survivors who did not have a partner and experienced lower social support and greater health impacts on social functioning reported lower HRQOL (Han et al., 2021; Leung et al., 2016; Zandbergen et al., 2019). Expanding on prior analyses of women with a breast or gynecologic cancer diagnosis, this study examines the associations of sociodemographic factors and social limitations with changes in HRQOL from pre- to postdiagnosis among older women with breast or gynecologic cancer.

Methods

Dataset and Study Population

This study was approved by the Ohio State University Cancer Institutional Review Board (#2020C0068). The data for this study were derived from the Surveillance, Epidemiology, and End Results–Medicare Health Outcomes Survey (SEER-MHOS) combined dataset

(Ambs et al., 2008). In brief, SEER-MHOS provides detailed cancer registry data (e.g., cancer type[s], stage, histology, diagnosis date) from selected U.S. regions, as well as self-administered, longitudinal survey data assessing physical and mental functioning, in addition to functional status, smoking status, and chronic medical conditions. Medicare beneficiaries were included in this analysis if they were self-reported female, were aged 65 years or older, had exactly one breast or gynecologic (e.g., ovarian, endometrial, cervical, vulvar, vaginal) cancer, had at least one complete MHOS datapoint between 1998 and 2017 and within five years of their cancer diagnosis, and had completed at least one survey before diagnosis and one after.

HRQOL Outcomes

Physical and mental health statuses were assessed using the Veterans RAND 12-Item Health Survey (VR-12), a brief, generic, multiuse, self-administered health survey consisting of 12 items related to 8 physical and mental health domains: general health perceptions, physical functioning, role limitations because of physical problems, role limitations because of emotional problems, body pain, energy-fatigue, social functioning, and mental health (Selim et al., 2009). Physical component summary (PCS) and mental component summary (MCS) scores were then calculated and used as outcomes in this study. Scores range from 0 to 100, with higher scores indicating better HRQOL. Previous research has established a three-point minimal clinically important difference in VR-12 scores (Hays et al., 2005; Pandit et al., 2022; Revicki et al., 2008). Studies have demonstrated good internal consistency and reliability of the VR-12, with a Cronbach's alpha of 0.09 for the PCS and MCS subscales (Kazis et al., 2006; Kent et al., 2015).

Independent Variables

This study had four main independent variables of interest: social interference, rurality, race and ethnicity, and marital status. For social interference, beneficiaries were specifically asked how frequently physical health or emotional problems interfered with social activities, with the following possible responses: "all of the time," "most of the time," "some of the time," "a little of the time," and "none of the time." To assess rurality, rural-urban continuum codes based on the beneficiary's county of residence were used (Economic Research Service, 2023; Moss et al., 2021). Other variables in this study included the following: cancer treatment (e.g., radiation therapy, surgery), preexisting depressive symptoms as outlined

by Klapheke et al. (2020a), educational attainment, annual income, comorbidity burden, and American Joint Committee on Cancer stage. See Supplemental Table 1 online for definitions of the variables included in this study.

Statistical Analysis

Descriptive statistics of patient demographic and clinical characteristics included medians and interquartile ranges (IQRs) for continuous variables and frequencies and percentages for categorical variables. A repeated-measures mixed-effects model was used to assess mean MCS and PCS scores over time. An unstructured covariance matrix parameterized through its Cholesky root was used to model the covariance matrix for each participant, and the marginal likelihood was approximated using Laplace's method. Adjusted mean MCS and PCS scores were assessed pre- and post-cancer diagnoses for the primary independent variables, and the significance of the change in pre- and postdiagnosis estimates was evaluated at the 0.05 level. In addition, adjusted mean MCS and PCS scores were evaluated at each month using locally estimated scatter plot smoothing, with a smoothing parameter of 0.6. All analyses were performed using SAS, version 9.4.

Results

A total of 9,807 older women with breast or gynecologic cancer were included in this study (see Table 1). More than 80% ($n = 8,000$) of the sample had breast cancer, 66% ($n = 6,482$) had less than \$50,000 in annual income, 60% ($n = 5,894$) had at least completed high school, and the median age at diagnosis was 74 years (IQR = 70–79). The median number of comorbidities was two (IQR = 1–3), and 5% ($n = 451$) of participants had preexisting depressive symptoms. More than half ($n = 5,400$) of participants had stage I cancer, 92% ($n = 9,041$) of participants received surgical treatment for their cancer, and 45% ($n = 4,387$) received radiation therapy treatment. Although most demographic and clinical characteristics were similar between older women with breast and gynecologic cancer, the median survey follow-up time for those with breast cancer was two years longer than for those with gynecologic cancer (median follow-up = 7.6 years and 5.6 years, respectively). At the first survey, median MCS and PCS scores were 53 (IQR = 43–60) and 39 (IQR = 29–49), respectively, and did not differ by cancer type (see Table 2). Most participants were White ($n = 6,987$, 71%), lived in a metro area with a population of one million or greater ($n = 5,765$, 59%),

or indicated on their first survey that physical health or emotional problems never interfered with social activities ($n = 4,988$, 51%).

Overall, no change in MCS scores was observed from before and after cancer diagnosis ($\Delta = 0.27$, 95% confidence interval [CI] $[-0.14, 0.67]$, $p = 0.2$) (see Table 3). Associations between patient factors and changes in MCS revealed no significant relationships with rurality, social interference, race and ethnicity, or marital status. In addition, no trends were observed across rurality and social interference; however, the most severe category of social interference (i.e., “all of the time”) was associated with a significant decrease in MCS scores. Specifically, among participants who reported having social interference “all of the time” (i.e., interference of physical or emotional health on social activities), MCS scores decreased 2.4 points on average (95% CI $[-4.26, -0.54]$, $p = 0.012$).

Adjusted PCS scores decreased significantly overall from 34.8 to 32.7 ($\Delta = -2.06$, 95% CI $[-2.51, -1.61]$, $p < 0.001$) (see Table 4). In addition, variability in the changes of adjusted mean PCS scores was noted for all primary independent variables. In particular, changes in PCS scores ranged from -3.02 for participants in areas of 20,000 people or more (95% CI $[-5.35, -0.69]$, $p = 0.011$) to -1.81 in rural or urban areas of less than 20,000 people (95% CI $[-4.56, 0.93]$, $p = 0.2$). For social interference, significant decreases in PCS scores ranged from -1.33 to -2.52 , where those who experienced social interference “none of the time” had the largest reduction in PCS scores (95% CI $[-3.11, -1.93]$, $p < 0.001$), and participants who experienced social interference “some of the time” (i.e., interference of physical or emotional health on social activities) had the smallest significant change in scores (95% CI $[-2.24, -0.42]$, $p = 0.004$). Of note, participants who reported experiencing social interference “all of the time” did not have a significant decrease in mean PCS score ($\Delta = -0.65$, 95% CI $[-2.73, 1.43]$, $p = 0.54$). Regarding race and ethnicity, significant decreases in PCS scores ranged from -1.53 to -11.81 , where those who identified as American Indian or Alaska Native (AIAN) had the largest reduction in PCS scores (95% CI $[-19.06, -4.56]$, $p = 0.001$), and those who identified as Asian or Pacific Islander had the smallest decrease in PCS scores (95% CI $[-2.91, -0.15]$, $p = 0.029$). Participants who identified as another race or multiracial did not have a significant decrease in mean PCS scores ($\Delta = -1.54$, 95% CI $[-5.37, 2.29]$, $p = 0.43$). Both marital status groups had significant decreases in PCS scores before and after cancer diagnosis; however, the change was slightly larger

TABLE 1. Sample Demographic and Clinical Characteristics at First Survey in the Surveillance, Epidemiology, and End Results–Medicare Health Outcomes Survey Dataset by Cancer Type

Characteristic	Gynecologic Cancer (N = 1,807)		Breast Cancer (N = 8,000)		Total (N = 9,807)	
	Median	IQR	Median	IQR	Median	IQR
Age at diagnosis (years)	74	70–80	74	70–79	74	70–79
Follow-up time (months)	67	41–98	91	61–132	86	56–123
Number of comorbidities	2	1–3	2	1–3	2	1–3
Characteristic	n	%	n	%	n	%
Cancer stage						
I	858	48	4,542	57	5,400	55
II	207	12	2,458	31	2,665	27
III	429	24	703	9	1,132	12
IV	313	17	297	4	610	6
Education level						
At most some high school	403	22	1,859	23	2,262	23
Completed high school or GED or some college	1,096	61	4,798	60	5,894	60
Completed college or more than 4-year degree	250	14	1,153	14	1,403	14
Missing data	58	3	190	2	248	3
Income (\$)						
Less than 20,000	663	37	2,842	36	3,505	36
20,000–49,999	524	29	2,453	31	2,977	30
50,000 or more	183	10	886	11	1,069	11
Missing data	437	24	1,819	23	2,256	23
Preexisting depression						
No	1,051	58	3,941	49	4,992	51
Yes	93	5	358	5	451	5
Missing data	663	37	3,701	46	4,364	45
Radiation therapy treatment						
No	1,286	71	3,922	49	5,208	53
Yes	493	27	3,894	49	4,387	45
Missing data	28	2	184	2	212	2
Surgery treatment						
Yes	1,483	82	7,558	95	9,041	92
No	319	18	427	5	746	8
Missing data	5	–	15	–	20	–
Year of diagnosis						
1993–1997	–	–	482	6	482	5
1998–2002	–	–	1,535	19	1,535	16
2003–2007	461	26	1,789	22	2,250	23
2008–2012	858	48	2,707	34	3,565	36
2013–2015	488	27	1,487	19	1,975	20

IQR—interquartile range

Note. Because of rounding, percentages may not total 100.

among those who were unmarried ($\Delta = -2.08$, 95% CI $[-2.64, -1.53]$, $p < 0.001$) compared to those who were married ($\Delta = -2.03$, 95% CI $[-2.68, -1.38]$, $p < 0.001$).

Figures 1 and 2 show the changes in mean PCS and MCS scores over time. Briefly, except for social interference, stratifications demonstrated varied temporal changes in PCS and MCS around the time of cancer onset. For example, patients who were married had relatively stable PCS more than two years before and two years after cancer diagnosis; however, there was a substantial drop around the time of cancer diagnosis. Conversely, married patients had a decrease in MCS leading up to the diagnosis of cancer and then, during the following five years, increased to near-baseline levels.

Discussion

This study examined factors associated with changes in HRQOL from pre- to postdiagnosis in a cohort of older women diagnosed with breast or gynecologic cancer. Results indicated that HRQOL changed over time. In particular, physical HRQOL decreased over time, which is supported by the literature (Karlsen et al., 2016; Leung et al., 2014). Previous longitudinal studies have shown that changes in mental HRQOL after cancer diagnosis generally followed a U-shaped trajectory, demonstrating a return to precancer levels of HRQOL (Sauer et al., 2019; Stover et al., 2014). This return may demonstrate the psychological resilience of older cancer survivors in the face of potentially life-threatening illnesses (Seiler & Jenewein, 2019). However, of note, physical, psychological, and social difficulties are reported by older breast and gynecologic cancer survivors years after diagnosis (Bernardo et al., 2023; Krok-Schoen et al., 2018).

Social interference was the only significant factor associated with changes in mental HRQOL. Older women reporting the most severe category of social interference (i.e., interference of physical or emotional health on social activities “all of the time”) had the lowest mental HRQOL scores and experienced significant decreases in their scores. Older women who experienced social interference “some of the time” also had significant decreases in their mental HRQOL scores. Older women who experienced social interference “most of the time” through “none of the time” also experienced significant decreases in their physical HRQOL scores. However, among women with social interference “all of the time,” there was no significant change. This finding is counterintuitive and may be because of a floor effect, meaning that at prediagnosis, these women had poor physical health.

Additional research with larger sample sizes is warranted to explore this finding.

Interference of physical health or emotional problems on social activities has been shown to reduce HRQOL among older adults and cancer survivors (Hawton et al., 2011). Social activity interference can also negatively affect other outcomes among older cancer survivors. For example, Trevino et al. (2020) found that social activity interference was associated with a greater likelihood of receipt of mental health services among older cancer survivors. Additional research (e.g., focus groups, semistructured interviews) is needed to further examine how cancer and aging can affect social activity among older cancer survivors, as well as methods (e.g., technology, informal groups) to increase social engagement despite poorer health status.

There were several significant determinants of change in physical HRQOL from pre- to postdiagnosis among older women diagnosed with breast or gynecologic cancer. The most drastic drop of 11.8 points occurred among older women who self-identified as AIAN, which was well above the three-point minimal clinically important difference in VR-12 scores (Hays et al., 2005; Pandit et al., 2022; Revicki et al., 2008). The prediagnosis median score of 36 is similar to the previously reported mean VR-12 PCS score of 36.2 among older AIAN people. A potential reason for this finding may be the poor health status of older AIAN adults compared to their White counterparts (Du & Xu, 2016; Shippee et al., 2020; Yoo et al., 2014). AIAN communities experience significant inequity in health care and poorer health status, including lower life expectancy and a disproportionate disease burden compared to other U.S. populations (Kruse et al., 2022; Sequist, 2021). The Indian Health Service, which provides health care to AIAN people, is consistently underfunded, understaffed with limited technology, and often located at lengthy distances from AIAN people, which further exacerbates these health disparities (Cromer et al., 2019; Kruse et al., 2022). Specific to this study's population, Kim et al. (2022) found that older AIAN adults had the greatest number of chronic conditions and the highest prevalence of difficulties with activities of daily living compared to older adults from all other racial and ethnic groups. This result may also be attributed to the small sample size of this group within the cohort and outliers affecting the mean PCS score.

Older women from the other racial and ethnic groups (White, Black, Hispanic, Asian), apart from those identifying as multiracial or another race,

TABLE 2. Outcomes and Primary Independent Variables at First Survey in the Surveillance, Epidemiology, and End Results–Medicare Health Outcomes Survey Dataset by Cancer Type

Outcome	Gynecologic Cancer (N = 1,807)		Breast Cancer (N = 8,000)		Total (N = 9,807)	
	Median	IQR	Median	IQR	Median	IQR
Mental health–related quality of life	53	43–60	53	44–59	53	44–59
Physical health–related quality of life	39	30–49	39	29–49	39	29–49
Primary Independent Variable	n	%	n	%	n	%
Marital status						
Never married, divorced, separated, or widowed	1,065	59	4,469	56	5,534	56
Married	692	38	3,349	42	4,041	41
Missing data	50	3	182	2	232	2
Race and ethnicity^a						
American Indian or Alaska Native	13	1	30	–	43	–
Asian or Pacific Islander	120	7	584	7	704	7
Black or African American	192	11	817	10	1,009	10
Hispanic	185	10	680	9	865	9
White	1,257	70	5,730	72	6,987	71
Another race or multiracial	40	2	159	2	199	2
Social interference						
All of the time	70	4	242	3	312	3
Most of the time	138	7	660	8	798	8
Some of the time	334	19	1,521	19	1,855	19
A little of the time	331	18	1,342	17	1,673	17
None of the time	913	51	4,075	51	4,988	51
Missing data	21	1	160	2	181	2
Rurality (people per area)^b						
Metro						
Less than 250,000	129	7	623	8	752	8
250,000–1 million	492	27	2,241	28	2,733	28
More than 1 million	1,081	60	4,684	59	5,765	59
Urban						
2,500–19,999 (adjacent to metro)	22	1	130	2	152	2
2,500–19,999 (nonadjacent to metro)	16	1	49	1	65	1
20,000 or more (adjacent to metro)	19	1	113	1	132	1
20,000 or more (nonadjacent to metro)	41	2	126	2	167	2
Rural						
Rural or less than 2,500 urban (adjacent to metro)	5	–	21	–	26	–
Rural or less than 2,500 urban (nonadjacent to metro)	2	–	13	–	15	–

^a Categories are presented as they were depicted in the Surveillance Epidemiology, and End Results–Medicare Health Outcomes Survey dataset.

^b For all analyses, urban “20,000 or more (adjacent to metro)” and urban “20,000 or more (nonadjacent to metro)” were collapsed into “urban 20,000 or more”; urban “2,500–19,999 (adjacent to metro),” urban “2,500–19,999 (nonadjacent to metro),” “rural or less than 2,500 urban (adjacent to metro),” and “rural or less than 2,500 urban (nonadjacent to metro)” were collapsed into urban “less than 20,000 or rural.”

IQR—interquartile range

Note. Because of rounding, percentages may not total 100.

Note. Mental and physical health–related quality of life were measured using the mental component summary and physical component summary of the Veterans RAND 12-Item Health Survey. Total scores range from 0 to 100, with higher scores indicating better health-related quality of life.

experienced significant reductions in physical HRQOL pre- and post-cancer diagnosis compared to older AIAN women. The current study's findings are consistent with those of other studies of cancer survivors, indicating that racial or ethnic differences in HRQOL at follow-up are negligible and clinically insignificant (i.e., less than three points) (Pinheiro et al., 2015; Rao et al., 2008). Despite a lack of differences

in PCS scores between racial and ethnic groups, older adults of racial and ethnic minority groups may have unique needs, including diverse health beliefs or attitudes, and may report or perceive their health status differently than their non-Hispanic White counterparts (Ng et al., 2014). Therefore, it is imperative for researchers and clinicians to communicate with older cancer survivors to understand and, ideally,

TABLE 3. Adjusted Mean Mental Component Summary Scores Pre- and Post-Cancer Diagnosis by Rurality, Marital Status, Race and Ethnicity, and Social Interference

	Prediagnosis		Postdiagnosis				
Variable	Adjusted \bar{X}	Range	Adjusted \bar{X}	Range	Δ	95% CI	p
Rurality (people per area)							
Metro							
Less than 250,000	41	40–42	40.8	39.4–42.2	–0.23	[–1.46, 0.99]	0.71
250,000–1 million	41.5	40.7–42.3	41.7	40.7–42.6	0.13	[–0.52, 0.79]	0.69
More than 1 million	41.6	40.8–42.4	42	41.1–42.8	0.36	[–0.15, 0.88]	0.17
Urban							
Less than 20,000 or rural	41.6	40.2–43	42	39.6–44.5	0.44	[–2.01, 2.88]	0.72
20,000 or more	41.5	40.2–42.9	42.1	39.9–44.2	0.52	[–1.56, 2.6]	0.62
Variable	Adjusted \bar{X}	Range	Adjusted \bar{X}	Range	Δ	95% CI	p
Marital status							
Married	41.7	40.9–42.6	41.8	40.8–42.8	0.09	[–0.5, 0.68]	0.77
Never married, divorced, separated, or widowed	41.2	40.4–42.1	41.6	40.7–42.5	0.37	[–0.13, 0.87]	0.14
Race and ethnicity ^a							
American Indian or Alaska Native	40.4	37.1–43.6	39.1	33.1–45.1	–1.26	[–7.59, 5.08]	0.7
Asian or Pacific Islander	43.4	42.4–44.3	43.8	42.5–45.1	0.41	[–0.83, 1.65]	0.52
Black or African American	41.3	40.5–42.1	41.8	40.6–43	0.49	[–0.61, 1.59]	0.38
Hispanic	41.3	40.5–42.1	41.5	40.2–42.9	0.23	[–1.03, 1.49]	0.72
White	42.2	41.6–42.8	42.5	41.8–43.2	0.23	[–0.23, 0.69]	0.33
Another race or multiracial	41	39.3–42.7	38.5	35.1–41.9	–2.45	[–5.91, 1.01]	0.16
Social interference							
All of the time	31.7	30.4–33	29.3	27.6–31	–2.4	[–4.26, 0.54]	0.012*
Most of the time	36	35–37	35.7	34.4–37	–0.32	[–1.56, 0.92]	0.62
Some of the time	41.1	40.3–42	42	40.9–43	0.85	[0.03, 1.67]	0.041*
A little of the time	46.4	45.5–47.3	46.6	45.5–47.7	0.18	[–0.7, 1.06]	0.69
None of the time	53	52.1–53.8	53.3	52.3–54.3	0.32	[–0.21, 0.86]	0.23

* Estimates were significant.

^a Categories are presented as they were depicted in the Surveillance Epidemiology, and End Results–Medicare Health Outcomes Survey dataset. CI—confidence interval

Note. Estimates were adjusted for race and ethnicity, social interference, marital status, rurality, cancer stage, cancer type, surgery, radiation, education, preexisting depressive symptoms, age at diagnosis, number of comorbidities, and year of diagnosis.

Note. Mental health–related quality of life was measured using the mental component summary of the Veterans RAND 12-Item Health Survey. Scores range from 0 to 100, with higher scores indicating better health-related quality of life.

address their comprehensive health needs, health and treatment priorities, experiences with current and historic racism, and barriers to improve their physical HRQOL.

Physical HRQOL was higher among metro-dwelling older women compared to rural-dwelling older women. In addition, older women who lived in areas with populations of 20,000–250,000 people had

the highest physical HRQOL before cancer diagnosis, then had a clinically meaningful decrease (more than three points) in physical HRQOL postdiagnosis. Similarly, previous studies (Moss et al., 2021; Weaver et al., 2013) have found HRQOL scores were higher among older cancer survivors in urban areas than in rural areas. Lower HRQOL among rural populations may be attributed to rural–urban disparities in access

TABLE 4. Adjusted Mean Physical Component Summary Scores Pre- and Post-Cancer Diagnosis by Rurality, Marital Status, Race and Ethnicity, and Social Interference

	Prediagnosis		Postdiagnosis				
Variable	Adjusted \bar{X}	Range	Adjusted \bar{X}	Range	Δ	95% CI	p
Rurality (people per area)							
Metro							
Less than 250,000	34.9	33.7–36.2	32.8	31.1–34.4	−2.15	[−3.5, −0.79]	0.002*
250,000–1 million	34.7	33.7–35.7	32.5	31.4–33.7	−2.18	[−2.91, −1.45]	< 0.001*
More than 1 million	34.9	33.9–35.8	32.9	31.8–34	−1.97	[−2.55, 1.4]	< 0.001*
Urban							
Less than 20,000 or rural	33.3	31.6–35	31.5	28.7–34.4	−1.81	[−4.56, 0.93]	0.2
20,000 or more	36	34.3–37.6	33	30.5–35.5	−3.02	[−5.35, −0.69]	0.011*
Variable	Adjusted \bar{X}	Range	Adjusted \bar{X}	Range	Δ	95% CI	p
Marital status							
Married	34.7	33.6–35.7	32.6	31.5–33.8	−2.03	[−2.68, 1.38]	< 0.001*
Never married, divorced, separated, or widowed	34.9	33.9–35.9	32.8	31.7–33.9	−2.08	[−2.64, −1.53]	< 0.001*
Race and ethnicity ^a							
American Indian or Alaska Native	36	32.1–39.9	24.2	17–31.3	−11.81	[−19.06, 4.56]	0.001*
Asian or Pacific Islander	35.9	34.7–37	34.3	32.8–35.9	−1.53	[−2.91, −0.15]	0.029*
Black or African American	34.5	33.5–35.5	32.8	31.3–34.2	−1.69	[−2.91, 0.47]	0.006*
Hispanic	34.7	33.6–35.7	32.4	30.8–34	−2.25	[−3.65, 0.86]	0.002*
White	34.8	34.1–35.6	32.7	31.9–33.6	−2.13	[−2.64, 1.63]	< 0.001*
Another race or multiracial	34.8	32.7–36.9	33.3	29.4–37.2	−1.54	[−5.37, 2.29]	0.43
Social interference							
All of the time	28.7	27.2–30.3	28.1	26.1–30	−0.65	[−2.73, 1.43]	0.54
Most of the time	30.4	29.2–31.6	28.1	26.5–29.6	−2.32	[−3.7, 0.95]	< 0.001*
Some of the time	33.6	32.6–34.7	32.3	31.1–33.6	−1.33	[−2.24, −0.42]	0.004*
A little of the time	37.4	36.3–38.4	35.6	34.3–36.9	−1.76	[−2.74, −0.79]	< 0.001*
None of the time	43.3	42.2–44.3	40.8	39.6–41.9	−2.52	[−3.11, −1.93]	< 0.001*

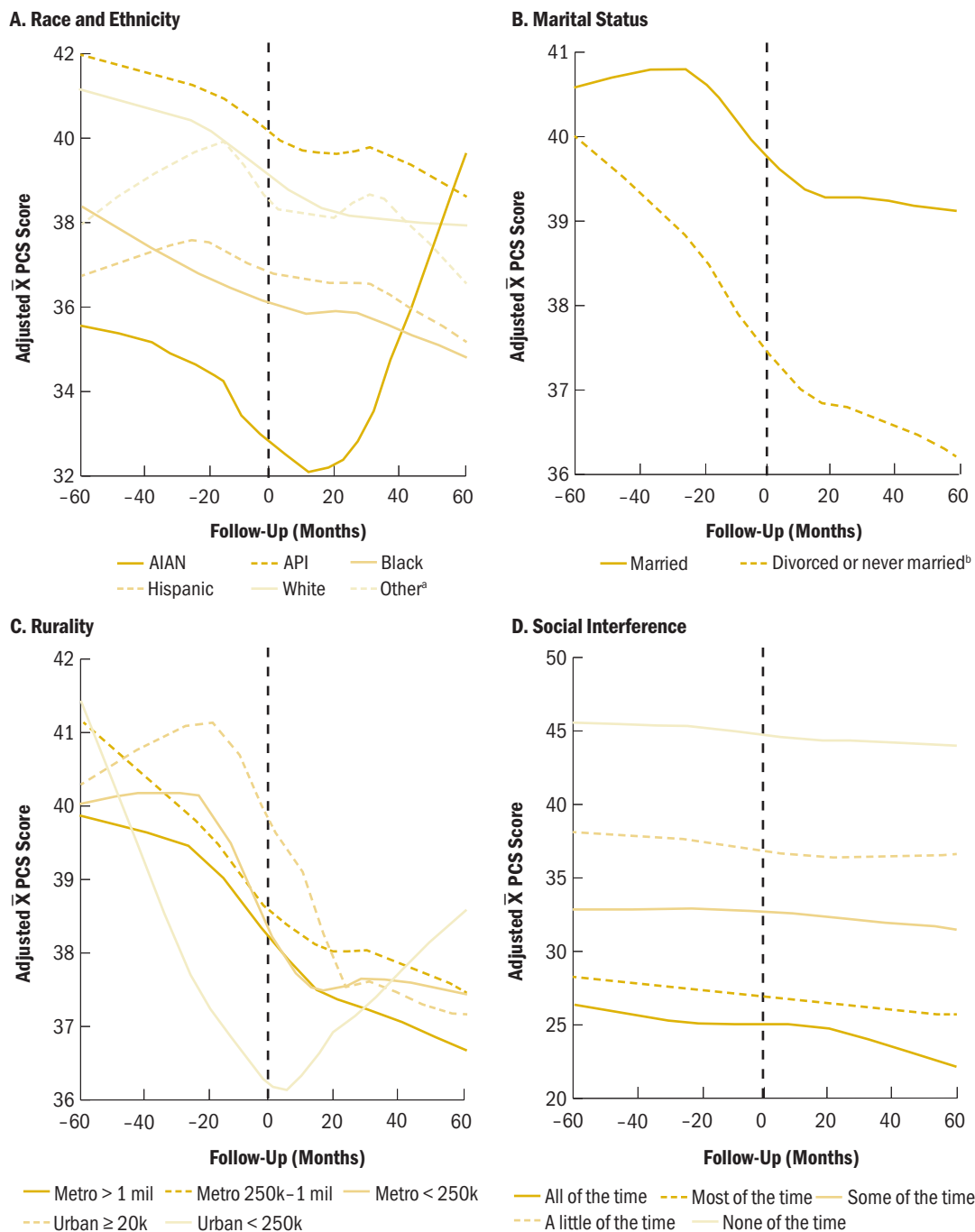
* Estimates were significant.

^a Categories are presented as they were depicted in the Surveillance Epidemiology, and End Results–Medicare Health Outcomes Survey dataset. CI—confidence interval

Note. Estimates were adjusted for race and ethnicity, social interference, marital status, rurality, cancer stage, cancer type, surgery, radiation, education, preexisting depressive symptoms, age at diagnosis, number of comorbidities, and year of diagnosis.

Note. Physical health–related quality of life was measured using the physical component summary of the Veterans RAND 12-Item Health Survey. Scores range from 0 to 100, with higher scores indicating better health-related quality of life.

FIGURE 1. Changes in Mean PCS Over Time Among Older Women With Breast or Gynecologic Cancer by Race and Ethnicity, Marital Status, Rurality, and Social Interference



^a Includes all other races and those who identified as multiracial

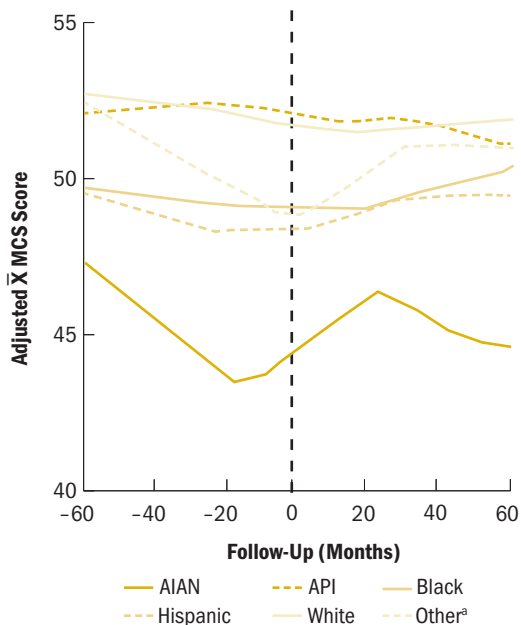
^b Never married includes separated and widowed.

AIAN—American Indian or Alaska Native; API—Asian or Pacific Islander; k—thousand; mil—million; PCS—physical component summary

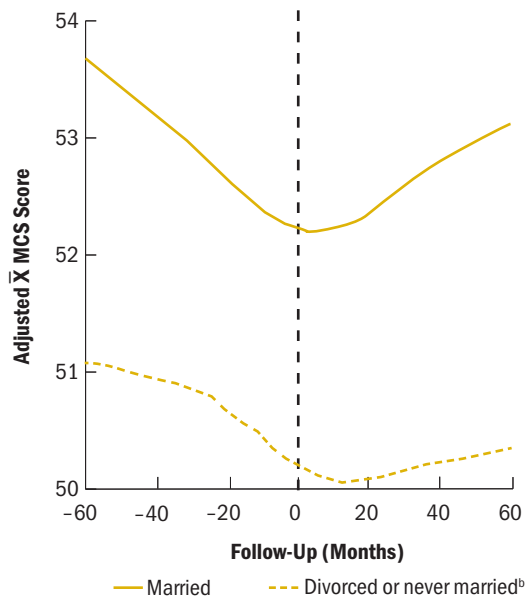
Note. For all graphs, the black dashed line indicates the date of cancer diagnosis.

FIGURE 2. Changes in Mean MCS Over Time Among Older Women With Breast or Gynecologic Cancer by Race and Ethnicity, Marital Status, Rurality, and Social Interference

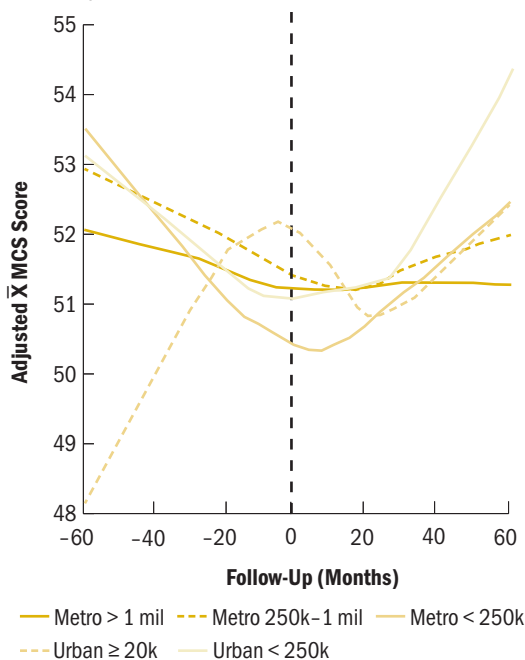
A. Race and Ethnicity



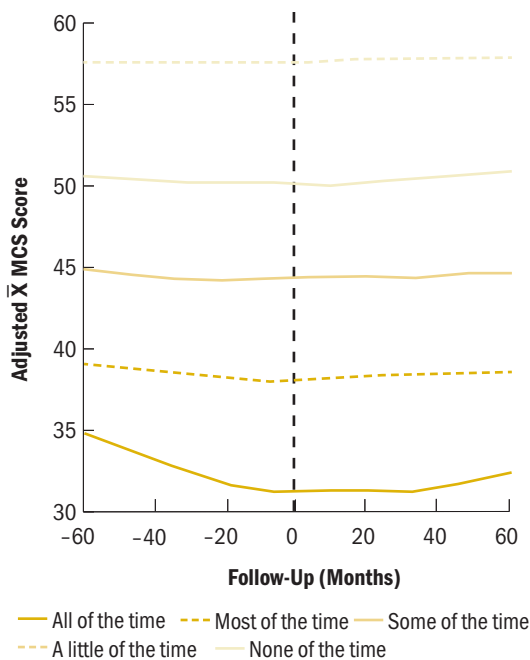
B. Marital Status



C. Rurality



D. Social Interference



^a Includes all other races and those who identified as multiracial

^b Never married includes separated and widowed.

AIAN—American Indian or Alaska Native; API—Asian or Pacific Islander; k—thousand; MCS—mental component summary; mil—million

Note. For all graphs, the black dashed line indicates the date of cancer diagnosis.

to healthcare providers, including supportive care, and may give rise to differences in treatment options and, subsequently, HRQOL. However, the high level of social connectedness in rural communities may provide some buffer to reduced HRQOL among older cancer survivors in these areas (Garrard et al., 2017; Rivera et al., 2023). Additional information about barriers to supportive care experienced by rural- and urban-dwelling older cancer survivors, including perceptions and opinions of supportive care, availability and use of telehealth, distance traveled to appointments, built environment, the role of social networks, and unmet needs, would provide some context to these observed differences.

In this sample, significant decreases in mean PCS scores were observed for married and unmarried older women, which deviates from a study that found that HRQOL differed by marital status among older cancer survivors (Karlsen et al., 2016). Measuring the quality of multiple social relationships (e.g., family, friends, significant other) in addition to marital status could help to discern this finding (Durá-Ferrandis et al., 2017). A potential explanation for this observation and the overall declines in physical HRQOL observed may be the age of the sample itself. This study included HRQOL measures in a 10-year span, during which physical health can decline among older adults. Previous research has demonstrated the additive effects of cancer treatments on physical deficits among older cancer survivors compared to cancer-free controls (Kenzik et al., 2015; Williams et al., 2020).

Strengths and Limitations

The large sample size and relative representativeness of the population were strengths of the study. However, the results of this study should be considered in light of several limitations. First, survivor bias is inherent in the SEER-MHOS dataset, which can result in a healthier sample size reporting higher physical and mental HRQOL. Sample sizes of older women identifying themselves as AIAN and multiple races or other race were small as were the sample sizes of rural and smaller urban populations, limiting generalizability. Last, physical or mental health interference in social activities was limited to a single item, which may not recapitulate a validated scale. However, the VR-12 is a commonly used measure and has been validated in previous studies of older cancer survivors within the SEER-MHOS (Doll et al., 2017; Kent et al., 2015). Qualitative research is warranted to understand the context of HRQOL among older

KNOWLEDGE TRANSLATION

- Interference of physical or mental health on social activities was the only significant factor associated with changes in mental health-related quality of life.
 - A decrease in physical health-related quality of life after cancer diagnosis was consistently observed in older women with breast or gynecologic cancer.
 - Nurses can advocate for comprehensive geriatric assessments for survivors to develop a broad understanding of the needs of older cancer survivors.
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women with and without cancer. Future research should explore the associations of sociodemographic variables and HRQOL before and after cancer diagnosis with greater representation of members of vulnerable populations (e.g., low-income individuals, immigrants, sexual and gender minority groups).

Implications for Nursing

The results of this study can be used to inform nurses and other clinicians' discussions with older women with cancer about changes in HRQOL. Clinical interventions to increase physical and mental HRQOL as part of survivorship care can promote healthy aging in women with cancer. Previous research has denoted that greater social support is associated with higher HRQOL (Kadambi et al., 2020; Teo et al., 2019; Utley et al., 2022). In addition, social support interventions led by nurses and other clinicians have been effective in improving HRQOL (Clark et al., 2013; Kornblith et al., 2006; Porter et al., 2011; Teo et al., 2019). For example, Kornblith et al. (2006) found that older women who received nurse-led monthly telephone social support in addition to educational materials reported significantly higher HRQOL and lower levels of anxiety and depression compared to the education-only group. Results of this study also pointed to the importance of screening for depressive symptoms even prior to diagnosis because they can be indicative of continued distress and poor health (Kornblith et al., 2006). In addition, for those with significant physical or mental health disabilities after cancer, nurses can assess to what extent the survivor's social activities and connections are affected, putting them at higher risk for poor health outcomes. Nurses should be alert to significant decreases in physical HRQOL after cancer diagnosis in all groups of older women with cancer. To develop a comprehensive understanding of the needs of older cancer survivors, nurses can

advocate for comprehensive geriatric assessments for survivors (Overcash et al., 2019). A geriatric assessment tool can inform clinicians of their patients' supportive care needs and help generate subsequent referrals and follow-up services. Finally, the current study's results highlight the importance of tailoring nursing and survivorship care to cultural considerations, including race, ethnicity, rurality, and the patient's support system.

Conclusion

This study provides insight into associations between patient characteristics (marital status, race and ethnicity, rurality, and health interference on social activities) and physical and mental HRQOL among older women pre- and postdiagnosis. Results indicated that physical and mental HRQOL changed over time, with mental HRQOL returning to prediagnosis levels while physical HRQOL continued to decrease. Sociodemographic factors of race and ethnicity, rurality, marital status, and social interference were associated with changes in physical HRQOL, whereas social interference was associated with mental HRQOL changes. These pre- and postdiagnosis data are pertinent for clinicians, such as primary care physicians and oncologists, and researchers who can identify and support older female cancer survivors who have reduced physical and mental HRQOL.

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REFERENCES

- Ambs, A., Warren, J.L., Bellizzi, K.M., Topor, M., Haffer, S.C., & Clauser, S.B. (2008). Overview of the SEER–Medicare Health Outcomes Survey linked dataset. *Health Care Financing Review*, 29(4), 5–21.
- Bernardo, B.M., Pennell, M.L., Naughton, M.J., Brodin, N.P., Neuhaus, M.L., Chlebowski, R.T., & Paskett, E.D. (2023). Self-reported symptoms among cancer survivors in the Women's Health Initiative (WHI) Life and Longevity After Cancer (LILAC) cohort. *Journal of Cancer Survivorship: Research and Practice*, 17(5), 1427–1434. <https://doi.org/10.1007/s11764-022-01200-4>
- Bhandari, N.R., Ounpraseuth, S.T., Kamel, M.H., Kent, E.E., McAdam-Marx, C., Tilford, J.M., & Payakachat, N. (2020). Changes in health-related quality of life outcomes in older patients with kidney cancer: A longitudinal cohort analysis with matched controls. *Urologic Oncology*, 38(11), 852.e11–852.e20. <https://doi.org/10.1016/j.urolonc.2020.08.015>
- Bluthmann, S.M., Mariotto, A.B., & Rowland, J.H. (2016). Anticipating the “silver tsunami”: Prevalence trajectories and comorbidity burden among older cancer survivors in the United States. *Cancer Epidemiology, Biomarkers and Prevention*, 25(7), 1029–1036. <https://doi.org/10.1158/1055-9965.EPI-16-0133>
- Clark, M.M., Rummans, T.A., Atherton, P.J., Cheville, A.L., Johnson, M.E., Frost, M.H., . . . Brown, P.D. (2013). Randomized controlled trial of maintaining quality of life during radiotherapy for advanced cancer. *Cancer*, 119(4), 880–887. <https://doi.org/10.1002/cncr.27776>

- Cromer, K.J., Wofford, L., & Wyant, D.K. (2019). Barriers to healthcare access facing American Indian and Alaska Natives in rural America. *Journal of Community Health Nursing*, 36(4), 165–187. <https://doi.org/10.1080/07370016.2019.1665320>
- Doll, K.M., Pinheiro, L.C., & Reeve, B.B. (2017). Pre-diagnosis health-related quality of life, surgery, and survival in women with advanced epithelial ovarian cancer: A SEER-MHOS study. *Gynecologic Oncology*, 144(2), 348–353. <https://doi.org/10.1016/j.ygyno.2016.12.005>
- Dos Santos Hughes, S.F., & Malone, M.L. (2023). “What matters most?” for older patients who have cancer. *Journal of the American Geriatrics Society*, 71(1), 8–10. <https://doi.org/10.1111/jgs.18096>
- Du, Y., & Xu, Q. (2016). Health disparities and delayed health care among older adults in California: A perspective from race, ethnicity, and immigration. *Public Health Nursing*, 33(5), 383–394. <https://doi.org/10.1111/phn.12260>
- Durá-Ferrandis, E., Mandelblatt, J.S., Clapp, J., Luta, G., Faul, L., Kimmick, G., . . . Hurria, A. (2017). Personality, coping, and social support as predictors of long-term quality-of-life trajectories in older breast cancer survivors: CALGB protocol 369901 (Alliance). *Psycho-Oncology*, 26(11), 1914–1921. <https://doi.org/10.1002/pon.4404>
- Economic Research Service. (2023). *Rural–urban continuum codes*. U.S. Department of Agriculture. <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes>
- Garrard, E.D., Fennell, K.M., & Wilson, C. (2017). ‘We’re completely back to normal, but I’d say it’s a new normal’: A qualitative exploration of adaptive functioning in rural families following a parental cancer diagnosis. *Supportive Care in Cancer*, 25(11), 3561–3568. <https://doi.org/10.1007/s00520-017-3785-6>
- Gudina, A.T., Cheruvu, V.K., Gilmore, N.J., Kleckner, A.S., Arana-Chicas, E., Kehoe, L.A., . . . Cupertino, A.P. (2021). Health related quality of life in adult cancer survivors: Importance of social and emotional support. *Cancer Epidemiology*, 74, 101996. <https://doi.org/10.1016/j.canep.2021.101996>
- Han, X., Robinson, L.A., Jensen, R.E., Smith, T.G., & Yabroff, K.R. (2021). Factors associated with health-related quality of life among cancer survivors in the United States. *JNCI Cancer Spectrum*, 5(1), pkaa123. <https://doi.org/10.1093/jncics/pkaa123>
- Hawton, A., Green, C., Dickens, A.P., Richards, S.H., Taylor, R.S., Edwards, R., . . . Campbell, J.L. (2011). The impact of social isolation on the health status and health-related quality of life of older people. *Quality of Life Research*, 20(1), 57–67. <https://doi.org/10.1007/s11136-010-9717-2>
- Hays, R.D., Farivar, S.S., & Liu, H. (2005). Approaches and recommendations for estimating minimally important differences for health-related quality of life measures. *COPD*, 2(1), 63–67. <https://doi.org/10.1081/copd.200050663>
- Jones, S.M.W., LaCroix, A.Z., Li, W., Zaslavsky, O., Wassertheil-Smoller, S., Weitlauf, J., . . . Danhauer, S.C. (2015). Depression and quality of life before and after breast cancer diagnosis in older women from the women’s health initiative. *Journal of Cancer Survivorship*, 9(4), 620–629. <https://doi.org/10.1007/s11764-015-0438-y>
- Kadambi, S., Soto-Perez-de-Celis, E., Garg, T., Loh, K.P., Krok-Schoen, J.L., Battisti, N.M.L., . . . Hsu, T. (2020). Social support for older adults with cancer: Young International Society of Geriatric Oncology review paper. *Journal of Geriatric Oncology*, 11(2), 217–224. <https://doi.org/10.1016/j.jgo.2019.09.005>
- Karlsen, R.V., Frederiksen, K., Larsen, M.B., von Heymann-Horan, A.B., Appel, C.W., Christensen, J., . . . Bidstrup, P.E. (2016). The impact of a breast cancer diagnosis on health-related quality of life. A prospective comparison among middle-aged to elderly women with and without breast cancer. *Acta Oncologica*, 55(6), 720–727. <https://doi.org/10.3109/0284186x.2015.1127415>
- Kazis, L.E., Selim, A., Rogers, W., Ren, X.S., Lee, A., & Miller, D.R. (2006). Dissemination of methods and results from the veterans health study: Final comments and implications for future monitoring strategies within and outside the veterans healthcare system. *Journal of Ambulatory Care Management*, 29(4), 310–319. <https://doi.org/10.1097/00004479-200610000-00007>
- Kent, E.E., Ambs, A., Mitchell, S.A., Clauser, S.B., Smith, A.W., & Hays, R.D. (2015). Health-related quality of life in older adult survivors of selected cancers: Data from the SEER-MHOS linkage. *Cancer*, 121(5), 758–765. <https://doi.org/10.1002/cncr.29119>
- Kenzik, K.M., Morey, M.C., Cohen, H.J., Sloane, R., & Demark-Wahnefried, W. (2015). Symptoms, weight loss, and physical function in a lifestyle intervention study of older cancer survivors. *Journal of Geriatric Oncology*, 6(6), 424–432. <https://doi.org/10.1016/j.jgo.2015.08.004>
- Kim, T., White, K., & DuGoff, E. (2022). Racial/ethnic variations in social determinants of mental health among Medicare advantage beneficiaries. *Journal of Applied Gerontology*, 41(3), 690–698. <https://doi.org/10.1177/07334648211039311>
- Klapheke, A.K., Keegan, T.H.M., Ruskin, R., & Cress, R.D. (2020a). Depressive symptoms and health-related quality of life in older women with gynecologic cancers. *Journal of Geriatric Oncology*, 11(5), 820–827. <https://doi.org/10.1016/j.jgo.2019.10.001>
- Klapheke, A.K., Keegan, T.H.M., Ruskin, R., & Cress, R.D. (2020b). Pre-diagnosis health-related quality of life and survival in older women with endometrial cancer. *Supportive Care in Cancer*, 28(10), 4901–4909. <https://doi.org/10.1007/s00520-020-05324-0>
- Kornblith, A.B., Dowell, J.M., Herndon, J.E., II, Engelman, B.J., Bauer-Wu, S., Small, E.J., . . . Holland, J.C. (2006). Telephone monitoring of distress in patients aged 65 years or older with advanced stage cancer: A cancer and leukemia group B study. *Cancer*, 107(11), 2706–2714. <https://doi.org/10.1002/cncr.22296>
- Krok-Schoen, J.L., Naughton, M.J., Bernardo, B.M., Young, G.S., & Paskett, E.D. (2018). Fear of recurrence among older breast, ovarian, endometrial, and colorectal cancer survivors: Findings from the WHI LILAC study. *Psycho-Oncology*, 27(7), 1810–1815. <https://doi.org/10.1002/pon.4731>

- Kruse, G., Lopez-Carmen, V.A., Jensen, A., Hardie, L., & Sequist, T.D. (2022). The Indian health service and American Indian/Alaska Native health outcomes. *Annual Review of Public Health*, 43, 559–576. <https://doi.org/10.1146/annurev-publhealth-052620-103633>
- Leung, J., Pachana, N.A., & McLaughlin, D. (2014). Social support and health-related quality of life in women with breast cancer: A longitudinal study. *Psycho-Oncology*, 23(9), 1014–1020. <https://doi.org/10.1002/pon.3523>
- Leung, J., Smith, M.D., & McLaughlin, D. (2016). Inequalities in long term health-related quality of life between partnered and not partnered breast cancer survivors through the mediation effect of social support. *Psycho-Oncology*, 25(10), 1222–1228. <https://doi.org/10.1002/pon.4131>
- Moss, J.L., Pinto, C.N., Mama, S.K., Rincon, M., Kent, E.E., Yu, M., & Cronin, K.A. (2021). Rural–urban differences in health-related quality of life: Patterns for cancer survivors compared to other older adults. *Quality of Life Research*, 30(4), 1131–1143. <https://doi.org/10.1007/s11136-020-02683-3>
- Mukand, N.H., Ko, N.Y., Nabulsi, N.A., Hubbard, C.C., Chiu, B.C.-H., Hoskins, K.F., & Calip, G.S. (2022). The association between physical health-related quality of life, physical functioning, and risk of contralateral breast cancer among older women. *Breast Cancer*, 29(2), 287–295. <https://doi.org/10.1007/s12282-02101309-x>
- Ng, J.H., Bierman, A.S., Elliott, M.N., Wilson, R.L., Xia, C., & Scholle, S.H. (2014). Beyond black and white: Race/ethnicity and health status among older adults. *American Journal of Managed Care*, 20(3), 239–248.
- Overcash, J., Ford, N., Kress, E., Ubbing, C., & Williams, N. (2019). Comprehensive geriatric assessment as a versatile tool to enhance the care of the older person diagnosed with cancer. *Geriatrics*, 4(2), 39. <https://doi.org/10.3390/geriatrics4020039>
- Pandit, A.A., Bhandari, N.R., Khalil, M.I., Kamel, M.H., Davis, R., & Payakachat, N. (2022). Evaluating health-related quality of life as a prognostic tool for overall survival in routine cancer care for older patients with bladder cancer: A US based study. *Urologic Oncology*, 40(1), 11.e1–11.e8. <https://doi.org/10.1016/j.urolonc.2021.09.012>
- Park, J., Rodriguez, J.L., O'Brien, K.M., Nichols, H.B., Hodgson, M.E., Weinberg, C.R., & Sandler, D.P. (2021). Health-related quality of life outcomes among breast cancer survivors. *Cancer*, 127(7), 1114–1125. <https://doi.org/10.1002/cncr.33348>
- Pinheiro, L.C., Wheeler, S.B., Chen, R.C., Mayer, D.K., Lyons, J.C., & Reeve, B.B. (2015). The effects of cancer and racial disparities in health-related quality of life among older Americans: A case-control, population-based study. *Cancer*, 121(8), 1312–1320. <https://doi.org/10.1002/cncr.29205>
- Porter, L.S., Keefe, F.J., Garst, J., Baucom, D.H., McBride, C.M., McKee, D.C., . . . Scipio, C. (2011). Caregiver-assisted coping skills training for lung cancer: Results of a randomized clinical trial. *Journal of Pain and Symptom Management*, 41(1), 1–13. <https://doi.org/10.1016/j.jpainsymman.2010.04.014>
- Rao, D., Debb, S., Blitz, D., Choi, S.W., & Cella, D. (2008). Racial/ethnic differences in the health-related quality of life of cancer patients. *Journal of Pain and Symptom Management*, 36(5), 488–496. <https://doi.org/10.1016/j.jpainsymman.2007.11.012>
- Reeve, B.B., Potosky, A.L., Smith, A.W., Han, P.K., Hays, R.D., Davis, W.W., . . . Clauser, S.B. (2009). Impact of cancer on health-related quality of life of older Americans. *Journal of the National Cancer Institute*, 101(12), 860–868. <https://doi.org/10.1093/jnci/djp123>
- Revicki, D., Hays, R.D., Cella, D., & Sloan, J. (2008). Recommended methods for determining responsiveness and minimally important differences for patient-reported outcomes. *Journal of Clinical Epidemiology*, 61(2), 102–109. <https://doi.org/10.1016/j.jclinepi.2007.03.012>
- Rivera, J.N., Berger, T., Sizemore, Y., & Burris, J.L. (2023). Similarities and differences across the underlying dimensions of social functioning in rural and nonrural cancer survivors: A mixed-methods study. *Journal of Rural Health*, 39(2), 434–443. <https://doi.org/10.1111/jrh.12721>
- Rowland, J.H., & Bellizzi, K.M. (2014). Cancer survivorship issues: Life after treatment and implications for an aging population. *Journal of Clinical Oncology*, 32(24), 2662–2668. <https://doi.org/10.1200/jco.2014.55.8361>
- Sauer, C., Weis, J., Faller, H., Junne, F., Hönig, K., Bergelt, C., . . . Maatouk, I. (2019). Impact of social support on psychosocial symptoms and quality of life in cancer patients: Results of a multilevel model approach from a longitudinal multicenter study. *Acta Oncologica*, 58(9), 1298–1306. <https://doi.org/10.1080/0284186x.2019.1631471>
- Seiler, A., & Jenewein, J. (2019). Resilience in cancer patients. *Frontiers in Psychiatry*, 10, 208. <https://doi.org/10.3389/fpsyg.2019.00208>
- Selim, A.J., Rogers, W., Fleishman, J.A., Qian, S.X., Fincke, B.G., Rothendler, J.A., & Kazis, L.E. (2009). Updated U.S. population standard for the Veterans RAND 12-Item Health Survey (VR-12). *Quality of Life Research*, 18(1), 43–52. <https://doi.org/10.1007/s11136-008-9418-2>
- Sequist, T.D. (2021). Improving the health of the American Indian and Alaska Native population. *JAMA*, 325(11), 1035–1036. <https://doi.org/10.1001/jama.2021.0521>
- Shippee, T.P., Duan, Y., Olsen Baker, M., & Angert, J. (2020). Racial/ethnic disparities in self-rated health and sense of control for older adults receiving publicly funded home- and community-based services. *Journal of Aging and Health*, 32(10), 1376–1386. <https://doi.org/10.1177/0898264320929560>
- Siegel, R.L., Giaquinto, A.N., & Jemal, A. (2024). Cancer statistics, 2024. *CA: A Cancer Journal for Clinicians*, 74(1), 12–49. <https://doi.org/10.3322/caac.21820>
- Smith, A.W., Reeve, B.B., Bellizzi, K.M., Harlan, L.C., Klabunde, C.N., Amsellem, M., . . . Hays, R.D. (2008). Cancer, comorbidities, and health-related quality of life of older adults. *Health Care Financing Review*, 29(4), 41–56.

- Stover, A.M., Mayer, D.K., Muss, H., Wheeler, S.B., Lyons, J.C., & Reeve, B.B. (2014). Quality of life changes during the pre- to postdiagnosis period and treatment-related recovery time in older women with breast cancer. *Cancer*, 120(12), 1881–1889. <https://doi.org/10.1002/cncr.28649>
- Teo, I., Krishnan, A., & Lee, G.L. (2019). Psychosocial interventions for advanced cancer patients: A systematic review. *Psycho-Oncology*, 28(7), 1394–1407. <https://doi.org/10.1002/pon.5103>
- Trevino, K.M., Nelson, C.J., Saracino, R.M., Korc-Grodzicki, B., Sarraf, S., & Shahrokni, A. (2020). Is screening for psychosocial risk factors associated with mental health care in older adults with cancer undergoing surgery? *Cancer*, 126(3), 602–610. <https://doi.org/10.1002/cncr.32564>
- Utle, M., Adeyanju, T., Bernardo, B., Paskett, E.D., & Krok-Schoen, J.L. (2022). The association between mental health, social support and physical health outcomes among older female cancer survivors. *Journal of Geriatric Oncology*, 13(6), 834–838. <https://doi.org/10.1016/j.jgo.2022.04.001>
- Weaver, K.E., Geiger, A.M., Lu, L., & Case, L.D. (2013). Rural-urban disparities in health status among US cancer survivors. *Cancer*, 119(5), 1050–1057. <https://doi.org/10.1002/cncr.27840>
- Williams, G.R., Chen, Y., Kenzik, K.M., McDonald, A., Shachar, S.S., Klepin, H.D., . . . Bhatia, S. (2020). Assessment of sarcopenia measures, survival, and disability in older adults before and after diagnosis with cancer. *JAMA Network Open*, 3(5), e204783. <https://doi.org/10.1001/jamanetworkopen.2020.4783>
- Williams, G.R., Mackenzie, A., Magnuson, A., Olin, R., Chapman, A., Mohile, S., . . . Holmes, H. (2016). Comorbidity in older adults with cancer. *Journal of Geriatric Oncology*, 7(4), 249–257. <https://doi.org/10.1016/j.jgo.2015.12.002>
- Yoo, G.J., Musselman, E., Lee, Y.-S., & Yee-Melichar, D. (2014). Addressing health disparities among older Asian Americans: Data and diversity. *Generations*, 38(4), 74–81.
- Zandbergen, N., de Rooij, B.H., Vos, M.C., Pijnenborg, J.M.A., Boll, D., Kruitwagen, R.F.P.M., . . . Ezendam, N.P.M. (2019). Changes in health-related quality of life among gynecologic cancer survivors during the two years after initial treatment: A longitudinal analysis. *Acta Oncologica*, 58(5), 790–800. <https://doi.org/10.1080/0284186x.2018.1560498>