Gender Differences in Predictors of Quality of Life at the Initiation of Radiation Therapy

Claudia West, RN, MS, Steven M. Paul, PhD, Laura Dunn, MD, Anand Dhruva, MD, John Merriman, RN, PhD, and Christine Miaskowski, RN, PhD, FAAN

Purpose/Objectives: To evaluate gender differences in quality of life (QOL), demographic, clinical, and symptom characteristics.

Design: Prospective, observational.

Setting: Two radiation oncology departments in northern California.

Sample: 185 patients before initiation of radiation therapy (RT).

Methods: At their RT simulation visit, patients completed a demographic questionnaire, a measure of QOL, and symptom-specific scales. Backward elimination regression analyses were conducted to determine the significant predictors of QOL.

Main Research Variables: QOL, gender, and 20 potential predictors.

Findings: In women, depressive symptoms, functional status, age, and having children at home explained 64% of the variance in QOL. In men, depressive symptoms, state anxiety, number of comorbidities, being a member of a racial or ethnic minority, and age explained 70% of the variance in QOL.

Conclusions: Predictors of QOL differed by gender. Depressive symptom score was the greatest contributor to QOL in both genders.

Implications for Nursing: Nurses need to assess for QOL and depression at the initiation of RT. Knowledge of the different predictors of QOL may be useful in the design of gender-specific interventions to improve QOL.

Key Words: quality of life; gender differences; depression; anxiety; radiation therapy

ONF, 42(5), 507–516. doi: 10.1188/15.ONF.507-516

Decreases in quality of life (QOL) are associated with patients' responses to their disease and its treatment and can have a negative impact on survival (Efficace et al., 2006; Gotay, Kawamoto, Bottomley, & Efficace, 2008). For these reasons, QOL is one of the most important patient-reported outcomes in clinical practice and research (Trask, Hsu, & McQuellon, 2009.). Many demographic and clinical factors can affect QOL, including gender, age, race, education, marital status, social support, income, one's ability to function in multiple domains (e.g., physical, psychological, cognitive, social, spiritual) (Cherepanov, Palta, Fryback, & Robert, 2010; Hagelin, Seiger, & Fürst, 2006; Juul et al., 2014; Luncheon & Zack, 2012; Mor, Allen, & Malin, 1994; Parker, Baile, de Moor, & Cohen, 2003), as well as many disease-specific characteristics, number and severity of comorbidities, number and severity of symptoms, illness severity, and prognosis (Hagelin et al., 2006; Hopman et al., 2009; Jordhoy et al., 2001; Juul et al., 2014; Miaskowski et al., 2014; Zimmerman et al., 2011).

Several population-based studies (Cherepanov et al., 2010; Hinz, Singer, & Brähler, 2014; Juul et al., 2014; Mielck, Vogelmann, & Leidl, 2014), as well as studies across a number of chronic conditions, including cancer (Bushnell et al., 2014; Heo, Lennie, Moser, & Kennedy, 2014; Lisspers, Ställberg, Janson, Johansson, & Svärdsudd, 2013; Miaskowski et al., 2014; Pashos et al., 2013; Smith, Cho, Salazar, & Ory, 2013; Zimmermann et al., 2011), have reported gender differences in QOL, with women usually reporting a lower QOL than men in at least one of the domains assessed. These differences hold true across different measures of QOL and when controlling for age, income, and disease severity (Cherepanov et al., 2010; Hopman et al., 2009; Zimmermann et al., 2011).

The reasons for these gender differences are not completely understood. However, they may be related to differences in responses to disease and its treatment, differences in perceptions and reporting of symptoms, and differences in gender roles and societal expectations (Izadnegahdar, Norris, Kaul, Pilote, & Humphries, 2014; Norris, Murray, Triplett, & Hegadoren, 2010; Zimmerman et al., 2011). Given these differences, the characteristics that predict QOL in women and men are likely to be different. Greater understanding of these characteristics would assist clinicians in identifying patients at greater risk for a poorer QOL and implementing gender-specific interventions to maintain or improve the patient's QOL.

Only one study (Pud, 2011) was identified that evaluated gender differences in the predictors of QOL in individuals with cancer. In this study of 114 adult outpatients (80 women, 34 men) who were receiving "over two cycles of active treatment" (p. 487), a separate stepwise linear regression was done for each gender to determine the effects of pain, fatigue, and depression on QOL. For the female patients, pain intensity and depression, but not fatigue, predicted total QOL scores and explained 58% of the variance in QOL. For the male patients, only depression predicted the total QOL score and explained 39% of the variance in QOL. This study was limited by the small number of men in the sample and evaluation of only a small number of symptoms as predictors.

Given the paucity of research on gender differences in QOL and the knowledge that many demographic and clinical characteristics can influence QOL, the purpose of the current study of 96 male and 89 female patients, who were assessed prior to the initiation of radiation therapy (RT), was to evaluate for gender differences in subscale and total QOL scores, as well as in the demographic, clinical, and symptom characteristics that predict total QOL scores.

Methods

The University of California, San Francisco Symptom Management Model was used as the conceptual framework for the entire study. This model consists of three interrelated dimensions: symptom experience, symptom management strategies, and symptom status. These dimensions occur in the context of the person, health and illness, and environment. QOL is a major component of the symptom status dimension.

Patients and Settings

The current study is part of a larger descriptive longitudinal study that evaluated multiple symptoms in patients who underwent primary or adjuvant RT. The methods are described in detail elsewhere (Dunn et al., 2013; Miaskowski et al., 2011). In brief, patients were recruited from two RT departments located in a comprehensive cancer center and a community-based oncology program at the time of the patient's simulation visit. Eligibility criteria included being older than 18 years; being scheduled to receive primary or adjuvant RT for breast, prostate, lung, or brain cancer; being able to read, write, and understand English; giving written informed consent; and having a Karnofsky Performance Status (KPS) score of 60 or greater. If patients were diagnosed with metastatic disease, more than one cancer, or a sleep disorder, they were excluded.

Instruments

The demographic questionnaire obtained information on age, gender, marital status, education, ethnicity, and employment status. Participants rated their functional status using the KPS scale that ranged from 30 ("I feel severely disabled and need to be hospitalized.") to 100 ("I feel normal; I have no complaints or symptoms.") (Karnofsky, 1977; Karnofsky, Abelmann, Craver, & Burchenal, 1948). Participants indicated the presence of comorbidities from a list of 26 common medical conditions.

Participants were asked if they had pain during the past week, and, if so, they rated the intensity of their average and worst pain using a numeric rating scale (NRS) that ranged from 0 (no pain) to 10 (worst imaginable pain). Patients who reported "yes" to the presence of pain completed the eight interference items from the Brief Pain Inventory (BPI), which are rated on a 0 (does not interfere) to 10 (completely interferes) NRS. The BPI, which included the pain intensity NRS, is a valid and reliable measure to evaluate pain intensity and the pain's level of interference with function (Jensen, 2003).

The Lee Fatigue Scale (LFS) consists of 18 items designed to assess physical fatigue and energy (Lee, Hicks, & Nino-Murcia, 1991). Each item was rated on a 0–10 NRS. Total fatigue and energy scores were calculated as the mean of the 13 fatigue items and 5 energy items, with higher scores indicating greater fatigue severity and higher levels of energy. Respondents were asked to rate each item based on how they felt "right now," within 30 minutes of awakening (i.e., morning fatigue or morning energy), and prior to going to bed (i.e., evening fatigue or evening energy). The LFS has been used with healthy individuals (Gay, Lee, & Lee, 2004; Lee et al., 1991) and in patients with cancer and HIV (Lee, Portillo, & Miramontes, 1999; Miaskowski & Lee, 1999; Miaskowski et al., 2006, 2008). Cutoff scores of 3.2 or greater and 5.6 or greater indicated high levels of morning and evening fatigue, respectively (Fletcher et al., 2008). Cutoff scores of 6 or less and 3.5 or less indicated low levels of morning and evening energy, respectively (Lee et al., 1999; Miaskowski & Lee, 1999; Miaskowski et al., 2006, 2008). In the current study, Cronbach alpha for evening and morning fatigue scales at enrollment were 0.96 and 0.95, respectively. Cronbach alpha for evening and morning energy scales were 0.95 and 0.95, respectively.

The Attentional Function Index (AFI) consists of 16 items designed to measure attentional function at the present time in patients with cancer. Each item is rated on a 0–10 NRS. A mean AFI score was calculated, with higher scores indicating greater capacity to direct attention (Cimprich, 1992; Cimprich, Visovatti, & Ronis, 2011). Based on a previously conducted analysis of the frequency distributions of AFI scores, attentional function can be grouped into low (patients who score less than 5), moderate (patients who score 5–7.5), and high (patients who score greater than 7.5) functioning (Cimprich, So, Ronis, & Trask, 2005). The AFI has well-established reliability and validity (Cimprich, 1992; Jansen, Dodd, Miaskowski, Dowling, & Kramer, 2008). In the current study, Cronbach alpha for the AFI was 0.95.

The General Sleep Disturbance Scale (GSDS) consists of 21 items designed to assess the quality of sleep in the past week. Each item was rated on a 0 (never) to 7 (every day) NRS. The GSDS total score can range from 0 (no disturbance) to 147 (extreme sleep disturbance). A total score of 43 or greater indicates a significant level of sleep disturbance (Fletcher et al., 2008). The GSDS has well-established validity and reliability in shift workers, pregnant women, patients with cancer, and patients with HIV (Lee, 1992; Lee & DeJospeh, 1992; Miaskowski & Lee, 1999). In the current study, the Cronbach alpha for the GSDS total score was 0.84.

The Spielberger Trait Anxiety Inventory (STAI-T) and State Anxiety Inventory (STAI-S) consist of 20 items each that are rated from 1–4. The scores for each scale are summed and can range from 20–80. A higher score indicates greater anxiety. The STAI-T measures an individual's predisposition to anxiety determined by his or her personality and estimates how a person generally feels. The STAI-S measures an individual's transitory emotional response to a stressful situation. Cutoff scores of 31.8 or greater and 32.2 or greater indicate high levels of trait and state anxiety, respectively. The STAI-T and STAI-S have well-established validity and reliability (Bieling, Antony, & Swinson, 1998; Kennedy, Schwab, Morris, & Beldia, 2001; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). In the current study, the Cronbach alpha for the STAI-T and STAI-S were 0.92 and 0.95, respectively.

The Center for Epidemiological Studies–Depression scale (CES-D) consists of 20 items selected to represent the major symptoms in the clinical syndrome of depression as experienced during the past week. Scores can range from 0–60, with scores of 16 or greater indicating the need for individuals to seek clinical evaluation for major depression. The CES-D has well-established concurrent and construct validity (Carpenter et al., 1998; Radloff, 1977; Sheehan, Fifield, Reisine, & Tennen, 1995). In the current study, the Cronbach alpha for the CES-D was 0.88.

QOL was measured using the Multidimensional QOL Scale–Patient Version (MQOLS–PV) (Padilla et al., 1983; Padilla, Ferrell, Grant, & Rhiner, 1990). The MQOLS-PV is a 41-item instrument that measures four dimensions of QOL (physical well-being, psychological well-being, social well-being, and spiritual well-being) experienced at the present time in patients with cancer, as well as a total QOL score. Each item is rated on a 0–10 NRS, with higher scores indicating a better QOL. The MQOLS-PV has established validity and reliability (Ferrell, 1995; Ferrell, Dow, & Grant, 1995; Padilla et al., 1983, 1990). In the current study, the Cronbach alpha for the MQOLS-PV total score was 0.94. The total QOL score, which is a mean of the 41 items, was used in subsequent analyses.

Procedures

The current study was approved by the Committee on Human Research at the University of California, San Francisco and by the institutional review board at the second site. At the time of the simulation visit (about one week prior to the initiation of RT), patients were approached by a research nurse to discuss participation in the study. After obtaining written informed consent, patients completed the enrollment questionnaires. Medical records were reviewed for disease and

Table 1. Sample Characteristics by Gender at the Initiation of Radiation Therapy (N = 185)

	Women (n = 89)		Men (n = 96)		
Characteristic	**$\bar{X}$**	**SD**	**$\bar{X}$**	**SD**	**p**
Age (years)	54.7	11.9	66	9.4	< 0.001
Education (years)	16.2	2.7	15.9	3.2	0.434
KPS	87.4	12.6	93.8	9.8	< 0.001
Comorbidities	5	2.5	4.6	2.5	0.298
Characteristic	**n**	**%**	**n**	**%**	**p**
Married or partnered					< 0.001
Yes	35	39	68	71	
No	51	57	28	29	
No response	3	3	–	–	
Lives alone					0.026
Yes	34	38	22	23	
No	55	62	74	77	
Race					0.622
Caucasian	61	69	71	74	
Non-Caucasian	26	29	25	26	
No response	2	2	–	–	
Employed					1
Yes	38	43	41	43	
No	49	55	51	53	
No response	2	2	4	4	
Children at home					0.025
Yes	20	22	9	9	
No	61	69	73	76	
No response	8	9	14	15	
Parent at home					0.117
Yes	6	7	1	1	
No	76	85	79	82	
No response	7	8	16	17	
Cancer diagnosis					< 0.001
Breast	78	88	–	–	
Prostate	–	–	82	85	
Brain	9	10	4	4	
Lung	2	2	10	10	

KPS—Karnofsky Performance Status

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

Table 2. Gender Differences in Symptom Characteristics and QOL Prior to the Initiation of Radiation Therapy

	Women (N = 89)		Men (N = 96)		
Variable	$\bar{X}$	SD	$\bar{X}$	SD	p
Average daily pain score[a, b]	3.5	2.1	3.3	1.5	0.667
Pain interference[b]	2.8	2.2	3.6	2.3	0.15
Trait anxiety	36.3	11.3	32.4	8.7	0.011
State anxiety	34.3	13	29.1	8.5	0.002
Depression	12.4	9.4	7.1	7.2	< 0.001
Sleep disturbance	45.2	21.5	35.5	17.1	0.001
Fatigue (evening)	4.9	1.8	3.7	2.1	< 0.001
Fatigue (morning)	2.9	2	1.9	1.8	0.001
Energy (evening)	4.1	1.7	4.8	1.9	0.008
Energy (morning)	5.2	1.8	6.2	2	0.001
Attentional function	6.6	1.9	7.4	1.6	0.001
QOL (total)	6.2	1.6	7.2	1.3	< 0.001
QOL (physical)	7.5	1.9	8.7	1.4	< 0.001
QOL (psychological)	5.7	2.1	7.2	1.7	< 0.001
QOL (social)	6.4	2.5	7.7	1.9	< 0.001
QOL (spiritual)	5.5	2.1	5.1	2.1	0.252

[a] Pain was reported in 42 (48%) women and 27 (28%) men (p = 0.006).

[b] Of those experiencing pain, 39 women and 25 men completed these items.

QOL—quality of life

treatment information. Of 472 patients approached, 185 (39%) consented to participate. The major reasons for refusal were being too overwhelmed with the cancer experience or being too busy. No differences were found in any demographic or clinical characteristics between patients who did and did not choose to participate.

Data Analysis

Data were analyzed using SPSS®, version 22.0. Descriptive statistics and frequency distributions were generated on the sample characteristics. Independent samples t-tests and Fisher's exact analyses were conducted to evaluate for gender differences in demographic, clinical, and symptom characteristics, as well as subscale and total QOL scores. Pearson's correlations were performed separately for each gender group to examine the relationships between total QOL score and 20 selected demographic, clinical, and symptom characteristics. These characteristics were selected based on research evidence and the authors' clinical experience and included age, education, KPS score, race (with Caucasian as the referent), living alone, marital status, number of comorbid conditions, working for pay, caring for children at home, caring for an older parent at home, trait anxiety score, state anxiety score, CES-D score, morning and evening fatigue scores, morning and evening energy scores, total AFI score, total GSDS score, and the presence of pain. All of these characteristics were entered into separate backwards elimination regression analyses for each gender group to determine predictors of the total QOL score.

Results

Gender Differences in Demographic and Clinical Characteristics

Gender differences in demographic and clinical characteristics at enrollment are listed in Table 1. Women were significantly younger and had a lower KPS score. In addition, a higher percentage of women lived alone, were not married or partnered, and had children living at home.

Gender Differences in Symptom and Quality-of-Life Scores

Gender differences in symptom and QOL scores are shown in Table 2. Women reported significantly higher state and trait anxiety, depressive symptoms, sleep disturbance, and evening and morning fatigue scores, as well as lower morning energy and attentional function scores. In addition, more women reported having pain and, except for the spiritual well-being subscale score, women reported lower subscale and total MQOLS-PV scores.

Gender Differences in Predictors of Quality of Life

The final predictive models for the total MQOLS-PV score for women and men are displayed in Tables 3 and 4, respectively. The total percentage of explained variance in QOL was large for women (64%) and men (70%). The actual predictors of QOL and their unique contributions to the variability in QOL differed by gender. Women who were younger, had lower KPS scores, were not caring for children at home, and had higher depressive symptom scores had lower total MQOLS-PV

Table 3. Effect of Selected Characteristics on Women's Total QOL Scores Prior to Initiation of Radiation Therapy (N = 89)

Characteristic	R^2	r	β	R^2–Change (sr^2)	p
Overall	0.64	–	–	–	< 0.001
Age (years)	–	0.4	0.279	0.068	0.001
KPS	–	0.55	0.313	0.085	< 0.001
Have children	–	0.4	0.208	0.038	0.009
CES-D score	–	–0.58	–0.469	0.198	< 0.001

CES-D—Center for Epidemiological Studies–Depression; KPS—Karnofsky Performance Status; QOL—quality of life scores. The depressive symptom score made the largest independent contribution to the explained variance in the women's QOL score at 20%.

Men who were younger and non-Caucasian, had more comorbidities, had higher state anxiety scores, and had higher depressive symptom scores had lower total MQOLS-PV scores. The depressive symptom score made the largest independent contribution to the explained variance in the men's QOL score at 9%, followed by state anxiety at 7%.

Discussion

To the researchers' knowledge, the current study is the first to examine gender differences in the predictors of QOL of patients with cancer using a broad array of demographic, clinical, and symptom characteristics in a relatively large sample of men and women. Consistent with previous reports (Cherepanov et al., 2010; Dodd et al., 2011; Hagelin et al., 2006; Hjermstad, Fayers, Bjordal, & Kaasa, 1998; Juul et al., 2014; Miaskowski et al., 2014; Pud, 2011; Zimmermann et al., 2011), women reported significantly lower physical, psychological, and social subscale, as well as total QOL, scores.

For both gender groups, the regression models explained a large amount of the variance in total QOL scores. Although age and CES-D score were the two characteristics retained in the final models for both genders, the CES-D score in women explained the largest amount of the variance in their total QOL scores (20%) but contributed only 9% to the men's total QOL scores. The researchers' findings are consistent with Pud (2011), who found that depression made the largest independent contribution to the amount of explained variance in QOL in both genders. However, in contrast with the current study, Pud (2011) found that the CES-D score explained a greater percentage of the total variance in QOL in men (39%) than women (33%). This difference may be explained partially by the fact that the sample of men was relatively small (n = 34), the CES-D scores were considerably higher in both gender groups than in the current study, and only two predictors were entered into the regression models. The researcher and many others have reported that higher depressive symptoms were associated with a lower QOL (Bower, 2008; Brown & Roose, 2011; Dodd et al., 2011; Dunn et al., 2011; Fann et al., 2008; Miaskowski et al., 2014; Osann et al., 2014; Pud, 2011; Pulgar, Alcalá, & Reyes del Paso, 2013; Roland, Rodriguez, Patterson, & Trivers, 2013) and other adverse outcomes, including reduced adherence to treatment and other health behaviors (DiMatteo, Lepper, & Croghan, 2000) and increased perception of pain and other symptoms (Dunn et al., 2011; Fann et al., 2008; Gaston-Johansson, Ohly, Fall-Dickson, Nanda, & Kennedy, 1999; Huang, Chen, Liang, & Miaskowski, 2014). The researchers' findings reinforce the need for clinicians to assess for and treat depressive symptoms in patients with cancer at the beginning of RT.

Table 4. Effect of Selected Characteristics on Men's Total QOL Scores Prior to Initiation of Radiation Therapy (N = 96)

Characteristic	R^2	r	β	R^2–Change (sr^2)	p
Overall	0.7	–	–	–	< 0.001
Age (years)	–	0.31	0.183	0.031	0.004
Caucasian	–	0.13	0.183	0.033	0.003
Number of comorbidities	–	–0.3	–0.21	0.041	0.001
State anxiety score	–	–0.69	–0.363	0.07	< 0.001
CES-D score	–	–0.73	–0.414	0.089	< 0.001

CES-D—Center for Epidemiological Studies–Depression; QOL—quality of life

Age accounted for more than twice the explained variance in the QOL of women as compared to men in the researchers' sample, which is consistent with other population-based (Cherepanov et al., 2010; Hjermstad et al., 1998; Juul et al., 2014) and clinical studies (Pashos et al., 2013; Zimmerman et al., 2011) that found that even as men age, they report better QOL than women.

In the current study, older age predicted higher QOL in both gender groups, which is consistent with previous findings in a variety of clinical populations (Brown & Roose, 2011; Hopman et al., 2009; McNaughton et al., 2001), including individuals with cancer (Hagelin et al., 2006; Mor et al., 1994; Pashos et al., 2013; Popovic et al., 2013; Roland et al., 2013; Wan, Counte, & Cella, 1997; Wong et al., 2013; Zimmerman et al., 2011). The explanation for this finding is unclear but could be because of the fact that older adults are less likely than younger people to have family and job responsibilities, which partially may lessen the trauma and burden of a potentially life-threatening illness (Mor et al., 1994.). Other possible explanations for the higher QOL in older adults are that older adults may be receiving less aggressive treatment; they may have more coping strategies and resources to be able to manage a long-term, life-threatening illness (Leak et al., 2013; Wenzel et al., 1999); and they may experience a "response shift" in their reports of QOL in such a way that they are more accepting of changes in function and symptoms (Jiao, Vincent, Cha, Luedtke, & Oh, 2014; Wan et al., 1997). Additional studies are needed to clarify the relationships between older age and QOL.

Caring for children at home was a unique predictor of higher QOL in women, contributing to 4% of the total variance. Caring for children may help buffer some of the impact of coping with cancer and its treatment, possibly by providing a sense of purpose. Having children at home also may be a marker of social support more broadly. However, in an earlier analysis (Dhruva et al., 2010) of the breast cancer subset of the current sample, the researchers found that caring for children at home predicted higher levels of evening fatigue at the initiation of RT. The relationship between caring for children at home and women's QOL and fatigue is complex, and additional studies are needed to clarify it.

The unique predictors of lower total QOL scores in men were being non-Caucasian, having a higher number of comorbidities, and having higher state anxiety. The association of being non-Caucasian with having poorer QOL is consistent with other population-based (Luncheon & Zack, 2012) and clinical studies (Paxton et al., 2012; Powe et al., 2007; Quittner et al., 2010; Smith et al., 2013). This relationship may be related to multiple factors, including lower income, limited access to and culturally appropriate health care, advanced stages of cancer at the time of diagnosis, higher levels of stress, differences in health behaviors, and differences in perceptions of chronic illness (Powe et al., 2007; Quittner et al., 2010; Smith et al., 2013).

Consistent with a population-based study (Juul et al., 2014), as well as studies of patients with chronic medical conditions (Heo et al., 2014; Hopman et al., 2009; Lopez-Espuela et al., 2014; Smith et al., 2013), a higher number of comorbidities was associated with poorer QOL in the male patients in the current study. The number of comorbidities in the women in the researchers' sample was not significantly different from the men, but this characteristic was not associated with QOL in the women. Because the men's functional status was in the highly functional range (i.e., KPS score greater than 90) and significantly higher than the women's in the current study, the effect of comorbidities on men's QOL may have been mediated through their state anxiety or depressive symptoms, or some other characteristics that were not measured. An analysis of differences in the specific comorbid conditions reported by men and women found that the only differences were that a higher proportion of women had kidney, bladder, or urinary problems; skin problems such as psoriasis and eczema; and osteoporosis.

State anxiety as a predictor of poorer QOL in the men is somewhat surprising in that the men's STAI-S scores did not exceed the clinically meaningful cutoff score for state anxiety. However, the correlation coefficient for state anxiety in the regression model was –0.69, which indicates a fairly strong negative association with QOL. Also, the men's trait and state anxiety scores were significantly lower than the women's, but anxiety did not contribute to the explained variance in QOL in the women. The reasons for this paradox are unclear but may be explained partially by the fact that men often under-report the occurrence and severity of anxiety (Egloff & Schmukle, 2004; Feingold, 1994), and the expression of anxiety may be demonstrated in their lower QOL. Larger studies would confirm or refute this finding.

A number of demographic, clinical, and symptom characteristics did not predict QOL in the men or women, but bivariate analysis indicated a number of significant differences between the gender groups. A lower percentage of women were married or partnered, and a higher proportion lived alone. These two findings suggest that women in the current study experienced less social support, which was associated with a lower QOL by others (Brix et al., 2008; Osann et al., 2014; Parker et al., 2003; Roland et al., 2013). In addition, when the researchers compared responses to the single item that assesses social support on the MQOLS-PV (i.e., "Is the amount of support you receive from others sufficient to meet your needs?"), women reported a significantly lower score on this item than the men (8.4 [SD = 2.1] versus 9 [SD = 1.6], respectively; p = 0.03), which suggests that they perceived an inadequate amount of social support. A more specific measure of social support would provide insights into this characteristic in additional studies.

When compared to men, the women's symptom profile was significantly worse, although neither gender group exceeded the cutoff scores for most of the symptom scales. The exceptions were that women scored below the clinically meaningful cutoff for morning energy (indicating low morning energy levels) and slightly exceeded the cutoff scores for sleep disturbance and trait and state anxiety. The women's lower level of morning energy may be explained partially by their higher levels of sleep disturbance.

Interestingly, neither morning nor evening fatigue scores predicted QOL in either gender group. In contrast, using the same fatigue measure as the researchers did, Pud (2011) found that higher levels of fatigue were associated with poorer QOL in women but not in men. However, a direct comparison between these findings cannot be made because Pud did not evaluate for diurnal variation in fatigue severity, while the researchers in the current study evaluated fatigue severity upon awakening and before going to bed. The reason fatigue did not predict QOL in the current study may be because of the relatively low levels of morning and evening fatigue reported by the patients prior to the initiation of RT.

Neither gender group exceeded the clinically meaningful cutoff score for the CES-D. However, the women's mean score (12.4 [SD = 9.4]) approached the cutoff of 16, which suggests a subsyndromal level of depressive symptoms (i.e., depressive symptoms below the threshold for depression) (Dunn et al., 2013).

Subsyndromal depression was associated with lower functional status, higher state and trait anxiety (Dunn et al., 2011), and lower QOL (Das-Munshi et al., 2008; Forsell, 2007; Judd, Paulus, Wells, & Rapaport, 1996). Although the men's mean CES-D score (7.1 [SD = 7.2]) was considerably lower, it did predict QOL in this group as well. A post-hoc analysis found that 11% of the men and 35.6% of the women had CES-D scores of 16 or greater.

Both groups reported a moderate level of attentional function, indicating that some deficits exist in the ability to direct attention to a particular thought or task. However, the men's score (7.4) was only slightly below the cutoff for high functioning (greater than 7.5). In addition, more women reported having pain, although no differences in average or worst pain or pain interference scores were found between men and women. Many studies found that women report higher occurrence rates and higher severity scores for a variety of common symptoms associated with cancer and its treatment (Dodd et al., 2011; Grant et al., 2011; Hagelin et al., 2006; Miaskowski et al., 2014; Zimmerman et al., 2011).

Limitations of the current study include that the primary reasons for patients' refusal to participate were being overwhelmed with their cancer experience or being too busy. Although no differences were found in any demographic or clinical characteristics between patients who did and did not choose to participate, one can speculate that the patients who refused were experiencing more severe symptoms with worse functional status and poorer QOL, which could have been differentially distributed across the genders and altered the predictors of QOL.

Because 88% of the women in this sample had breast cancer and 85% of the men had prostate cancer, the researchers could not determine whether the differences in the predictors of QOL were because of gender and not cancer diagnosis. Additional studies will need to determine the answer to this question using cancer diagnoses that occur in men and women. Because the sample was primarily Caucasian and well educated, the findings can be generalized only to this population. Because previous studies found that race and education are predictors of QOL (Luncheon & Zack, 2012; Mielck et al., 2014; Paxton et al., 2012; Powe et al., 2007; Quittner et al., 2010; Smith et al., 2013), additional studies need to examine gender differences in the predictors of QOL in larger, more racially and educationally diverse samples. In addition, the researchers did not collect data on the medications patients were taking for their symptoms. Therefore, symptom severity scores may have been affected by medications that may have diminished their effect on QOL. Although a large amount of the total variances in QOL were explained in the current study, 36% of the variance in women and 30% of the variance in men remain unexplained. Additional studies need to explore more variables that could affect QOL differentially across genders, such as gender roles (Norris et al., 2010), optimism, coping and adjustment (Chambers et al., 2011; Roland et al., 2013), resilience (Strauss et al., 2007), and social support.

Knowledge Translation

All patients need to be evaluated for depression at the initiation of radiation therapy (RT).

Patients who are depressed and younger; women with lower functional status; and men who are anxious, have more comorbidities, and are members of a racial or ethnic minority should be assessed for decrements in quality of life (QOL) at the initiation of RT.

Knowledge of the different predictors of QOL in women and men can be used to develop gender-specific interventions to prevent decrements in QOL.

Conclusions and Implications for Nursing Practice

Despite its limitations, the current study is the first to evaluate for gender differences in the predictors of QOL using a broad array of demographic, clinical, and symptom characteristics. The percentage of explained variance in QOL was large for women and men. The actual predictors of QOL and their relative contributions to the variability in QOL differed by gender. Women who were younger, had lower KPS scores, had no children at home, and reported higher levels of depressive symptoms reported a lower total QOL. Depression made the largest independent contribution to the total amount of explained variance in the women's QOL. Men who were younger and non-Caucasian, had more comorbidities, had higher state anxiety, and had more depressive symptoms had lower total QOL scores. Depression made the largest independent contribution to the total amount of explained variance in the men's QOL, followed by state anxiety.

QOL and the predictors previously noted should be included in the nurse's initial assessment of patients at the beginning of RT. For clinical purposes, patients' QOL can be assessed by whatever instrument is used in the setting or by using the single item from the Edmonton Symptom Assessment System (Bush et al., 2010). This item asks patients to rate their sense of well-being using a 0–10 scale, where 0 indicates "best feeling of well-being" and 10 represents "the worst possible feeling of well-being."

A tool specific for depression should be administered to all patients—either one that is used in the setting already, or another, such as the CES-D, with appropriate referral for additional evaluation and treatment if needed. Similarly, evaluation of anxiety in men with appropriate follow-up also is necessary. The presence of comorbidities in men and lowered functional status in women may require additional support or assistance in the home. Referral to cancer or RT support groups designed for younger patients of both genders may assist these patients in developing coping strategies and learning about other helpful resources. Nurses can be instrumental in developing racially and culturally appropriate teaching materials and resources for men of racial or ethnic minority groups.

Claudia West, RN, MS, is a clinical professor emerita and Steven M. Paul, PhD, is a principal statistician, both in the School of Nursing at the University of California, San Francisco (UCSF); Laura Dunn, MD, is an associate professor of psychiatry and Anand Dhruva, MD, is an associate professor of medicine, both in the School of Medicine at UCSF; John Merriman, RN, PhD, is a postdoctoral scholar in the School of Nursing at the University of Pittsburgh in Pennsylvania; and Christine Miaskowski, RN, PhD, FAAN, is a professor in the School of Nursing at UCSF. This research was supported by grants from the National Institute of Nursing Research (NR04835) and the National Cancer Institute (K05 CA168960). Miaskowski is funded by the American Cancer Society as a clinical research professor. Merriman was supported by a National Institute of Nursing Research T32, Interdisciplinary Training of Nurse Scientists in Cancer Survivorship Research (TNR011972A). Miaskowski can be reached at chris.miaskowski@nursing.ucsf.edu, with copy to editor at ONFEditor@ons.org. (Submitted December 2014. Accepted for publication March 15, 2015.)

References

Bieling, P.J., Antony, M.M., & Swinson, R.P. (1998). The State-Trait Anxiety Inventory, Trait version: Structure and content re-examined. *Behaviour Research and Therapy, 36,* 777–788. doi:10.1016/S0005-7967(98)00023-0

Bower, J.E. (2008). Behavioral symptoms in patients with breast cancer and survivors: Fatigue, insomnia, depression, and cognitive disturbance. *Journal of Clinical Oncology, 26,* 768–777. doi:10.1200/JCO.2007.14.3248

Brix, C., Schleussner, C., Füller, J., Roehrig, B., Wendt, T.G., & Strauss, B. (2008). The need for psychosocial support and its determinants in a sample of patients undergoing radiooncological treatment of cancer. *Journal of Psychosomatic Research, 65,* 541–548. doi:10.1016/j.jpsychores.2008.05.010

Brown, P.J., & Roose, S.P. (2011). Age and anxiety and depressive symptoms: The effect on domains of quality of life. *International Journal of Geriatric Psychiatry, 26,* 1260–1266. doi:10.1002/gps.2675

Bush, S.H., Parsons, H.A., Palmer, J.L., Li, Z., Chacko, R., & Bruera, E. (2010). Single- vs. multiple–item instruments in the assessment of quality of life in patients with advanced cancer. *Journal of Pain and Symptom Management, 39,* 564–571. doi:10.1016/j.jpainsymman.2009.08.006

Bushnell, C.D., Reeves, M.J., Zhao, X., Pan, W., Prvu-Bettger, J., Zimmer, L., . . . Peterson, E. (2014). Sex differences in quality of life after ischemic stroke. *Neurology, 82,* 922–931.

Carpenter, J.S., Andrykowski, M.A., Wilson, J., Hall, L.A., Rayens, M.K., Sachs, B., & Cunningham, L.L. (1998). Psychometrics for two short forms of the Center for Epidemiologic Studies-Depression Scale. *Issues in Mental Health Nursing, 19,* 481–494.

Chambers, S.K., Meng, X., Youl, P., Aitken, J., Dunn, J., & Baade, P. (2011). A five-year prospective study of quality of life after colorectal cancer. *Quality of Life Research, 21,* 1551–1564. doi:10.1007/s11136-011-0067-5

Cherepanov, D., Palta, M., Fryback, D.G., & Robert, S.A. (2010). Gender differences in health-related quality-of-life are partly explained by sociodemographic and socioeconomic variation between adult men and women in the US: Evidence from four US nationally representative data sets. *Quality of Life Research, 19,* 1115–1124. doi:10.1007/s11136-010-9673-x

Cimprich, B. (1992). Attentional fatigue following breast cancer surgery. *Research in Nursing and Health, 15,* 199–207. doi:10.1002/nur.4770150306

Cimprich, B., So, H., Ronis, D.L., & Trask, C. (2005). Pre-treatment factors related to cognitive functioning in women newly diagnosed with breast cancer. *Psycho-Oncology, 14,* 70–78. doi:10.1002/pon.821

Cimprich, B., Visovatti, M., & Ronis, D.L. (2011). The Attentional Function Index—A self-report cognitive measure. *Psycho-Oncology, 20,* 194–202. doi:10.1002/pon.1729

Das-Munshi, J., Goldberg, D., Bebbington, P.E., Bhugra, D.K., Brugha, T.S., Dewey, M.E., . . . Prince, M. (2008). Public health significance of mixed anxiety and depression: Beyond current classification. *British Journal of Psychiatry, 192,* 171–177. doi:10.1192/bjp.bp.107.036707

Dhruva, A., Dodd, M., Paul, S.M., Cooper, B.A., Lee, K., West, C., . . . Miaskowski, C. (2010). Trajectories of fatigue in patients with breast cancer before, during, and after radiation therapy. *Cancer Nursing, 33,* 201–212. doi:10.1097/NCC.0b013e3181c75f2a

DiMatteo, M.R., Lepper, H.S., & Croghan, T.W. (2000). Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Archives of Internal Medicine, 160,* 2101–2107.

Dodd, M.J., Cho, M.H., Cooper, B.A., Petersen, J., Bank, K.A., Lee, K.A., & Miaskowski, C. (2011). Identification of latent classes in patients who are receiving biotherapy based on symptom experience and its effect on functional status and quality of life. *Oncology Nursing Forum, 38,* 33–42. doi:10.1188/11.ONF.33-42

Dunn, L.B., Aouizerat, B.E., Langford, D.J., Cooper, B.A., Dhruva, A., Cataldo, J.K., . . . Miaskowski, C. (2013). Cytokine gene variation is associated with depressive symptom trajectories in oncology patients and family caregivers. *European Journal of Oncology Nursing, 17,* 346–353. doi:10.1016/j.ejon.2012.10.004

Dunn, L.B., Cooper, B.A., Neuhaus, J., West, C., Paul, S. Aouizerat, B., . . . Miaskowski, C. (2011). Identification of distinct depressive symptom trajectories in women following surgery for breast cancer. *Health Psychology, 30,* 683–692. doi:10.1037/a0024366

Efficace, F., Bottomley, A., Coens, C., Van Steen, K., Conroy, T., Schöffski, P., . . . Köhne, C.H. (2006). Does a patient's self-reported health-related quality of life predict survival beyond key biomedical data in advanced colorectal cancer? E*uropean Journal of Cancer, 42,* 42–49. doi:10.1016/j.ejca.2005.07.025

Egloff, B., & Schmukle, S.C. (2004). Gender differences in implicit and explicit anxiety measures. *Personality and Individual Differences, 36,* 1807–1815. doi:10.1016/j.paid.2003.07.002

Fann, J.R., Thomas-Rich, A.M., Katon, W.J., Cowley, D., Pepping, M., McGregor, B.A., & Gralow, J. (2008). Major depression after breast cancer: A review of epidemiology and treatment. *General Hospital Psychiatry, 30,* 112–126. doi:10.1016/j.genhosppsych.2007.10.008

Feingold, A. (1994). Gender differences in personality: A meta-analysis. *Psychological Bulletin, 116,* 429–456.

Ferrell, B.R. (1995). The impact of pain on quality of life. A decade of research. *Nursing Clinics of North America, 30,* 609–624.

Ferrell, B.R., Dow, K.H., & Grant, M.M. (1995). Measurement of the quality of life in cancer survivors. *Quality of Life Research, 4,* 523–531. doi:10.1007/BF00634747

Fletcher, B.S., Paul, S.M., Dodd, M.J., Schumacher, K., West, C., Cooper, B., . . . Miaskowski, C.A. (2008). Prevalence, severity, and impact of symptoms on female family caregivers of patients at the initiation of radiation therapy for prostate cancer. *Journal of Clinical Oncology, 26,* 599–605. doi:10.1200/JCO.2007.12.2838

Forsell, Y. (2007). A three-year follow-up of major depression, dysthymia, minor depression and subsyndromal depression: Results from a population-based study. *Depression and Anxiety, 24,* 62–65. doi:10.1002/da.20231

Gaston-Johansson, F., Ohly, K.V., Fall-Dickson, J.M., Nanda, J.P., & Kennedy, M.J. (1999). Pain, psychological distress, health status, and coping in patients with breast cancer scheduled for autotransplantation. *Oncology Nursing Forum, 26,* 1337–1345.

Gay, C.L., Lee, K.A., & Lee, S.Y. (2004). Sleep patterns and fatigue in new mothers and fathers. *Biological Research for Nursing, 5,* 311–318. doi:10.1177/1099800403262142

Gotay, C.C., Kawamoto, C.T., Bottomley, A., & Efficace, F. (2008). The prognostic significance of patient-reported outcomes in cancer clinical trials. *Journal of Clinical Oncology, 26,* 1355–1363. doi:10.1200/JCO.2007.13.3439

Grant, M., McMullen, C.K., Altshuler, A., Mohler, M.J., Hornbrook, M.C., Herrinton, L.J., . . . Krouse, R.S. (2011). Gender differences in quality of life among long-term colorectal cancer survivors with ostomies. *Oncology Nursing Forum, 38,* 587–596. doi:10.1188/11.ONF.587-596

Hagelin, C.L., Seiger, A., & Fürst, C.J. (2006). Quality of life in terminal care—With special reference to age, gender and marital status. *Supportive Care in Cancer, 14,* 320–328. doi:10.1007/s00520-005-0886-4

Heo, S., Lennie, T.A., Moser, D.K., & Kennedy, R.L. (2014). Types of social support and their relationships to physical and depressive symptoms and health-related quality of life in patients with heart failure. *Heart and Lung, 43,* 299–305.

Hinz, A., Singer, S., & Brähler, E. (2014). European reference values for the quality of life questionnaire EORTC QLQ-C30: Results of a German investigation and a summarizing analysis of six European general population normative studies. *Acta Oncologica, 53,* 958–965. doi:10.3109/0284186X.2013.879998

Hjermstad, M.J., Fayers, P.M., Bjordal, K., & Kaasa, S. (1998). Health-related quality of life in the general Norwegian population assessed by the European Organization for Research and Treatment of Cancer Core Quality-of-Life Questionnaire: The QLQ-C30 (+3). *Journal of Clinical Oncology, 16,* 1188–1196.

Hopman, W.M., Harrison, M.B., Coo, H., Friedberg, E., Buchanan, M., & VanDenKerkhof, E.G. (2009). Associations between chronic disease, age, and physical and mental health status. *Chronic Diseases in Canada, 29,* 108–116.

Huang, H.P., Chen, M.L., Liang, J., & Miaskowski, C. (2014). Changes in and predictors of severity of fatigue in women with breast cancer: A longitudinal study. *International Journal of Nursing Studies, 51,* 582–592. doi:10.1016/j.ijnurstu.2013.09.003

Izadnegahdar, M., Norris, C., Kaul, P., Pilote, L., & Humphries, K.H. (2014). Basis for sex-dependent outcomes in acute coronary syndrome. *Canadian Journal of Cardiology, 30,* 713–720. doi:10.1016/j.cjca.2013.08.020

Jansen, C.E., Dodd, M.J., Miaskowski, C.A., Dowling, G.A., & Kramer, J. (2008). Preliminary results of a longitudinal study of changes in cognitive function in breast cancer patients undergoing chemotherapy with doxorubicin and cyclophosphamide. *Psycho-Oncology, 17,* 1189–1195. doi:10.1002/pon.1342

Jensen, M.P. (2003). The validity and reliability of pain measures in adults with cancer. *Journal of Pain, 4,* 2–21. doi:10.1054/jpai.2003.1

Jiao, J., Vincent, A., Cha, S.S., Luedtke, C.A., & Oh, T.H. (2014). Relation of age with symptom severity and quality of life in patients with fibromyalgia. *Mayo Clinic Proceedings, 89,* 199–206. doi:10.1016/j.mayocp.2013.09.021

Jordhoy, M.S., Fayers, P., Loge, J.H., Saltnes, T., Ahiner-Elmqvist, M., & Kaasa, S. (2001). Quality of life in advanced cancer patients: The impact of sociodemographic and medical characteristics. *British Journal of Cancer, 85,* 1478–1485. doi:10.1054/bjoc.2001.2116

Judd, L.L., Paulus, M.P., Wells, K.B., & Rapaport, M.H. (1996). Socioeconomic burden of sybsyndromal depressive symptoms and major depression in a sample of the general population. *American Journal of Psychiatry, 153,* 1411–1417. doi:10.1176/ajp.153.11.1411

Juul, T., Petersen, M.A., Holzner, B., Laurberg, S., Christensen, P., & Grønvold, M. (2014). Danish population-based reference data for the EORTC QLQ-C30: Associations with gender, age and morbidity. *Quality of Life Research, 23,* 2183–2193. doi:10.1007/s11136-014-0675-y

Karnofsky, D. (1977). Performance scale. In G.T. Kennealey & M.S. Mitchell (Eds.), *Factors that influence the therapeutic response in cancer: A comprehensive treatise* (pp. 97–101). New York, NY: Plenum Press.

Karnofsky, D.A., Abelmann, W.H., Craver, L.F., & Burchenal, J.H. (1948). The use of nitrogen mustards in the palliative treatment of carcinoma. *Cancer, 1,* 634–656.

Kennedy, B.L., Schwab, J.J., Morris, R.L., & Beldia, G. (2001). Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *Psychiatric Quarterly, 72,* 263–276. doi:10.1023/A:1010305200087

Leak, A., Smith, S.K., Crandell, J., Jenerette, C., Bailey, D.E., Zimmerman, S., & Mayer, D.K. (2013). Demographic and disease characteristics associated with non-Hodgkin lymphoma survivors' quality of life: Does age matter? *Oncology Nursing Forum, 40,* 157–162. doi:10.1188/13.ONF.157-162

Lee, K.A. (1992). Self-reported sleep disturbances in employed women. *Sleep, 15,* 493–498.

Lee, K.A., & DeJoseph, J.F. (1992). Sleep disturbances, vitality, and fatigue among a select group of employed childbearing women. *Birth, 19,* 208–213. doi:10.1111/j.1523-536X.1992.tb00404.x

Lee, K.A., Hicks, G., & Nino-Murcia, G. (1991). Validity and reliability of a scale to assess fatigue. *Psychiatry Research, 36,* 291–298. doi:10.1016/0165-1781(91)90027-M

Lee, K.A., Portillo, C.J., & Miramontes, H. (1999). The fatigue experience for women with human immunodeficiency virus. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 28,* 193–200. doi:10.1111/j.1552-6909.1999.tb01984.x

Lisspers, K., Ställberg, B., Janson, C., Johansson, G., & Svärdsudd, K. (2013). Sex-differences in quality of life and asthma control in Swedish asthma patients. *Journal of Asthma, 50,* 1090–1095. doi:10.3109/02770903.2013.834502

Lopez-Espuela, F., Zamorano, J.D., Ramírez-Moreno, J.M., Jiménez-Caballero, P.E., Portilla-Cuenca, J.C., Lavado-García, J.M., & Casado-Naranjo, I. (2014). Determinants of quality of life in stroke survivors after 6 months, from a comprehensive stroke unit: A longitudinal study. *Biological Research for Nursing*. [Epub ahead of print]. doi:10.1177/1099800414553658

Luncheon, C., & Zack, M. (2012). Health-related quality of life among US veterans and civilians by race and ethnicity. *Preventing Chronic Disease, 9,* 110138. doi:10.5888/pcd9.110138

McNaughton Collins, M., Pontari, M.A., O'Leary, M.P., Calhoun, E.A., Santanna, J., Landis, J.R., . . . Litwin, M.S. (2001). Quality of life is impaired in men with chronic prostatitis: The Chronic Prostatitis Collaborative Research Network. *Journal of General Internal Medicine, 16,* 656–662. doi:10.1111/j.1525-1497.2001.01223.x

Miaskowski, C., Cooper, B.A., Melisko, M., Chen L.M., Mastick, J., West, C., . . . Aouizerat, B.E. (2014). Disease and treatment characteristics do not predict symptom occurrence profiles in oncology outpatients receiving chemotherapy. *Cancer, 120,* 2371–2378. doi:10.1002/cncr.28699

Miaskowski, C., Cooper, B.A., Paul, S.M., Dodd, M., Lee, K., Aouizerat, B.E., . . . Bank, A. (2006). Subgroups of patients with cancer with different symptom experiences and quality-of-life outcomes: A cluster analysis [Online exclusive]. *Oncology Nursing Forum, 33,* E79–E89. doi:10.1188/06.ONF.E79-E89

Miaskowski, C., Lee, K., Dunn, L., Dodd, M., Aouizerat, B.E., West, C., . . . Swift, P. (2011). Sleep-wake circadian activity rhythm parameters and fatigue in oncology patients before the initiation of radiation therapy. *Cancer Nursing, 34,* 255–268. doi:10.1097/NCC.0b013e3181f65d9b

Miaskowski, C., & Lee, K.A. (1999). Pain, fatigue, and sleep disturbances in oncology outpatients receiving radiation therapy for bone metastasis: A pilot study. *Journal of Pain Symptom Management, 17,* 320–332. doi:10.1016/S0885-3924(99)00008-1

Miaskowski, C., Paul, S.M., Cooper, B.A., Lee, K., Dodd, M., West, C., . . . Wara, W. (2008). Trajectories of fatigue in men with prostate cancer before, during, and after radiation therapy. *Journal of Pain and Symptom Management, 35,* 632–643. doi:10.1016/j.jpainsymman.2007.07.007

Mielck, A., Vogelmann, M., & Leidl, R. (2014). Health-related quality of life and socioeconomic status: Inequalities among adults with a chronic disease. *Health and Quality of Life Outcomes, 12,* 58.

Mor, V., Allen, S., & Malin, M. (1994). The psychosocial impact of cancer on older versus younger patients and their families. *Cancer, 74*(7 Suppl.), 2118–2127.

Norris, C.M., Murray, J.W., Triplett, L.S., & Hegadoren, K.M. (2010). Gender roles in persistent sex differences in health-related quality-of-life outcomes of patients with coronary artery disease. *Gender Medicine, 7,* 330–339. doi:10.1016/j.genm.2010.07.005

Osann, K., Hsieh, S., Nelson, E.L., Monk, B.J., Chase, D., Cella, D., & Wenzel, L. (2014). Factors associated with poor quality of life among cervical cancer survivors: Implications for clinical care and clinical trials. *Gynocologic Oncology, 135,* 266–272. doi:10.1016/j.ygyno.2014.08.036

Padilla, G.V., Ferrell, B., Grant, M.M., & Rhiner, M. (1990). Defining the content domain of quality of life for cancer patients with pain. *Cancer Nursing, 13,* 108–115. doi:10.1097/00002820-199004000-00006

Padilla, G.V., Presant, C., Grant, M.M., Metter, G., Lipsett, J., & Heide, F. (1983). Quality of life index for patients with cancer. *Research in Nursing and Health, 6,* 117–126. doi:10.1002/nur.4770060305

Parker, P.A., Baile, W.F., de Moor, C.D., & Cohen, L. (2003). Psychosocial and demographic predictors of quality of life in a large sample of cancer patients. *Psycho-Oncology, 12,* 183–193. doi:10.1002/pon.635

Pashos, C.L., Flowers, C.R., Kay, N.E., Weiss, M., Lamanna, N., Farber, C., . . . Khan, Z.M. (2013). Association of health-related quality of life with gender in patients with B-cell chronic lymphocytic leukemia. *Supportive Care in Cancer, 21,* 2853–2860. doi:10.1007/s00520-013-1854-z

Paxton, R.J., Phillips, K.L., Jones, L.A., Chang, S., Taylor, W.C., Courneya, K.S., & Pierce, J.P. (2012). Associations among physical activity, body mass index, and health-related quality of life by race/ethnicity in a diverse sample of breast cancer survivors. *Cancer, 118,* 4024–4031. doi:10.1002/cncr.27389

Popovic, M., Lao, N., Zeng, L., Zhang, L., Cella, D., Beaumont, J.L., . . . Chow, E. (2013). The impact of clinical and sociodemographic features on quality of life in patients with early stage cancers using the Functional Assessment of Cancer Therapy-General Assessment tool. *Supportive Care in Cancer, 21,* 2267–2277.

Powe, B.D., Hamilton, J., Hancock, N., Johnson, N,, Finnie, R., Ko, J., . . . Boggan, M. (2007). Quality of life of African American cancer survivors: A review of the literature. *Cancer, 109*(Suppl. 2), 435–445. doi:10.1002/cncr.22358

Pud, D. (2011). Gender differences in predicting quality of life in cancer patients with pain. *European Journal of Oncology Nursing, 15,* 486–491. doi:10.1016/j.ejon.2010.12.005

Pulgar, A., Alcalá, A., & Reyes del Paso, G.A. (2013). Pyschosocial predictors of quality of life in hematological cancer. *Behavioral Medicine, 41,* 1–8. doi:10.1080/08964289.2013.833083

Quittner, A.L., Schechter, M.S., Rasouliyan, L., Haselkorn, T., Pasta, D.J., & Wagener, J.S. (2010). Impact of socioeconomic status, race, and ethnicity on quality of life in patients with cystic fibrosis in the United States. *Chest, 137,* 642–650.

Radloff, L.S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401. doi:10.1177/014662167700100306

Roland, K.B., Rodriguez, J.L., Patterson, J.R., & Trivers, K.F. (2013). A literature review of the social and psychological needs of ovarian cancer survivors. *Psycho-Oncology, 22,* 2408–2418. doi:10.1002/pon.3322

Sheehan, T.J., Fifield, J., Reisine, S, & Tennen, H. (1995). The measurement structure of the Center for Epidemiologic Studies Depression Scale. *Journal of Personality Assessment, 64,* 507–521.

Smith, M.L., Cho, J., Salazar, C.I., & Ory, M.G. (2013). Changes in quality of life indicators among Chronic Disease Self-Management Program participants: An examination by race and ethnicity. *Ethnicity and Disease, 23,* 182–188.

Spielberger, C.D., Gorsuch, R.L., Lushene, P.R., Vagg, P.R., & Jacobs, A.G. (1983). *Manual for the State-Trait Anxiety Inventory (form Y): Self-evaluation questionnaire*. Palo Alto, CA: Consulting Psychologists Press.

Strauss, B., Brix, C., Fischer, S., Leppert, K., Füller, J., Roehrig, B., . . . Wendt, T.G. (2007). The influence of resilience on fatigue in cancer patients undergoing radiation therapy (RT). *Journal of Cancer Research and Clinical Oncology, 133,* 511–518. doi:10.1007/s00432-007-0195-z

Trask, P.C., Hsu, M.A., & McQuellon, R. (2009). Other paradigms: Health-related quality of life as a measure in cancer treatment: Its importance and relevance. *Cancer Journal, 15,* 435–440.

Wan, G.J., Counte, M.A., & Cella, D.F. (1997). The influence of personal expectations on cancer patients' reports of health-related quality of life. *Psycho-Oncology, 6,* 1–11.

Wenzel, L.B., Fairclough, D.L., Brady, M.J., Cella, D. Garrett, K.M., Kluhsman, B.C., . . . Marcus, A.C. (1999). Age-related differences in the quality of life of breast carcinoma patients after treatment. *Cancer, 86,* 1768–1774.

Wong, E., Chow, E., Zhang, L., Bedard, G., Lam, K., Fairchild, A., . . . Bottomley, A. (2013). Factors influencing health related quality of life in cancer patients with bone metastases. *Journal of Palliative Medicine, 16,* 915–921. doi:10.1089/jpm.2012.0623

Zimmermann, C., Burman, D., Swami, N., Krzyzanowska, M.K., Leighl, N., Moore, M., . . . Tannock, I. (2011). Determinants of quality of life in patients with advanced cancer. *Supportive Care in Cancer, 19,* 621–629. doi:10.1007/s00520-010-0866-1